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Alcohol consumption in adolescents from North of Portugal: A diagnostic situation

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Abstract

Currently, excessive alcohol consumption is considered by the World Health Organization as a threat to public health worldwide, explaining more years of life lost due to death or disability than tobacco or illicit drugs. In young people, alcohol abuse has assumed alarming levels. This study aims to examine the relationship between alcohol consumption prevalence throughout life and sociodemographic variables and peer influence.

This is a descriptive-correlational study, transversal approach, whose sample consisted of 450 students from a school in the north of Portugal. In the data collection we used a self-report questionnaire designed and validated for this purpose, which was applied in the classroom. In the processing of data we use the Special Package for Social Sciences, have appealed to descriptive and inferential statistics. The significance level was 5%.

Most of the sample was female (60.2%) and belonged to the age group of 15-17 years (46.9%). The prevalence of alcohol consumption over the life was 71.1%, the largest group of students said consume 1 or 2 times per year (29.8%), in the amount 1 cup or less (34.5%). The proportion of older students drinkers (≥ 18 years) is higher than that of younger (χ^2 : $p < 0.000$) as well the proportion of students who have the perception that most of their friends were drunk (χ^2 : $p < 0.000$) than who have the perception of not having friends who were drunk.

The proportion of alcohol consumers in the sample can be considered high, although lower than in other studies conducted in the same region. It found there is a relationship between alcohol consumption and the age group and the perception of having friends who were drunk. There are no differences between the sexes. This study could be a starting point to tailor future interventions in the prevention of alcohol consumption in this population.

Key words: Adolescent; Underage drinking; Substance-related disorders; Public health.

1. Introduction

Today, excessive consumption of alcohol is considered by the World Health Organization (WHO) a threat to World Public Health, which explains, more years of life lost to death or disability, than tobacco or illicit drugs (DGS, 2014).

Alcohol is the most traded abuse substance worldwide and one of the few psychotropic substances, which has its consumption legalized and encouraged by the community (Reis et al., 2011).

Several authors argue that alcohol is the most widely used psychoactive substance by adolescents, despite the consumption being illegal in this age group. It is therefore a major public health problem in this population, being the largest risk factor for your health due to the immediate effects and in long-term too. It is a problem that is transversal to all of Western society and it is associated with other risk lifestyles (WHO, 2006; Marques, Viveiro and Passadouro, 2013; Pierobon et al, 2013; Malta et al, 2014).

Adolescence is a stage of life cycle of the human being, between 10 and 19 years of age (UNICEF, 2011). It is characterized by biological changes like the transformation of the body, psychological changes with respect to development tasks, culminating in the definition of the identity and sociological changes in the transition from childhood to adulthood (Coob, 2010).

This period of great and intense transformations through which teenagers pass make these young people a risk group regarding to the use of psychoactive substances (Pratta and Santos, 2013).

The search for new challenges, new emotions, drive teenagers to risk behavior, who give themselves to the alcohol as a ritual to test the ability of each one to consume more and more this substance (Oliveira and Luis, 2005). This group links the ingestion of alcohol with fun and joy, perceiving this consumption as a way of not thinking in their problems (López-Cisneros et al., 2013).

According to Cerqueira et al. (2011), the level of alcohol consumption in the past 20 years decreased in developed countries, but it's increasing in developing countries.

The Report of the World Health Organization (WHO) on alcohol consumption in the EU revealed that the European continent continues to lead this consumption globally, with the annual average consumption of 12.4 liters per capita, being the region of the world with higher per capita consumption of alcohol, with some countries having a very high rate of consumption (WHO, 2014).

The 2011 ESPAD Report, which was attended by 36 European countries, states that the prevalence consumption varies widely between countries, there is no clear geographic pattern. The highest prevalence lifetime rates were found in the Czech Republic and Latvia (Above 95%). Iceland has the lowest proportion (56%), the same as the USA, which is not an ESPAD country. Other countries with relatively low rates (below 80%) include Montenegro, Norway, Portugal, Romania and Sweden. There were small reductions in 2003 to 2007 and 2007 to 2011. The average consumption of alcohol at least once in their life was 87%. In most countries the proportion of boys who drink is higher than girls, especially in the higher frequency of consumption (Hibell et al., 2012).

In this study, Portugal obtained a prevalence of lifetime consumption of 71%, and the Portuguese students have an average substance use close to the average of ESPAD students (Hibell et al., 2012).

The National Survey in School Environment (Portugal, INME, 2011) with 3rd cycle students showed that in 2011 was an increase in alcohol consumers percentages regarding to experimental use and current consumption accompanied by the stability of the prevalence of intoxication (Feijão, 2011).

In the first decade of this millennium there was a change in consumption patterns among Portuguese young people: trend to start drinking alcohol earlier in adolescence (12 and 16); change in consumption volume standard for binge drinking associated with the use of other substances; change in consumption patterns between the sexes, with a trend of increased consumption in women (Marques, Viveiro and Passadouro, 2013).

Young people who have experienced, as well as regular and abusive drinkers may have a distance profile towards their family, school and socialization with colleagues in school. Alcohol causes many problems, especially in young people who consume alcohol for the first time before the age of 14 years old, who have an increased risk of suffering from mental disorders associated with brain damage, cognitive deficits and implications in intellectual learning (Portal of Health, 2011).

The influence of peers is often referred as one of the main causes of substance use in adolescence (Palmqvist & Santavirta, 2006). When teenagers are surrounded by peers and away from home are less likely exposed to parental control and therefore more prone to alcohol consumption (Borsari and Carey, 2006).

The WHO in the European Charter on Alcohol states that children and adolescents have the right to grow up in an environment protected from the negative consequences of alcohol consumption and to protection against pressure to drink and aggressive advertising (DGS, 2012).

The National Health Plan of Portugal (PNS 2010-2016) emphasizes that childhood and adolescence are privileged periods of acquisition of healthy behaviors (DGS, 2012).

For the development of education health policies, health promotion and intervention programs aimed at this age group it is essential to study the health behaviors of adolescents and the factors influencing them (Matos, Simões, Carvalhosa and Reis, 2006).

It's in this issue that arose our study in which we set the following objectives: i) describe the pattern of alcohol consumption of the participants; ii) investigate the relationship between the prevalence of lifetime consumption and sociodemographic variables and the influence of peers.

There are studies conducted at national and regional level on the prevalence of alcohol consumption, but few locally relating this consumption to some factors, aimed at making a diagnosis situation justifying future interventions.

2. Methodology

To achieve the proposed objectives, we developed a descriptive and correlational study, transversal and quantitative approach (Fortin, Côté and Fillion, 2009).

2.1. Participants

The study population consisted of 768 students of the 3rd cycle and 1135 high level students, attending a high school, in northern of Portugal, totaling 1,903 students.

We established as inclusion criteria, attending the 3rd cycle and high education level, being aged between 12 and 19 years old and return the consent form informed, duly signed by the parent or by himself, if he/she had more than 18 years. As exclusion criteria we defined have not completed at least 80% of the questions.

The sample, the accidental kind, was thus constituted by the students who were present on the day of data collection and who met the inclusion criteria, a total of 450 students, about 23.6% of the population.

Of the total number of students participating in the study ($n = 450$), most were female (60.2%) belonged to the age group of 15-17 years old (46.9%) and was a high education level (62.9 %) (Table 1). The average age was 15.86 ± 1.934 years and mode 18, data not on the table.

Table 1

Characterization of the study participants (n = 450)

Variables		Af	Rf (%)
Sex	Female	271	60,2
	Male	179	39,8
Age group	12-14 years	124	27,6
	15-17 years	211	46,9
	≥ 18 years	115	25,5
Level of Education	3rd Cycle	167	37,1
	High level	283	62,9

Legend: Af – Absolute frequency; Rf – Relative frequency.

2.2. Material

In the data collection we used a self-report questionnaire designed and validated for this purpose, through a pilot test. This instrument consisted of two parts: Part I, intended to socio-demographic characterization of students according to sex, age group and education level attended. Part II was intended to describe the use of psychoactive substances, in particular, the consumption of tobacco, alcohol and illegal drugs. This study will address only the consumption of alcohol and the data of the tobacco and illegal drugs consumption will be used in other studies.

Alcohol consumption was evaluated for the frequency with six response options, from never to every day; type of beverage consumed; age that made the first use; amount of drink consumed per occasion with six response options, from 1 cup or less to 6 or more glasses and get drunk; and perception about friends who consume alcohol, with five response options, from no friend to most that percept friends as a consumer of alcohol.

2.3. Procedures

Prior to data collection an application for authorization was completed and approved by the General Directorate of Education (Portugal), which gave a favorable opinion (No. 0444700001) and to the Director of the School Group, who also authorized. Then we met with Health Education Project Coordinator teacher (HEP) of the school, which was informed of the study objectives. We were asked to assist in the realization of it and we agreed in the data collection procedure. The HEP Coordinator spoke with other teachers who collected the informed consents returned by the students and distributed the questionnaires, which were completed by them in the classroom. Then we collected the questionnaires that have been returned by HEP Coordinator, in a sealed envelope. The data collection period was from 6 to 13 June 2014. The ethical principles were respected, namely, the anonymity and confidentiality of the participants.

In data processing we used the SPSS program (22.0). We used the descriptive statistics with calculation of absolute and relative frequencies and mode for all variables and the average and standard deviation for the measurement level variables ratio. We use the inferential statistics, with the use of non-parametric statistical test of χ^2 . We considered the significance level 5% (Maroco, 2014).

3. Presentation and discussion of results

The prevalence of alcohol lifetime consumption found in this study was 71.1%. This percentage is lower than the one obtained in the study PINGA (Reis et al., 2011), held in the

northeast of Portugal, with a sample of 1061 students of the 3rd cycle and high level education, aged between 13 and 19 years of age, which obtained a prevalence of lifetime consumption of 89.8%. That prevalence is also lower than that of Gonçalves studies (2014), attended by 378 students, high level, between 15 and 21 years, which was 86.8% and Minhava (2014), with 501 students, high level education from 15 to 21 years, which was 87.4%, both held inside northern Portugal. These differences may be explained by the cultural differences, in the first study compared and in the last ones because they involve only high level students, older and with higher alcohol consumption than the younger ones. However, the prevalence found in this study is almost coincident with that obtained in the study Health Behavior in School-Aged Children (HBSC, 2014), data from Portugal, with 6026 students of the 6th, 8th and 10th grade, which was 71% (Matos et al., 2015).

The age of initiation to alcohol consumption occurred predominantly between the 14 and 15 years and after 15 years old, categories that achieved the same percentage (22.8%), which aggregate account for 45.6%. However there is a group of students (20.7%), which started this consumption up to 13 years old. The proportion of boys were higher in earlier consumption categories (Table 2). The initiation age of the participants in our study is very similar to that found in the study by Gonçalves (2014), in which the largest group of students began the consumption between 14-15 years (40.2%). And yet the one obtained in Marques, Viveiro and Passadouro study (2013), attended by 405 students, high level education, aged between 15 and 18, in which 56% of students started this consumption, between 13 and 15, differing only in the higher proportion of students in these categories of these studies. Consumption was earlier in boys in all studies.

Referring to the frequency of alcohol consumption of the total sample, the largest group reported consuming 1 or 2 times/year (29.8%), followed by the group of participants who consumed 1 or 2 times/month. The boys framed up more in the category 1 or 2 times/month (29.6%), while girls in category 1 or 2 times/year (34.5%). There were only men in the most frequent consumption categories (Table 2). The consumption rate of this sample differs from the study Reis et al. (2011) and Goncalves study (2014), in which the largest group fell within the category 1-2 times/month respectively 41% and 38.4%. However, also in these studies the category that succeeds is the 1 or 2 times/year, and there is an inversion in relation to our study.

With regard to the type of alcoholic beverage consumed by the participants in the study, the cocktails were the most consumed (32.2%), with higher percentage of females. All other beverages are consumed in greater proportion by males (Table 2). The results of this study are consistent with the results of Gonçalves (2014) and Minhava study (2014), in which also the cocktails were the most consumed beverage, respectively, by 49.1% and 39.7% of students. These percentages, however, are higher than in our study, but also in those studies these drinks were the most consumed by girls. The results of our study do not converge to the study of Marques, Viveiro and Passadouro (2013) and European HBSC (Currie et al., 2012), in which the most consumed beverage was beer, respectively, 35% and 29% of students. However, in all studies beer was the alcoholic beverage most consumed by boys.

Regarding to the amount of drink consumed, the major group of the total of the students reported consuming one cup or less per occasion (34.5%), followed by the group of respondents who consumed 2 cups (22.6%). The girls had only the highest percentage in the category 1 cup or less, and the higher percentage of men in the highest amount of categories (Table 2). These findings converge with those obtained in study Minhava (2014), wherein the higher group also consumed one cup or less (24.9%), but differ with regard to the study of Goncalves (2014), wherein the largest group framed up in the category of 2 glasses per occasion (28.6%), although the percentage of our study is higher. However, in the studies compared the percentage of the category 1 cup or less were very close.

Most students (43.8%) had had the perception of having few friends who consumed alcohol. It note that 24.2% of students held a perception that most of their peers consumed alcohol. The percentage of boys with this perception is slightly higher than girls (Table 2). The fact that the proportion of consumers is higher in students who percept that their friends consume alcohol,

denotes the influence of the peer group, in initiating this consumption, referred by Marques et al. (2013), in which the first use occurred, preferably in the company of friends (63%) and the influence of friends (11.8%) in the decision to drink in the participants of the study of Moreno, Ventura and Brêtas (2010), held in Brazil.

Table 2

Characterization of alcohol consumption by study participants (n = 450)

Variables	Sex		Total
	Male	Female	
Age of initiation			
Recently	3,6	6,0	4,8
After 15 years	25,4	20,2	22,8
Between 14 and 15 years	19,3	26,3	22,8
Between 10 and 13 years	19,8	16,0	17,9
Before 10 years	3,8	1,8	2,8
No consumer	28,1	29,7	28,9
Frequency of consumption			
1 or 2 times/year	25,0	34,5	29,8
1 or 2 times/month	29,6	23,8	26,7
All the weekends	14,9	12,3	13,6
Several times/week	1,4	0,0	0,7
Every day	0,8	0,0	0,4
No consumer	28,3	29,5	28,9
Type drink			
Wine	5,9	3,9	4,9
Beer	27,7	13,5	20,6
Cocktails	22,3	42,1	32,2
Bagasse, Brandy, Whisky	16,7	10,1	13,4
No consumer	27,4	30,4	28,9
Amount of consumption			
1 cup or less	30,4	38,6	34,5
2 cups	24,3	20,9	22,6
3 to 6 cups	12,6	9,6	11,1
6 or more cups	0,6	0,2	0,4
To be happy	4,1	0,9	2,5
No consumer	28,0	29,8	28,9
Perception of friends who consume alcohol			
None	5,9	8,3	7,1
Do not know	25,5	23,9	24,7
Few	42,7	44,9	43,8
Most	25,5	22,9	24,2
Did not answer	0,4	0,0	0,2

The proportion of alcohol lifetime consumers does not differ significantly between the sexes (χ^2 : $p \geq 0.751$).

We found that the proportion of consumers differ significantly between the age groups (χ^2 : $p < 0.000$), and the proportion of older students (18-19 years) is higher than the younger ones (12-14 years). The same happened between the two levels of education in analysis (χ^2 : $p < 0.000$) wherein the proportion of students consumers attending high level is higher than the students of the 3rd cycle. Also the proportion of consumers differs significantly between students with different perceptions about the number of friends/peers who consumed alcohol (χ^2 : $p < 0.000$). The

proportion of students who percept that most of their friends drank alcohol is greater than those who percept have none or referred unaware (Table 3).

Table 3

Results of statistical test χ^2 between the prevalence of lifetime consumption and sociodemographic variables

Variables	n	Teste value	df	p	AR
Prevalence X Sex					
Masculino	179	0,132	1	0,751	+ 0,4
Feminino	271				- 0,4
Prevalence X Age group					
12-14 years	124	68,572	2	0,000	- 8,2
15-17 years	211				+ 3,7
18-19 years	115				+ 4,1
Prevalence X Level of education					
3rd Cycle	167	80,811	1	0,000	- 9,0
High level	283				+ 9,0
Prevalence X Perception of friends who consume alcohol					
None	32	71,025	3	0,000	- 4,3
Do not know	111				- 6,2
Few	197				+ 3,6
Most	109				+ 4,7

Legend: n – Total of sample; df – Degree of freedom; p – Probability; AR – Adjusted residue

These results converge with Gonçalves study (2014), in which the prevalence did not differ significantly between the sexes, but there were been highly significant differences between the proportions of age groups, with older obtaining higher proportions. Also they observed the same highly statistically significant differences between different levels of education, with high level education obtaining the highest proportion and among students with different perceptions about the amount of friends who drinks, with students who percept most of friends and few friends who drank alcohol to get the highest proportions of consumers.

4. Conclusion

The prevalence of alcohol lifetime consumption of the sample under study is lower than that found in other studies in Portugal, but in different regions, coinciding with the HBSC study. However, it remains a concern that nearly three-quarters of the study participants consumed alcohol, taking into account their ages and the impact on their health and learning.

The pattern of alcohol consumption by students participating in the study is characterized by an age of initiation between 14 and 15 years old, consuming 1 or 2 times/year to 1 or 2 times/month, predominantly, cocktails and beer and 1 or 2 cups per occasion. This pattern is very similar to participants in other studies carried out in Portugal and other countries, while noting the lower frequency and quantity of drinks consumed. Differs for the European study on the type of drink, emphasizing the high alcohol content of cocktails, the most consumed beverage in this study.

We found there is a relationship between the prevalence of alcohol lifetime consumption and older age, as well as education level and the perception about the amount of peers who consume alcohol, highlighting the effect of the age factor and the influence of peers in the initiation and continued use of this substance.

The main limitations of the study comes to a cross-sectional study, which does not allow the cause-effect relationship and the sample was not random.

This study may contribute to the actors responsible for implementing consumer prevention programs of this psychotropic substance can adapt better their policies for Health Education and

select the priority ages. The work was developed in partnership with these actors and the final report was made available to them.

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Anthropometric indicators and their correlation with hypertension comorbidly occurring with diabetes in some residents of Abeokuta, Nigeria

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ABSTRACT

To compare anthropometric measurements of general obesity and central obesity and assess the respective associations with type-2-diabetes (T2DM) comorbidly occurring with hypertension, and also to determine if the association between the anthropometric indices and cardiovascular risk factors varies with gender. Age and sex matched control subjects (n=150) and patients (n=470) [hypertensive non-diabetics(n=179), normotensive diabetics(n=132), hypertensive diabetics(n=159)] presenting at the Medical Out-Patient Clinic of the State Hospital, Abeokuta, Nigeria were recruited. Weight, height, umbilical circumference(UC), waist circumference(WC), hip circumference(HC), were measured using standard procedures; body mass index(BMI), body fat percentage(BF%), waist-to-hip ratio(WHR), waist-to-height ratio (WHtR) and other body composition were calculated to assess overweight and obesity. BMI and BF % were significantly increased in all the patients. There was significant difference in gender BMI and BF%. In both controls and patients, BMI and BF% were significantly ($p<0.05$) higher in female when compared with their male counterparts. Also UC, WC, HC, WHR, WHtR were significantly higher in patients in both sexes when compared with their control counterparts. WHtR has more significantly positive correlation with hypertension and/or T2DM when compared with all other anthropometric parameters. WHtR was still a slightly better predictor in men, whereas in women, WC was slightly better than others. The association of central and general obesity varied with gender.

Assessing food intake among Malaysian : Prevent risk disease through design preferences

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Abstract

Desirable health behavior is an early practice to prevent from risk diseases such as cardiovascular diseases. Desirable behavior can be categorized into two groups such as active physical activity and health food intake. As reported by current research, most of Malaysian practices unhealthy diet, which could lead them to risk diseases such as non-communicable diseases, this group of disease can be split into few particular behaviors such as tobacco use, physical inactivity, unhealthy diet and the harmful use of alcohol. Heart disease captured Ministry of Health Malaysia attention back in 1991 when Health Education Division done promotion on how to prevent from heart disease, but with growth population in Malaysia, in 2006 cardiovascular has become no.2 killer in Malaysia and become no.1 killer in 2010. In order to prevent Malaysian from cardiovascular diseases, a study must be done on how to change their behavior and practice healthy behavior to prevent from risk diseases. The purpose of this research is (1) to review on food intake among Malaysian, (2) to discuss on what potential sub-component in design characteristics that can educate them to adapt balance diet. Methodology for this research will involve a literature review of published research and educational articles. Results from this research shows unhealthy diet practices among Malaysian could lead them to risk diseases, with most of the previous research focuses on curative education approach, which is good but prevention is more better than cure, this research will helping in preventing risk behavior to prevent from risk disease. Prevention of disease through healthy diet should be propose to young adults as the risk disease will affect at the age 30 years old. Prevention from disease can be divided into three different levels such as primary, secondary and tertiary. Each of sub-group has it own focus target respondents. In Conclusion, prevention from risk diseases can be applies with practice of healthy behavior through balance food intake. In Malaysia, the reason non-communicable diseases still high is because of unhealthy lifestyle such as imbalance food intake especially among young adults. These groups are easy to get risk disease because they are exposed with unhealthy lifestyle environment. In order to change their unhealthy lifestyle, a research regarding on how to persuade them to adapt healthy lifestyle should be done to decrease potential them to get risk diseases.

Keywords: Desirable Behavior, Prevention Risk Disease, Unhealthy Diet, Healthy Behavior, Food Intake

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Abstract

Desirable health behavior is an early practice to prevent from risk diseases such as cardiovascular diseases. Desirable behavior can be categorized into two groups such as active physical activity and health food intake. As reported by current research, most of Malaysian practices unhealthy diet, which could lead them to risk diseases such as non-communicable diseases, this group of disease can be split into few particular behaviors such as tobacco use, physical inactivity, unhealthy diet and the harmful use of alcohol. Heart disease captured Ministry of Health Malaysia attention back in 1991 when Health Education Division done promotion on how to prevent from heart disease, but with growth population in Malaysia, in 2006 cardiovascular has become no.2 killer in Malaysia and become no.1 killer in 2010. In order to prevent Malaysian from cardiovascular diseases, a study must be done on how to change their behavior and practice healthy behavior to prevent from risk diseases. The purpose of this research is (1) to review on food intake among Malaysian, (2) to discuss on what potential sub-component in design characteristics that can persuade them to practice balance diet. Methodology for this research will involve a literature review of published research and educational articles. Results from this research shows unhealthy diet practices among Malaysian could lead them to risk diseases, with most of the previous research focuses on curative education approach, which is good but prevention is more better than cure, this research will helping in preventing risk behavior to prevent from risk disease. Prevention of disease through healthy diet should be propose to young adults as the risk disease will affect at the age 30 years old. Prevention from disease can be divided into three different levels such as primary, secondary and tertiary. Each of sub-group has it own focus target respondents. In Conclusion, prevention from risk diseases can be applies with practice of healthy behavior through balance food intake. In Malaysia, the reason non-communicable diseases still high is because of unhealthy lifestyle such as imbalance food intake especially among young adults. These groups are easy to get risk disease because they are exposed with unhealthy lifestyle environment. In order to change their unhealthy lifestyle, a research regarding on how to persuade them to adapt healthy lifestyle should be done to decrease potential them to get risk diseases.

Keywords: Desirable Behavior, Prevention Risk Disease, Unhealthy Diet, Healthy Behavior, Food Intake

Introduction.

Desirable health behavior is an early practice to prevent from risk diseases such as cardiovascular diseases. Desirable behavior can be categorized into two groups such as active physical activity and health food intake. As reported by current research, most of Malaysian practices unhealthy diet, which could lead them to risk diseases such as non-communicable diseases (Tajik et al., 2015). Non-communicable diseases, this group of disease can be split into few particular behaviors such as tobacco use, physical inactivity, unhealthy diet and the harmful use of alcohol (Dans et al., 2011; WHO, 2008; Yang, Yang, Zhu, & Qiu, 2011). Heart disease captured Ministry of Health, Malaysia attention back in 1991 when Health Education Division done promotion on how to prevent from heart disease, but with growth population in Malaysia, in 2006 cardiovascular has become no.2 killer in Malaysia and become no.1 killer in 2010.

Imbalance diet could expose practitioner to other risk diseases, and education has been highlighted in order to educate community on essential of balance diet education, as reviewed in four selected regions namely Northern (Karangan & Pendang in Kedah), Southern (Johor Bahru, Skudai & Layang-Layang in Johor), Eastern (Kampung Bukit Payung and Kampung Raja in Besut, Terengganu) and Sarawak (Kampung Ensebang Plaie, Kota Samarahan and Kuching), respondent from 18 to 60 years old had involve in this assessment, the study shown an appropriate education could help them to have a better understanding to adapt healthy diet pattern in order to prevent them from chronic diseases (Ss, Mn, Kk, & Zawiah H, 1997). Meanwhile in Sabak Bernam district, identification of dual forms of malnutrition for underweight child (UW) from age 1 to 6 years old and overweight mother (OW) above 20 years old had shown that the needs of intervention messages and activities need to be tailored to meet the needs of the socio-cultural and economic characteristics of the community (Khor & Sharif, 2003). A study regarding on energy intake, diet composition, time spent doing physical activity and energy expenditure among three different groups such as underweight (UW), normal weight (NW) and overweight (OW) among Malaysian adolescent from age 11 to 15 years old has suggested in order to perform early preventative action from overweight (OW) and obesity among children and adolescents, strategies that address eating behaviours and physical activity are required. Various segments of the society must be involved in efforts to promote healthful dietary intakes and active lifestyle in children and adolescents (Zalilah M S, Khor G L, Mirnalini K, Norimah A K, 2006). In 2002 and 2003, The Malaysian Adults Nutrition Survey (MANS) carried out 6,928 adults respondent by using stratified random sampling divided in three zones such as Peninsular Malaysia, Sabah and Sarawak. The scholar revealed people who working with inflexible and time-pressured employee are mostly would skip breakfast and practice unhealthy diet such as continuously snacking or light eating behavior. Throughout the study, the conclusion can be made for those who skipped breakfast and lunch, potentially they will exposed to over eating pattern when having a dinner compare to those who have a balance meals. If this practice applied daily in their lifestyle, chances to get risk disease is high (Manan et al., 2012). Unhealthy diet is caused because of skipped main meals and continues snacking pattern, Underweight (UW) and Overweight (OW) basically connected with perception of image body among adolescents, this categories will represent human body image for example unhealthy body image will fall under overweight which always related to unhealthy weight control and imbalance diet. This situation could affect them to perform health behavior to avoid from risk disease. Eat out and skipped family meals could be another factor that influence failure for adolescents to practice healthy diet, and due to high of missing breakfast and poor consumption intake of fruit, vegetable and dairy products. This unhealthy diet practice could lead to inappropriate food intake, it is essential to educate on healthy diet education could help them to improve quality of diet, diet practice and adolescents' psychological well-being (Tajik et al., 2015).

In order to prevent Malaysian from cardiovascular diseases a study must be done on how to change their behavior through practicing healthy behavior from risk diseases (Chang, Lee, & Cheah, 2012; Lauren, 2010). Scholar also conclude balance nutrition intake will maintain work performance and prevent from risk disease which are connected of imbalance diet (Ss et al., 1997). Unhealthy diet practices among Malaysian could lead them to risk diseases, with most of the previous research focuses on curative education approach, which is good but prevention is more better than cure, this research will not helping in preventing from risk disease. Prevention from disease can be divided into three different levels such as primary, secondary and tertiary (Chang et al., 2012; Keith., Sylvia, & Yvonne, 1990). Each of sub-group has it own focus target respondents. Prevention of disease through healthy diet should be propose to young adults as the risk disease will affect at the age 30 years old (Calnan, 1991). Risk content could stimulate apprehension and anxiety. In the cancer screening literature, perceived apprehension and anxiety are always positively correlated, *but both have been found to be independently associated with screening behavior* (e.g., McCaul et al., 1996). *In some cases, worry about the consequences of a behavior may be more effective than perceived risk in motivating people to consider changing their behavior* (Magnan et al., 2009). *Empirical research testing the role of affect in medical decision-making and behavior is sparse. However, one study found that smokers who reported negative affective responses to graphic warning labels on cigarette packs were more likely to have quit, made an attempt to quit, or reduced their smoking* (Hammond, Fong, McDonald, Brown, & Cameron, 2004). (Martin & DiMatteo, 2014). Printed education materials are one of tangible promotion items that could be easily reach target readers, but to make it effective it must be user-friendly. This includes the use of simple words, large print, and graphics to provide short directives geared toward patient behaviors that can lead to success (Ruffin, 2008a) Health education materials is one of the reliable printed material in enhance comprehension of health education especially on patient' and their cares' (Shieh & Hosei, 2008). Printed educational material might be adjunctive but it is most helpful promotion media when it adheres to clear health communication with low-literacy guidelines especially with the use of short information and simple words, with active voice approach, adherence to a fifth-grade reading level or below, attention to layout and appropriate graphics usage (Martin & DiMatteo, 2014). Visual persuasion is one of the method which could be use to persuade target audience to perform healthy behavior, but it must appropriately design to make it approachable. Jessica Hoffman Brylo listed few techniques for making your presentation as persuasive as possible such as *color choices, one message per graphic, technology, color of fonts and medical terms* (Brylo, 2010). In her explanation, Brylo highlighted few essential guide as can be review in Table 2. Respondent has recommended that graphic is one of an essential design characteristics, because of graphic help reading assist and helpful. Information that contain of graphics are more likely to be seek by the reader (Rose, Worrall, Hickson, & Hoffmann, 2011). Graphic also help motivate the reader (Rose, Worrall, Hickson, & Hoffmann, 2012). An attractive health education materials can be achieve with easy to read and remember, several respondents recommended the printed material could be helpful if graphics supported with captions, which is also suggested in the literature (Houts, Doak, Doak, & Loscalzo, 2006; Rose et al., 2011). Unlike verbal education, health education material deliver as a long-lasting record documentation of information to reader (Aldridge, 2004). Health education materials must be user-friendly, the use of simple terminology of disease, appropriate size of material, and suitability use of graphics supposedly meet the requirement to be understand by target reader (Ruffin, 2008b). Risk image is one of the potential education that could avoid reader to perform risk behavior with suggestion either to adapt healthy lifestyle or not. The use of image will represent what consequence the reader will experience if they do not perform healthy lifestyle, the motivational elements could play essential role to persuade the reader to perform healthy lifestyle (Ouellette, Hessling, Gibbons, Reis-Bergan, & Gerrard, 2005).

Method

Involved a literature review of published research and educational articles related to diet pattern among Malaysian by using search term “diet intake”. Additional articles were found from the reference lists of retrieved articles and also review on design preferences to identify potential sub-components in health education materials in order to trigger reader behavior to perform health desirable behavior to prevent from risk disease.

Result

Overview

The review of the literature had identified that education has become an essential approach to educate the community especially an exposure of important balance diet to their health. Even though health education has been highlighted to become focus on previous research. It is important to identify on what appropriate method to reach target audience that have various level of age. Multiple interventions, two-way communications, printed education materials delivered in person, and locally respected health personnel as educators are the most effective educational strategies (Cauffman et al., 2002; Griffin et al., 2004) (Shumaker, Ockene, & Riekert, 2009). Research involving participant without aphasia found PEMs more preferred if the printed materials incorporated a number of content and design characteristics listed as *simple language, large print, white space, colour, and instructional graphics* (Davis, Fredrickson, Arnold, Murphy, Herbst, & Bocchini, 1998); *considered more appealing* (Davis et al., 1998), *effective, noticeable, readable, and understandable* (Paul, Redman, & Sanson-Fisher, 1997); *increased knowledge* (Davis et al., 1998; McKenna & Scott, 2007); *assisted consumers to locate information more easily* (Dickinson, Raynor, & Duman, 2001); *and were more likely to be self-collected by patients* (Hanson Frost, Thompson, & Boeding Thiemann, 1999) (Rose et al., 2012). Most of respondents agreed that graphics are helpful to the readers. Only minority of respondent who did not consider graphics helpful either had very mild or very severe aphasia. As suggested in their previous research, *people with mild-to-moderate aphasia may benefit most from aphasia-friendly formatting* (Rose, Worrall, & McKenna, 2003). Visual aids that appropriately designed can enhance comprehension of risks associated with different medical treatments, screenings, and lifestyles (Waters, Weinstein, Colditz, & Emmons, 2007; Zikmund- Fisher, Fagerlin, & Ubel, 2008). *Visual aids also increase appropriate risk-avoidance behaviors, promote healthy behaviors, and reduce errors induced by anecdotal narratives* (Cox, Cox, Sturm, & Zimet, 2010; Fagerlin, Wang, & Ubel, 2005; Schirillo & Stone, 2005). *Moreover, risk information presented visually is judged as easier to understand and recall, and requires less viewing time than the same information presented numerically* (Feldman- Stewart, Brundage, & Zotov, 2007; Gaissmaier et al., 2012; Goodyear-Smith et al., 2008). *Nevertheless, the benefits of visual aids are different for different people.* (Garcia-Retamero & Cokely, 2013).

Recommendation of Design Preference for Health Education Materials

The design of health education materials requires few characteristics such as content, literacy demand, numeracy, graphics, layout and typography (Hashim et al., 2013). Graphic illustrations or cartoon are important design characteristics in health education materials because it engages the interest of the viewers. The United State of America Department of Defense has used cartoon magazines for long period of year to convey vehicle and equipment maintenance information to military troops. In 1989, The first use of cartoons as visual aids in medical and health education for adults and children has been explored by McDermott (Delp & Jones, 1996). Visual aids can be presented in three major approaches: as pictorial symbols, graphic symbols, or verbal symbols. Pictorial symbols produced as *photographs, illustrations, or drawings, are recommended for non-literate adults*. Meanwhile the British and East Indians have used graphic symbols to aid non-literate people interpret guidance for medicine intake and some American pharmacist have used graphic auxiliary labels to reinforce written guidance (Ngoh & Shepherd, 1997). As mentioned by Weintraub, *illustrations and graphics should include positive cultural images for the specific audience, allowing for a match in logic, language, and experience* (Weintraub et al., 2004). Reading a wide range of materials are mostly enjoyed by young people including *periodicals, series fiction, and comic books—materials some librarians have shunned. Research shows that comic books are linguistically appropriate reading material, bearing no negative impact on school achievement or language acquisition* (Krashen, 1993). Comic books and graphic novels are typically presented at a fourth to sixth grade reading level, comparable to Time magazine and young adult novels. *Graphic novels strongly appeal to teens and are an invaluable tool for motivating reluctant readers* (Grade & Amy, 2004). The basic characteristics of graphic design can be divided as *shape, size, form, texture, lines, and color*. But, the visual context in which products, brands, and ads are presented may affect consumers' reactions (Wedel & Pieters, 2007). 3M company has done a research, collaborate with University of Minnesota under School of Management, this findings form this research shows with the use of 43 percent visual aids in presentation, it had persuade audience members to take desirable course compared to presentation without any visual aids (Parkinson, 2015).

Graphics / Illustration

Graphics play important role in shaping patient comprehension of kidney disease since the blood pressure and glomerular filtration are difficult to explain with text (Tuot, Davis, Velasquez, Banerjee, & Powe, 2013) The use of graphics also been used to identified or recognizable, relevant to the key message, explain figures through captions (Rose et al., 2011; Weintraub, Maliski, Fink, Choe, & Litwin, 2004). As suggested by Pfizer Principles for Clear Health Communication, the use of graphic supposedly contribute to deliver the message and it should exclude from printed material if not contribute to the message. Any chart, diary, table and list must explain as mentioned in Principle 5 Select visuals that clarify and motivate. (G.Doak & Doak, 2004). Meanwhile evaluation on layout recommended the use of illustrations supposedly support sequence of information, visual cueing, use of white space, use of color, line length, contract between type and paper, and use of low-gloss paper (Weintraub et al., 2004). The use of graphics can be widely used which is occupied 44.4% of the materials, although 33.3% of the materials did not include captions to explain the graphics (Hoffmann & McKenna, 2006). Graphics should be used to enhance the text, but not to make it more complicated the readers, especially those with limited education, may find that the diagrams add to their confusion rather than helping them to understand it. Scholar also shown that even those with higher levels of education and reading abilities prefer materials that are written in more simple language with appropriate graphics over more complex and densely written materials (Ryan et al., 2014). Generally a graphics are presented with the associated text above, below, or at

the side (Cooper, 1998). *Graphics that appear simple in content and design can easily be under evaluated by the learner* (Cook, 2006). Experts suggest that graphics should be use in combination of verbal or written information (Kripalani et al., 2007). Adding explanatory verbal information is redundant if the presented graphics are clearly can be identified by viewer (Cook, 2006). An addition of graphic images has been summarized increase patient satisfaction as well as ability to recall the procedure, understanding in follow instruction, and comply to therapy (Kripalani et al., 2007). Research among aphasia participants agreed that graphics should be included in health education materials. Participants reported that graphics: (1) *make information interesting*, (2) *help with understanding*, (3) *help with reading*, (4) *make information easier to read*, (5) *make information quicker to read*, (6) *help orient to the topic*, (7) *help with remembering*, and (8) *add humour/enjoyment*. They also recommended graphic can be helpful if placement of graphics are closely related to the text, information represented with graphic are favorable and should be helpful with caption accompany or single keyword. *Graphics have previously been reported to provide motivation* (Doak et al., 1996a), *and to make written information more inviting* (Foltz & Sullivan, 1999), *and easier to read, and remember* (Rodgers et al., 2004). (Rose et al., 2011). Scholar suggested the use of simple line drawings should support by simple text captions. Although image of photographs are good for capturing attention (e.g., on the cover of a brochure), line drawings are better option because there are less distracting elements. Healths professional are recommended in collaborating with the reader to come up design of drawings that appropriate to end users rather than artists. Scholar also suggests the use of prompts within the picture (e.g., labels or arrows) to help explain the intended meaning. Lastly, it is substantial to ensure that the graphics support key points in the health education (Caposecco, Hickson, & Meyer, 2011). The truth Initiative and Georgetown University Medical Centre researcher have discovered graphic anti-smoking images and warnings on cigarette packs spark brain activity in the areas of the brain involved in *emotion, memory and decision-making*. It shows that smokers are aware risk of smoking to their health. Lung Disease New revealed a research which involved young adult smoker by using brain scanning in order to record reaction to negative images of smoking's potential effects. The research team found that the self-reported motivation to quit smoking was *superior for graphic warning images compared with control warnings*, as results confirmed by the brain pictures, as indicated on the Lung Disease News report. According to the team, plain packaging of cigarette did not change the responses of participants. ("Graphic Anti-smoking Images on Cigarettes Trigger Specific Brain Regions," 2016). In research had done by scholar, even previous studies recommended larger graphic health warning information can become effective approach to deliver risk disease, future research should be focus on development of good content, design and rotation. *Strategies of pictorial health warnings to maximize and sustain the influence of PHW cost-effective intervention especially on cigarette packages* (Kuay et al., 2015). Most of the available evidence indicates that *exposure to graphic labels leads to enhanced knowledge about smoking risks and increased interest in quitting* (e.g., Li, Borland, Yong et al., 2012)(Martin & DiMatteo, 2014). A panel study conducted in Canada demonstrated that smokers who *had read, thought about, and dis- cussed the new labels at baseline were more likely to have quit, made a quit attempt, or reduced their smoking three months later* (Hammond, Fong, McDonald, Cameron, & Brown, 2004).

Table 1 Guidelines when using graphics

B. Clark, N. (2009). Patient Education Materials.	Caposecco, A., Hickson, L., & Meyer, C. (2011). Assembly and insertion of a self-fitting hearing aid: design of effective instruction materials.
• <i>Black print on cream or yellow,</i> • <i>Non-glossy paper</i> • <i>Footed font, such as Times New Roman, in</i> • <i>14-point or larger type</i> • <i>Normal mix of capital and lower case letters (using all capitals is difficult to read and is considered the visual equivalent to shouting)</i> • <i>Short, concise language</i> • <i>Bulleted lists</i> • <i>Customer service phone numbers emphasized, using all numerals instead of let-ters/words</i> • <i>Illustrations aid comprehension for those with poor reading skills and are generally easier to remember than text.</i> • <i>The illustration must match the words and be understandable without text accompanying it.</i> • <i>Illustrations should be simple;</i> • <i>a detailed anatomical diagram may not be as effective as a simple line drawing. Illustrations of patients should be representative of your target audience.</i>	• <i>Use simple line drawings</i> • <i>Include an explanatory text caption with each graphic</i> • <i>Include prompts (arrows, labels etc.) within the graphic to explain meaning</i> • <i>Avoid photography except to gain attention (e.g., cover)</i> • <i>Ensure the reader understands all elements in the graphic</i>

Pictures

The use of image of self-image and others are connected and always influence behavioral action is not new (e.g., Chassin et al., 1981; Gibbons & Gerrard, 1995; Markus & Nurius, 1986; Sutterlund&Niedenthal, 1993)(Ouellette et al., 2005) Picture also been using to identify either it can encourage viewer to perform exercise, as the research has been done with two exposure of prototype and possible selves pictures. The result shown images does related to willingness and behavior with systematic contemplation of images can produce changes in behavior (Ouellette et al., 2005). Houts suggest pictures in the health written education will help the reader to increase their attention, comprehension, recall, and adherence and the use of pictures are appropriate for low health literacy reader, researcher also advise it also help low health literacy reader to have a better understanding on relationship of related elements that might lead to risk disease (Houts et al., 2006). The use of pictures also encourage viewer to change their behavior, as concluded in the previous study aging pictures of self-image in the future if smoking behavior still in practice (Weiss et al., 2010). The review found that adding pictures to health education materials *can substantially increase patient attention, comprehension, recall, and adherence and that this was particularly true for people with low health literacy* (Caposecco et al., 2011). An assessed material shows the use of visual/pictures that were deemed professional and understandable, this design characteristic not deliver the overall information. Scholar recommend educational theory favored presentation congruent information in various formats could increase understanding, an importance of pictures for enhanced patient understanding of the risks/benefits of medication treatment and clinical research endeavors, as well as comprehension of medical illnesses has been well documented. Graphics can play a particularly important role in shaping patient understanding of kidney disease since the concepts of blood pressure and glomerular filtration can be difficult to explain with words (Tuot et al., 2013).

Table 2 Guidelines when using pictures

G.Doak, L., & Doak, C. C. (2004). Pfizer Principles for Clear Health \	Literacy Audit for Healthcare Settings. (2009). National Adult Literacy Agency.	Brylo, J. H. (2010). Visual Persuasion Tips and Techniques.
• <i>Use images appropriate to the audience and the subject</i> • <i>It's critical to use visuals that reflect the cultural background and beliefs of readers. They must be able to see themselves in the images to establish personal relevance and meaning.</i> • <i>When developing materials for adults, avoid childish visuals</i> • <i>Poor readers take images seriously.</i> • <i>Unrealistic illustrations used in serious messages, such as health care instructions, puzzle and distract poor readers.</i> • <i>Use visual that are literal and not abstract</i> • <i>Avoid anatomical illustration from medical text book</i> • <i>Use realistic photographs of medicines</i> • <i>Do not use blurry or unclear visuals</i> • <i>Use color to enhance realism, set a mood, differentiate, and add interest and excitement</i>	• <i>When using pictures make sure explanatory text is close by.</i> • <i>Be consistent and logical when placing visuals near text</i> • <i>Avoid using photographs or any graphic with irrelevant background details, which can distract readers</i> • <i>Aim to keep bullet lists short, no more than six to eight.</i> • <i>Some writers have found stick figures to be useful, as they are culturally neutral</i>	• <i>Be aware of color choice</i> • <i>Pick one message per graphic</i> • <i>Technology is not always your friend</i> • <i>Colors of fonts/medical terms</i> • <i>Pick one or two main exhibits</i> • <i>Use a flat finish</i> • <i>Test your exhibits on mock jurors</i>

Conclusion

Health education materials still reliable to be assess to all the previous studies location, easy to carry, the written health education will be able to deliver the message to the rural area or any place that have no internet access. In order to help Malaysian to adapt a healthy lifestyle, an approach on how to change their health behavior should be proposed to prevent them from risk diseases. Desirable behavior practice among Malaysian regarding imbalance food intake could worsen their health and will expose to risk disease, as suggested an education should be given to them in order to prevent from risk disease. Scholar has suggested the use of graphic or illustration could help them to have a better understanding in order to comprehend them through desirable behavior change for early prevention. Although documentation regarding how graphic and picture can help to educate target respondent and widely had been reviewed in previous research, none of the health education materials in Malaysia has been found on previous research.

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Assessing predictors of Postpartum Modern Contraceptive Use:

A population-based cross sectional study

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Postpartum period is a challenging time for women and it is pretty neglected in our social context. However, in case of Bangladesh little is known about how pregnant women arrive at their decisions to adopt post-partum modern family planning (PPMFP). The objective of this study is to explore the predictors for use of modern contraceptive methods among women of Bangladesh. A nationally representative data, Bangladesh Demographic and Health Survey (BDHS) 2011 was used for this purpose. We used 17,842 women of reproductive ages (15–49 years), who had a birth in the 5 years preceding the survey. Both the descriptive analyses and binary logistic regression were used to find the predictors of postpartum modern contraceptive use. PPMFP was significantly associated with ante natal care seeking behavior (OR=1.13 p=0.031); primary or secondary education (OR=1.22, p=0.011; OR=1.21 p=0.019 respectively); exposure to media (OR=1.21, p=0.002); religion (OR=.708, p=0.000) and age of woman at first birth (OR=0.785, p=0.000). In addition, PPMFP was associated with number of surviving children (OR=0.708 p=0.000,) and place of residence (OR=0.635, p=0.000). This study illustrates the significant interpreters for postpartum contraceptive use in Bangladesh. Socio-cultural factors in addition with ANC seeking behavior may play an important role to increase the usage of PPMFP methods. Future research should focus on effective interventions to encourage and enable these specific women group to engage with the maternity services.

Assessment of Comprehensive Health Education on Sexuality: Basis for Course Syllabus Enhancement

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Abstract. Researches have been conducted investigating health education and sexuality curriculum at the secondary level of education. However, limited inquiries are made about the students' perspective on health education and sexuality subject and how their perceptions help in the improvement of the curriculum. This research looked into the students' perspectives regarding comprehensive health education on sexuality as a basis for course syllabus enhancement. The study was conducted in Mindanao State University – Iligan Institute of Technology Integrated Developmental School, Iligan City. The respondents were selected through purposive sampling. A quantitative type of research using the correlational method was used. The research was done through survey questionnaire and written test after a series of lectures in health education on sexuality conducted by the researcher. The findings reveal that the respondents' age, sex, religion, and family background had a significant difference in viewing certain topics in comprehensive health education on sexuality. Respondents agreed that the teaching of health education on sexuality would be comprehensive. There would be an inclusion of contraceptive methods aside from abstinence, and other essential themes of sexual health should be incorporated into the curriculum. The study result provides information to emphasize abstinence and supplement the instruction with contraception in the course syllabus.

Keywords: Course Syllabus, Health Education, Sex Education, Sexuality Education, Sexual Health

Assessment of Health Literacy in adult population of Karachi: A preliminary investigation for concept-based evidence

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Abstract:

Background: Health literacy is the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate and informed health decisions. Health literacy is important to understand and apply basic health related instructions and information for better health outcomes. The health literacy is broadly conceptualized in three domains of health care, disease prevention and health promotion which encompass the individual competencies such as accessibility, understanding, judgment and application of health information. Health literacy is an unexplored concept in Pakistan. This study assesses the conceptual-based health literacy level in adult population of Karachi and provides evidence to the health care professionals and policy makers about the health literacy.

Objective: To assess the health literacy in adult population of Karachi.

Methodology: A cross sectional survey was conducted in three union councils of Karachi by including 315 adult respondents using multistage random sampling technique. A validated Health Literacy Survey Questionnaire (HLS-Asia-Q) developed by Asian Health Literacy Association administered by principal investigator and trained interviewer after taking informed consent from the respondents. The basic demographics, responses of questions and health literacy concept-based matrix used to show the results.

Results and Conclusion: Limited Health Literacy pertains in 82.4% of Karachi population irrespective of gender, age, education and profession. People had inadequate competencies to access, understand and make health decisions regarding health care, disease prevention and health promotion domains of health. The concept-based evidence sensitized health care professionals, health educators, policy makers, educational institutes and health care organizations to focus on initiatives and policy implications to improve health literacy.

Key Words: Health literacy, Health Care, Disease Prevention, Health Promotion, Well being, Health Information.

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INTRODUCTION:

Background

Health literacy is the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions⁽¹⁾. Health literacy is important to understand and apply basic health related instructions and information for better health, wellbeing and decision-making at individual and population level.⁽²⁾ General literacy and education is not sufficient to understand the health information⁽³⁾. People with low health literacy level experience problems in understanding of health educational materials, higher number of hospital administrations, decreased participation in disease prevention and health promotion activities, compromised health outcomes, increased healthcare cost and decreased quality of life^(2, 4). People should have adequate health literacy which empowers them to make better health decisions⁽⁵⁾. The health literacy is conceptualized in three domains; (1) Health Care: “the ability to access information on medical or clinical issues, to understand medical information, to interpret and evaluate medical information, and to make informed decisions on medical issues and comply with medical advice”. (2) Disease Prevention: “the ability to access information on risk factors for health, to understand information on risk factors and derive meaning, to interpret and evaluate information on risk factors, and to make informed decisions on risk factors for health”. (3) Health Promotion: “the ability to regularly update oneself on determinants of health in the social and physical environment, to comprehend information on determinants of health in the social and physical environment and derive meaning, to interpret and evaluate information on determinants, of health in the social and physical environment, and the ability to make informed decisions on health determinants in the social and physical environment”. Measured in terms of four information-processing competencies; (1) Accessing: “the ability to seek, find and obtain health information”. (2) Understanding: “the ability to comprehend the health information that is accessed”. (3) Judging: “the ability to interpret, filter, judge and evaluate the health information that has been accessed”. (4) Applying: “the ability to communicate and use the information to make a decision to maintain and improve health”. The health literacy definition then comprehended and elaborated as: “Health literacy is linked to literacy and entails the motivation, knowledge and competencies to access, understand, appraise and apply health information in order to make judgments and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life throughout the course of life”⁽⁵⁾.

Health literacy is unexplored concept in Pakistan⁽⁶⁾. The country in its epidemiological transition state of having triple burden of diseases; non-communicable, communicable and mental diseases⁽⁷⁾. World Health Organization (WHO) claimed that Improvement of health by reducing this burden could save approximately 2 billion dollar per year. Improving health system by incorporating health literacy is the major step in public health⁽⁸⁾. However, before using health literacy as intervention, its measurement in general population is essential.

This study is an assessment; it provides information about level of health literacy in adult population of Karachi. This study also emphasizes need to promote health literacy concept in our country and give preliminary evidence for policy makers, health care professionals and future researchers.

Objective

To assess the health literacy among adult population of Karachi

Rationale of the Research

Despite the high levels of literacy in developed countries, there is need for measuring health literacy level in general population. The National educational survey in America estimated that 90% adult population have limited health literacy⁽⁹⁾. Health literacy survey in Canada estimates that 60% adults are not able to properly maintain their health⁽¹⁰⁾. Australian Bureau of Statistics found that 60% Australians have limited health literacy⁽¹¹⁾. In Japan 85% adult population has limited health literacy⁽¹²⁾ and 47% population in Europe has limited health literacy⁽¹³⁾ which means they faced problems in understanding and application of health related information. Pakistan has no documented data regarding health literacy. In Pakistan, there is no policy regarding health literacy. As far as role of government of Pakistan in health literacy is concerned, it is limited to awareness campaigns about immunization, knowledge about family planning and control of spread of epidemics like dengue on short term basis. No formal program for health literacy is running in the country. This study is the preliminary investigation to provide concept-based evidence on health literacy in Karachi which is the major cosmopolitan city of Pakistan. The city comprises of a diverse of population with different age groups, ethnicity, profession, socio economic status and variable health status.

METHODOLOGY:

Study Design

Cross sectional survey design is used in the study.

Study Setting

The urban areas of Karachi were included in the study because it increased the diversity in sample regarding the education and profession.

Study Variables

Dependent Variable: Health Literacy

Independent Variable: Gender, Age groups, Education, Profession

Study Duration

4 months (July 2015-Oct 2015)

Sample Description

Population: The study population was urban adult men and women.

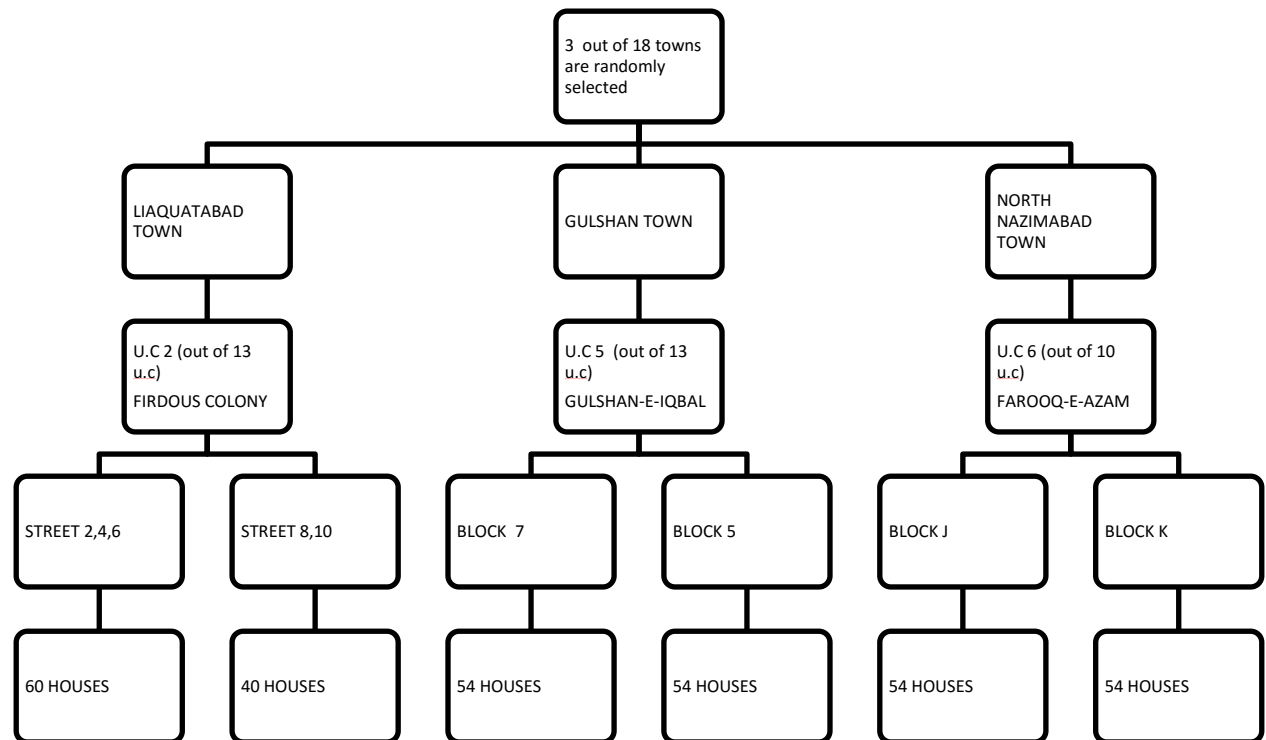
Inclusion Criteria: General Population Adults > 18years. The person in household who responded to request of interview and voluntarily (Consented to) participate in the study.

Exclusion Criteria: Respondents feeling ill.

Sample Size: Sample size (n=315) was calculated using online calculator Open Epi. Initially sample size 291 was calculated at 95% confidence interval with taking 25.3% outcome factor (GEN-HL)⁽¹²⁾, 1 million estimated population size and design effect as 1 (for random samples). Sample size is increased to n=315.

Sampling technique: Multistage Random sampling technique was used illustrating in Figure 1.

Figure 1: Multistage Random Sampling Technique



Research Instrument

The Asian Health Literacy Association developed the questionnaire which is validated in the Asian countries (HLS-Asia-Q)³. Various studies used Rapid estimate of Adult Literacy in Medicine (REALM)⁽¹⁴⁾, Rapid estimate of Adult Literacy in medicine–revised (REALM-R) and REALM-Teen⁽¹⁵⁾. Test of Functional Health Literacy in Adults, (TOHFLA) is widely used instrument to measure functional health literacy in patients⁽¹⁶⁾. Short assessment of health literacy (SAHL) contained 18 items for general population⁽¹⁷⁾, BRIEF screening tool contained 10 questions for assessing patients health literacy in clinical setting⁽¹⁸⁾ and Newest Vital Sign (NVS) measured numerical skills regarding nutritional labels⁽¹⁹⁾ is used in literature. However, in this study to encompass all health literacy domains slightly modified HLS-Q was used.

Questionnaire: Part 1-Demographics: This part include information of demographics; Gender (men and women), Age Groups (18- 27) (28-37) (38-47) (48-57) (>57), Highest level of Education in years (1-10) (11-12) (13-16) (>16) (Other[diploma or madressah]), Profession (Business, Finance & Management, Media, Medicine, Information Technology, Education, Government Employee, Other[law, warehouse keeper, salesman, labor] Not employed).

Part 2-Health Literacy Survey: Comprised of 47 items which encompasses the health literacy domains and competencies.

The code for Health Literacy items (1=very difficult, 2= fairly difficult, 3=fairly easy and 4= very easy).

General Health Literacy GEN-HL index comprised of all items. This gives the unified health literacy score. This score is used for the documentation of health literacy level. The three sub indices are Health Care Health Literacy Index (HC-HL), Disease Prevention Health Literacy index (DP-HL) and Health Promotion Health Literacy index (HP-HL).

Index Scores was standardized to unified metrics from 0 to 50 using the formula: $\text{Index} = (\text{mean} - 1) * (50/3)$, Where, Index is the specific index calculated (GEN, HC, DP, HP), Mean was the mean of all participating items for each individual, The minimal possible value of the mean was “1” (leading to a minimum value of the index of 0), 3 was the range of the mean, and 50 was the chosen maximum value of the new metric. Thus, an index value was obtained where 0=lowest Health Literacy and 50= highest Health Literacy.

As for the four HL indices the following thresholds were defined

- inadequate HL = scores of 25 or less points
- problematic HL = scores > 25- 33 points
- sufficient HL = scores >33- 42 points
- excellent HL = scores > 42-50 points
- inadequate + problematic = limited HL = scores of 33 or less points
- sufficient + excellent = satisfactory HL = scores of > 33-50 points^(12, 13)

³ Questionnaire is furnished upon permission

RESULTS:

Reliability

Internal consistency was excellent for the Gen-HL index examined Cronbach's alpha 0.94.

Response to Questionnaire

All 47 questions and their empirical answer pattern for the total sample are presented in the Table 2.

Table 1: Percentages of Respondents Giving Each Response for All Health Literacy Items

HEALTHDOMAIN/ COMPETENCE	ITEM	Very Difficult %	Fairly Difficult %	Fairly Easy %	Very Easy%	Total Difficult VD+FD
2.1HEALTH CARE/ FINDING	Finding information about symptoms of illnesses that concern you	22.2	25.4	43.8	8.6	47.6
2.2	Finding information on treatments of illnesses that concern you	16.5	41.3	31.7	10.5	57.8
2.3	Finding out what to do in case of a medical emergency	13.0	46.3	30.8	9.8	59.3
2.4	Finding out where to get professional help (such as doctors, pharmacist, psychologist) when you are ill	10.8	34.6	41.6	13.0	44.6
2.5UNDERSTANDING	Understanding what your doctor says to you	9.2	17.8	52.1	21.0	27
2.6	Understanding the leaflets that come with your medicine	23.8	39.0	21.0	16.2	62.8
2.7	Understand what to do in a medical emergency	10.5	38.1	34.0	17.5	48.6
2.8	Understand your doctor's or pharmacist's instruction on how to take a prescribed medicine	9.8	16.8	51.4	21.9	26.6
2.9 JUDGING	Judging how information from your doctor applies to you	15.2	44.4	24.4	15.9	59.6
2.10	Judge the advantages and disadvantages of different treatment options	18.1	51.1	22.2	8.6	69.2
2.11	Judge when you may need to get a second opinion from another doctor	14.9	25.7	44.4	14.9	40.6
2.12	Judge if the information about illness in the media (such as TV, Internet, or other media) is reliable	13.3	36.5	26.7	23.5	49.8
2.13APPLYING	Using information the doctor gives you to make decisions about your illness	12.1	47.3	22.9	17.8	59.4
2.14	Follow the instructions on medication	14.9	29.5	28.9	26.7	44.4
2.15	Call an ambulance in an emergency	11.4	18.4	30.5	39.7	29.8
2.16	Follow instructions from your doctor or pharmacist	12.7	13.0	48.3	26.0	25.7
2.17DISEASE PREVENTION/ FINDING	Finding information about how to manage unhealthy behavior such as smoking, low physical activity and drinking too much	16.5	21.3	43.2	19.0	37.8
2.18	Finding information on how to manage mental health problems like stress or depression	35.2	27.0	27.0	10.8	62.2
2.19	Finding information about vaccinations and health screenings (such as breast exam, blood sugar test, blood pressure) that you should have?	16.2	18.4	43.8	21.6	34.6
2.20	Finding information on how to prevent or manage conditions like being overweight, high blood pressure or high cholesterol	19.4	15.2	41.6	23.8	34.6
2.21	Understanding health warnings about behavior such as smoking, low physical activity and drinking	14.9	15.9	43.2	26.0	30.8

UNDERSTANDING						
2.22	Understanding why you need vaccinations	19.7	16.2	32.1	32.1	35.9
2.23	Understanding why you need health screenings (such as breast exam, blood sugar test, blood pressure)	17.5	15.2	36.2	31.1	32.7
2.24 JUDGING	Judging how reliable health warnings are, such as smoking, low physical activity and drinking	11.4	20.3	40.6	27.6	31.7
2.25	Judging when you need to go to a doctor for check-up?	23.8	33.7	21.3	21.3	57.5
2.26	Judging which vaccinations you may need	26.7	46.7	21.3	21.3	57.5
2.27	Judging which health screening you should have	21.9	33.3	27.9	16.8	55.2
2.28	Judge if the information on health risks in the media (such as TV, Internet or other media) is reliable	12.1	23.5	45.1	19.4	35.6
2.29APPLYING	Decide if you should have a flu vaccination	58.1	13.3	16.8	11.7	71.4
2.30	Decide how you can protect yourself from illness based on advice from family and friends	9.2	37.5	35.6	17.8	46.7
2.31	Decide how you can protect yourself from illness based on information in the media	15.9	32.4	39.0	12.7	48.3
2.32 HEALTH PROMOTION/ FINDING	Finding information on healthy activities such as exercise, healthy food and nutrition	14.3	27.0	37.5	21.3	41.3
2.33	Finding out about activities that are good for your mental well-being	26.7	39.0	16.8	17.5	65.7
2.34	Finding information on how your neighborhood could be more health-friendly	34.9	38.7	18.1	8.3	73.6
2.35	Finding about political changes that may affect health	48.9	25.1	20.0	6.0	74
2.36	Finding about efforts to promote your health at work	21.2	22.6	46.3	9.9	43.8
2.37	Understanding advice on health from family members or friends	8.9	19.0	53.0	19.0	27.9
UNDERTSANDING						
2.38	Understanding information on food packaging	8.9	25.7	47.9	17.5	34.6
2.39	Understanding information in the media on how to get healthier	9.8	25.4	47.9	16.8	35.2
2.40	Understanding information on how to keep your mind healthy	22.5	39.7	23.2	14.6	62.2
2.41JUDGING	Judging how where you live affects your health and well-being	18.7	32.7	37.5	11.1	51.4
2.42	Judging how your housing conditions help you to stay healthy	14.9	29.2	35.6	20.3	44.1
2.43	Judging which everyday behavior is related to your health	12.1	15.9	47.0	25.1	28
2.44APPLYING	Making decisions to improve your health	14.0	37.5	34.9	13.7	51.5
2.45	Joining a sports club or exercise class if you want to	27.6	34.0	22.5	15.9	61.6
2.46	Influencing your living conditions that affect your health	10.2	39.7	31.4	18.7	49.9
2.47	Taking part in activities that improve health and wellbeing in your community	60.0	13.7	14.3	12.1	73.7

Demographics:

Demographics of study respondents: gender, age, education and profession percentages of participants with limited and satisfactory health literacy and their general health literacy (Gen-HL) in table 2.

Table 2: Demographic Of Study Respondents, Percentages of Participants with Limited and Satisfactory Health Literacy and Their General Health Literacy (GEN-HL)

	Total (n=315)	Health Literacy(n=315)	GEN-HL	P value
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Variables	n	%	Limited%	Satisfactory%	Mean	SD	
Gender							t-test
Men	164	52.1	77.4	22.6	26.2	9.1	.049
Women	151	47.9	87.4	12.6	24.0	10.4	
Age Groups (years)							One-way ANOVA
Group1: 18-27	89	28.3	80.9	19.1	27.0	7.8	.044
Group2: 28-37	100	31.7	82.0	18.0	25.3	9.4	
Group3: 38-47	88	27.9	84.1	15.9	24.4	9.6	
Group4: 48-57	19	6.0	84.2	15.8	24.4	11.2	
Group5: >57	19	6.0	78.9	21.1	19.6	16.2	
Education Completed (years)							
Group1: 1-10	27	8.6	85.2	14.8	21.8	10.0	.001
Group2: 11-12	72	22.9	81.9	18.1	24.5	12.3	
Group3: 13-16	143	45.4	85.3	14.7	24.3	8.7	
Group4: >16	61	19.4	75.4	24.6	29.7	6.7	
Group5: Other	12	3.8	75.0	25.0	23.3	11.3	
Profession							
Business	65	20.6	86.2	13.8	25.3	9.2	<.001
Finance, Management	34	10.8	64.7	35.3	30.4	5.6	
Communication, Media	13	4.1	69.2	30.8	23.0	14.2	
Medicine	22	7.0	59.1	40.9	34.6	8.4	
Information Technology	31	9.8	90.3	9.7	24.7	4.5	
Education	42	13.3	85.7	14.3	24.4	8.8	
Government Employee	20	6.3	65.0	35.0	27.1	9.2	
Other	47	14.9	89.4	10.6	25.0	8.5	
Not Employed	41	13.0	97.6	2.4	16.4	11.1	

Health Literacy Indices:

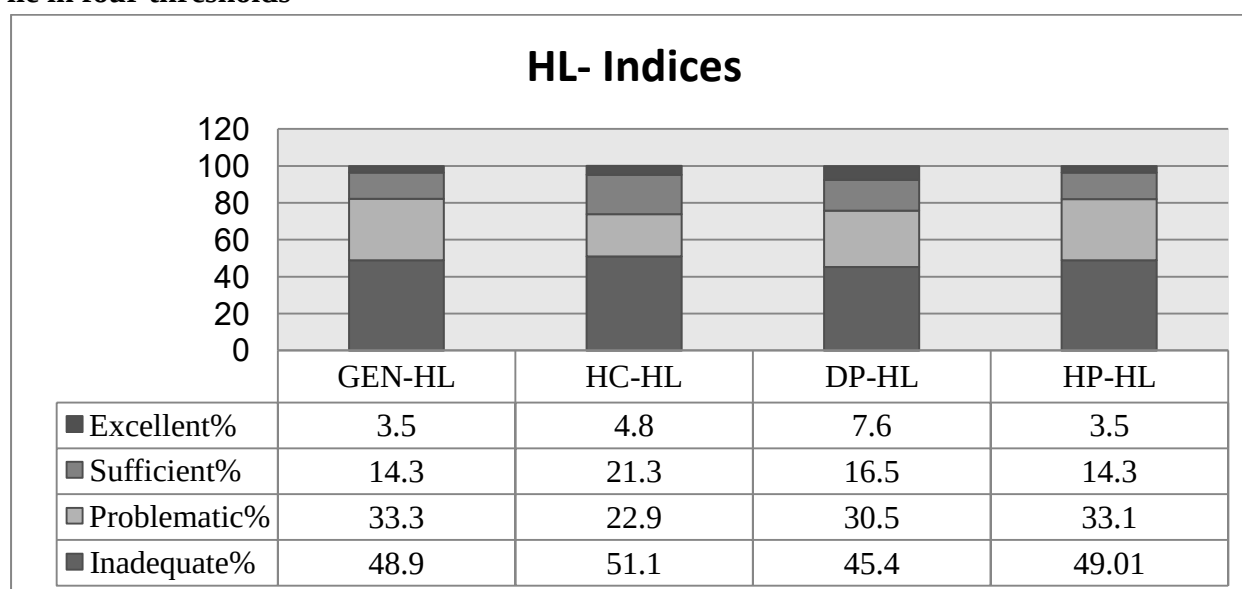
Mean Gen-HL score was 25.1 (SD 9.7) categorized as problematic health literacy. The Mean and SD of three HL indices were computed separately and categorized percentages in the four thresholds of health literacy in Table 3, graphical illustration in Figure 2. The three domains (HC, DP, HP) of health literacy and four competencies (access, understand, judge, apply) were unified by Index Formula and showing in Matrix-a.

Table 3: Health Literacy Indices

HEALTH LITERACY INDICES

GEN-HL	Mean (M) SD Categorized index (%) Inadequate Problematic Sufficient Excellent	25.1 9.7 48.9 33.3 14.3 3.5
HC-HL	Mean (M) SD Categorized index (%) Inadequate Problematic Sufficient Excellent	26.13 9.89 51.1 22.9 21.3 4.8
DP-HL	Mean (M) SD Categorized index (%) Inadequate Problematic Sufficient Excellent	25.5 9.7 45.4 30.5 16.5 7.6
HP-HL	Mean (M) SD Categorized index (%) Inadequate Problematic Sufficient Excellent	24.02 9.84 49.0 33.1 14.3 3.5

Figure 2: Comparison of Mean Health Literacy Indices and Percentages of Respondents lie in four thresholds



Matrix-a: Health Literacy Survey Scores

HLS MATRIX	1.Finding information on health(FHI)	2.Understanding information on health(UHI)	3.Judging information on health(JHI)	5.Applying information on health(AHI)
1.Health Care (HC)	23.7 (Inadequate)*	27.4 (Problematic)**	24.2 (Inadequate)	29.1 (Problematic)
2.Disease Prevention (DP)	25.9 (Problematic)	29.8 (Problematic)	24.8 (Inadequate)	21.8 (Inadequate)
3.Health Promotion (HP)	20.3 (Inadequate)	27.4 (Problematic)	27.7 (Problematic)	21.3 (Inadequate)

Cutoffs:

*Inadequate HL = scores of 25 or less points

**Problematic HL = scores > 25- 33 points

***Sufficient HL = scores >33- 42 points

**** Excellent HL = scores > 42-50 points

DISCUSSION AND RECOMMENDATIONS:

Discussion

Limited Health Literacy pertains in 82.4% of Karachi population irrespective of gender, age, education and profession.

Each domain in terms of the information-processing competency discussed below to give concept-based evidence.

Health Care domain

The mean HC-HL score was 26.13 interpreted in problematic health literacy threshold. In this domain people had inadequacy in finding and judging health information. More than 50% of people had difficulty in finding information about what to do in case of a medical emergency, in judging the information given by doctor and in applying the information given by doctor about their illness to make decisions. Moreover, more than 60% people had difficulty in understanding the leaflets that come with the medicines and in judging the advantages and disadvantages of different treatment options. It is evident from various studies that people having low health literacy level faced difficulty in utilization of health care services, experienced problems with understanding of medical leaflets and in making decisions due to lack of communication between health care providers and patient⁽²⁰⁾. The possible reasons were language barriers and difficult medical terminologies⁽²¹⁾ and inadequate doctor-patient communication⁽²²⁻²⁴⁾. In our results, almost 75% people understood doctors' and pharmacists' instructions as communication was done in common languages, however; finding competency of the information and judging the advantages and disadvantages were inadequate. Health literacy is a two-way communication, health care providers need to understand the ability of the patient and hence, provide understandable/ easy instructions and adequate health information⁽⁴⁵⁾.

Disease Prevention domain

The mean DP-HL score was 25.5 interpreted as problematic health literacy threshold. In this domain people judging and applying competency was inadequate. People experienced less difficulty in finding and understanding the information regarding smoking, less physical activity, vaccination, screenings and how to manage blood pressure/cholesterol but more than 50% people had inadequate judging competency for which vaccination or screening test they should have. Almost 62% people faced difficulty in finding information on how to manage mental health problems like stress or depression; This evidence is supported by the WHO report that claims Pakistan suffers from mounting burden of mental diseases⁽⁷⁾. The other health care behavior was observed that 57% people had difficulty in judging when the people needed to go to a doctor for check-up, most of the people respond that they visited to the doctor when their illness got worse (we included this response in "fairly difficult" scale). This reflects the increase cost and burden on health providers and as a whole on health care system. About 71% people had difficulty in deciding when to have a flu vaccination, alarming 58.1% did not know that there is any vaccination for flu available. Health literacy effect the disease prevention behavior among population. In this study a question was asked about the chronic disease occurrence in parents and grandparents. The result showed that prevalence of diabetes 30.2%, Hypertension 19.7% and Heart diseases 13.3% consistent with the other studies in Pakistan^(26, 27). The burden of these preventable disease could be reduced by health literacy, evidence from other studies suggested⁽²⁸⁻³⁰⁾.

Health Promotion domain

The mean HP-HL score was 24.0 interpreted as inadequate health literacy, the lowest score among the three domains. The people had major difficulty in finding information. More than 65-75% people had difficulty in finding information about activities those were good for the mental well-being, how neighborhood could be health-friendly and the political changes occurred in the country that may affect the health. Majority of people had difficulty in participating in the activities that improve health and well-being in the community. People only knew about the polio vaccination campaigns. People were unaware about new governmental health policies and legislations as it was evident in the study that policies and services are more towards curative aspect of health care rather than preventive in Pakistan⁽³¹⁾. More than 50% people had difficulty in judging how their living places affect their health and well-being and making decisions to improve their health. The health care professionals, especially medical students, doctors and nurses are not formally trained in providing the health information, to which people had direct access. Despite the recognition of increasing importance of health promotion strategies in economic well-being of the country, less has been done in our country. Health educators and public health professionals need to focus on mental well-being; health -friendly neighborhood and increase the participation of the people which comes through health literacy⁽³²⁾. Health literacy is the component of health promotion which ultimately affects the health status and quality of life.

Limitations of the study

- The respondents from medical profession had high mean Gen-HL 34.0 which was the sufficient health literacy threshold constituted 7% of the total sample size. If these respondents were excluded then health literacy scores might have decreased more.
- The sampling bias of self-selection as participating voluntarily in the study might exclude the people who were illiterate and affect the results.

Delimitations of the study

- The budget constrain restricted the study to be conducted in 3 union councils only.
- Adolescents could also be included in the study.

Strength of the study

- This study is the first of its kind in Pakistan providing the evidence-based data on health literacy
- The concepts of health literacy were clearly defined.
- The domains of health literacy and the information processing competencies were separately assessed and indexed.
- The cutoff values of health literacy indices were standardized and can be used for comparison internationally.
- The sample size is small to generalize the results however the sample statistics are the interpretation of the parameters as consistent with other studies.

Conclusion

Health literacy is important concept for the individual, society, health care professionals, policy makers and health care systems and organizations because of its major impact on health and well being. This study is a preliminary investigation survey to provide concept-based evidence about Health Literacy. People have limited health literacy in Pakistan. Most of the people faced difficulty in finding health information regarding health promotion domain which suggested the compromised decisions for better health. In Pakistan, the health services are more inclined towards curative health care and the less focus given to the

preventive measures. The understanding, judging and applying competencies were inadequate in health care and disease prevention domains. The probable cause would be barrier in communication of health care providers and general people. The health literacy is the empowering tool for individual and society to enjoy better health status and quality of life.

Recommendations

- Policy recommendation on “Health Literacy” from grass root level to government level. The Union Councils are the basic administrative unit; the women health literacy programs, adult health literacy could be initiated.
- Policy recommendation to education institutes and health care organizations for the improvement in health literacy.
- Health literacy is the essential element. The barriers to health literacy like cultural, linguistic and health beliefs need to be studied and addressed in our context.
- Determinants of health literacy required further investigations.
- The health literacy interventional studies recommended.

Ethical Consideration

The permission for conducting this study was granted by Research Review Committee of School of Public Health, Dow University of Health Sciences. This study is not violating any ethical aspect regarding the respondents’ autonomy and confidentiality, as there is no respondent personal identification is required in this study.

Competing Interest

The authors declare they have no competing interest.

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Association between Duration of Breastfeeding During Childhood and Frequency of Chronic Illness Among Student

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INDIA.

Abstract

Association between Duration of Breastfeeding during Childhood and Frequency of Chronic Illness among students.

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Objective: To evaluate association between duration of breastfeeding during childhood and frequency of chronic illness among IMS students.

Background:

It is known that breastfed babies are less likely to get chronic illness than are formula-fed or non-breastfeeding babies due to factors that help to support and increase a baby's immune system. We wanted to assess relationship, if any, between duration breast feeding during infancy and adult health problems.

Method:

This is a cross sectional study performed in a university setup where 100 participants were randomly picked. A self-reporting questionnaire about the association between duration of breastfeeding during childhood and frequency in experiencing chronic illness was administered.

The response is collected and analyzed.

Results

In this study, amongst percentage of participants who have been breastfed for 0-1 year the chances of getting sick frequently was 22.2% while from percentage of participants that have been breastfed more than 1 year the chances of getting sick frequently was 14.5%. The association between participants who have been breastfed for a duration 0-1 year and more than one year and getting sick easily was statistically less as compared to non-breast fed ones. Similarly, participants who were well breast fed had a lesser tendency to become obese.

Conclusion: Based on the findings of this study, there is a large number of participants from IMS who were breastfed during their childhood despite most of them have mothers with careers and had a better health profile. An infant's immunity development is highly dependent on antibodies that it obtained from milk of a mother. Thus, it is imperative that individuals who were breastfed have a stronger immunity and hence less risk for getting sick. This information needs to be passed on to the society for better health of their progeny.

INTRODUCTION

Nutrition is essential to the health and development of infants and children. Breastfeeding is superior to infant formula feeding because in addition to breast milk's nutritional advantages, it protects against infections through specific and nonspecific immune factors and has long-term consequences for metabolism and disease later in life.(1)

The objective of this study is to prove there is strong association between prolonged breastfeeding and frequency of chronic illness among student. There is much epidemiological evidence for the benefits of breastfeeding to the human infant against a wide range of illnesses and infections. Other scientific evidence for breastfeeding has demonstrated specific components that provide immunologic protection and beneficial effects on intestinal flora.

Human milk enhances the immature immunologic system of the neonate and strengthens host defense mechanisms against infective and other foreign agents. Mechanisms to explain active stimulation of the infant's immune system by breastfeeding are through bioactive factors in human milk. Following breastfeeding termination there may be prolonged protection against infections due to influences on the infant immune system mediated via human milk. World-wide initiatives have been established to promote breastfeeding and curb the use of infant formula.(2)

Breast milk contains several anti-infective factors such as bile salt stimulated lipase (protecting against amoebic infections) and lactoferrin (which binds to iron and inhibits the growth of intestinal bacteria). Antimicrobial activity of lactoferrin in the gut of the newborn infant The ability of lactoferrin to inhibit the growth of certain microorganisms in vitro has been well documented.(3)

AIM

To study the Association between Duration of Breastfeeding During Childhood and frequency in experiencing Chronic Illness Among IMS student

OBJECTIVES

- To prove there is strong association between duration breastfeeding and frequency in experiencing chronic infection
- To emphasize the importance of breastfeeding practice during infancy
- To increase the awareness about the benefits of breastfeeding which help in reducing the incidence of chronic infection.

HYPOTHESIS

Correlation between breastfeeding during childhood and better quality of life during adulthood

METHODOLOGY

A) Study area:-

International medical school of management and science university offshore campus Bangalore, India

B) Study population:-

100 students of IMS Bangalore

C) Study design:-

Cross sectional Study

D) Instruments:-

Questionnaire

E) Method:

This is a cross sectional study performed in a university

100 Participants are randomly picked from all students from IMS MSU Bangalore Campus

A self-reported questionnaire about the association between duration of breastfeeding and frequency in experiencing chronic infection

The questionnaire is then collected to be analyzed

- F) Plan of analysis:-
Descriptive statistics

Results

Gender		
	Frequency	Percent
Female	67	67.0
Male	33	33.0

From the 100 total students, 67(67.0%) participants are male and female are 33 (33.0%)

Table 1: Percentage of Breastfeeding and non-breastfeeding during childhood

	Number	Percentage (%)
Breastfeeding	98	98%
Non-Breastfeeding	2	2%

Of total 100 students, 98 (98%) participants have been breastfed during childhood, 2 (2%) have not been breastfed during childhood.

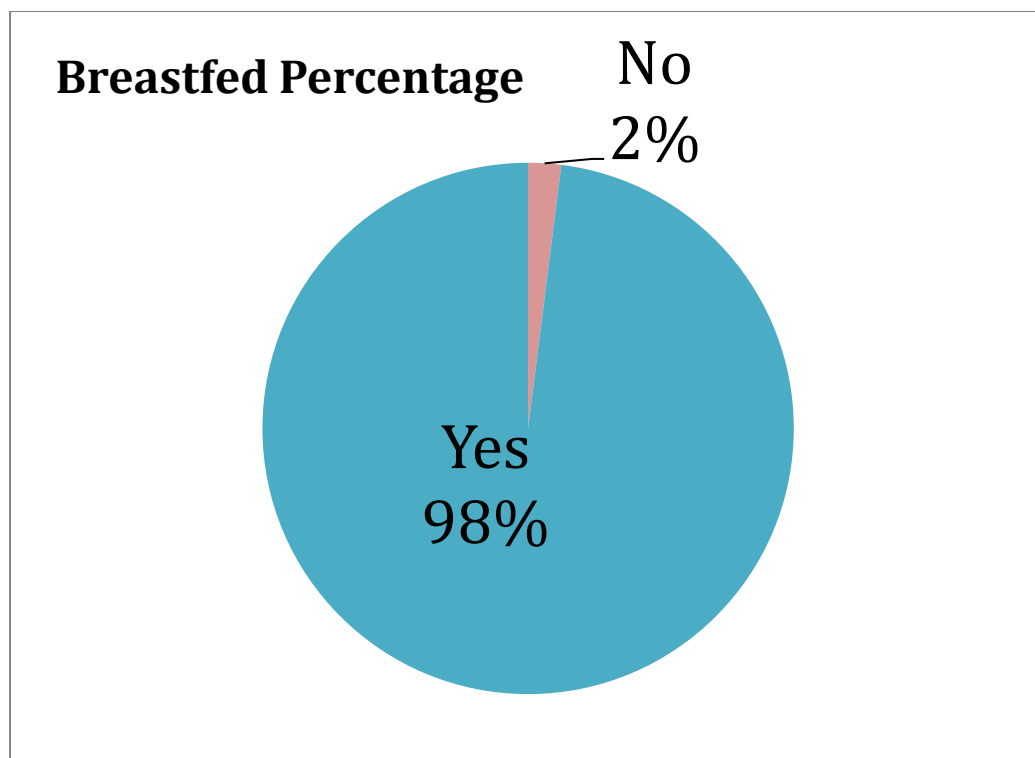
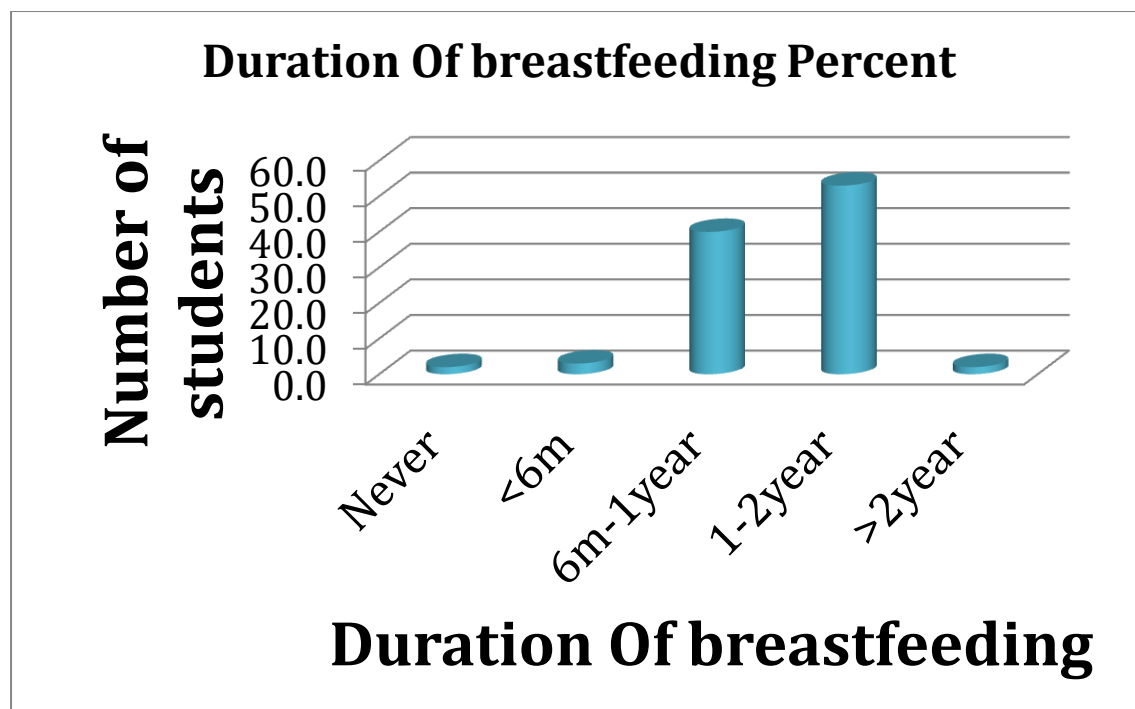


Table 2: Duration of breastfeeding during childhood

	Frequency	Percent
Never	2	2.0
<6m	3	3.0
6m-1year	40	40.0
1-2year	53	53.0
>2year	2	2.0

From 100 students, there is 2(2.0%) participants who have never been breastfed, 3(3.0%) participants that have been breastfed in <6 months, 40 (40%) participants that have been breastfed 6 months to 1 years, 53(53%) participants that have been breastfed 1-2 years and 2(2.0%) participants that have been breastfed for >2 years.



Working mother		
	Frequency	Percent(%)
No	28	28.0
Yes	72	72.0

From total 100 students, 72(72.0%) participants have mothers who are working and 28(28%) participants have mothers who are not working.

Working mother Percent

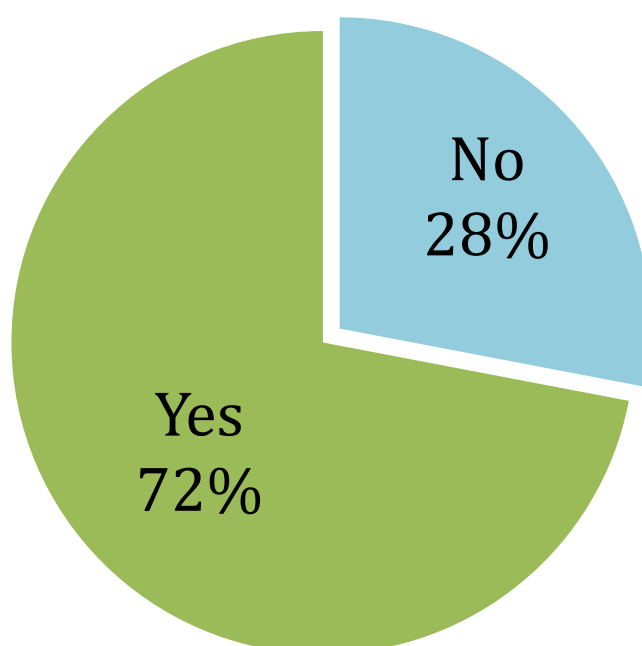


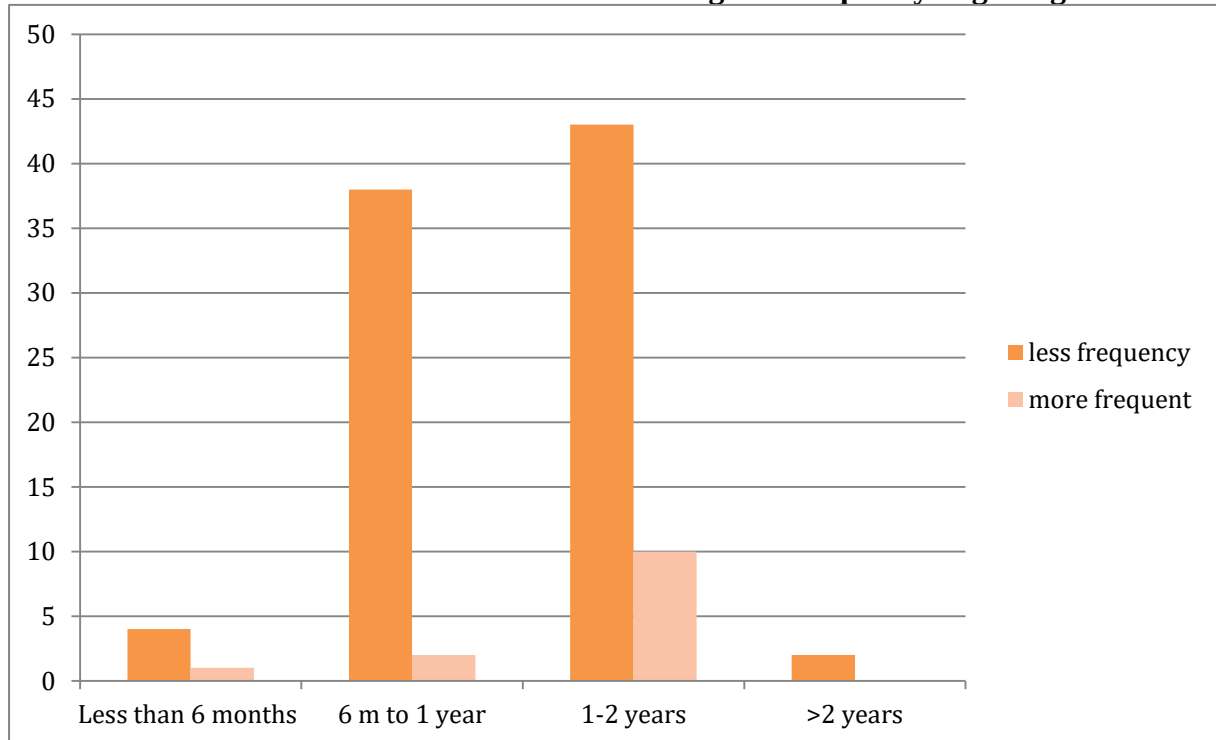
Table 3: selected question based on questionnaires

Questions No.	Answer; YES	Answer; NO
1.Have you been breastfeed during childhood?	98	2
2.Was your mother a working woman?	72	28
3.Do you have any overweight problem?	20	80
4.Do you have any childhood illness?	35	65
5.Do you feel immunologically strong?	84	16

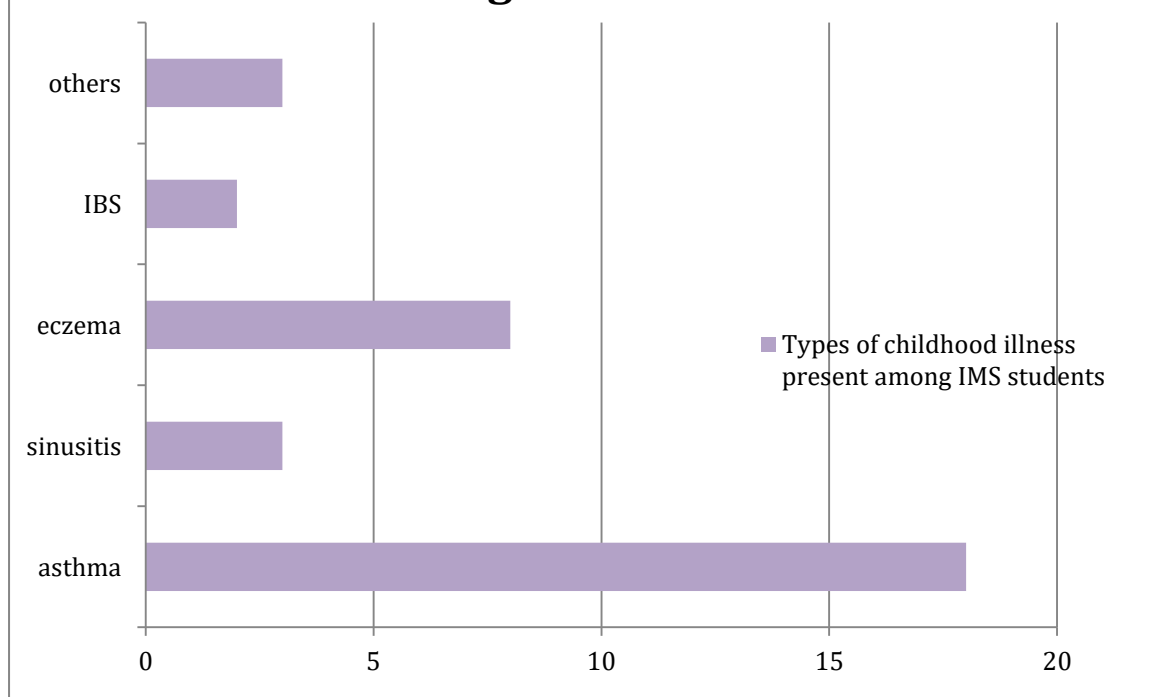
Based on the questionnaires given; Question 1,98(98.0%)have answered ‘Yes’ while 2(2.0%) answered ‘ No’. Question 2;72(72%) participants answered ‘Yes’ and 28(28%) participants answered ‘No’. Question 3; 20(20%) participants answered ‘Yes’ while

80(80%) participants answered 'No'. Question 4; 35(35%) participants answered 'Yes' while 65(65%) participants answered 'No'. Question 5; 84(84%) participants answered 'Yes' while 16(16%) participants answered 'No'.

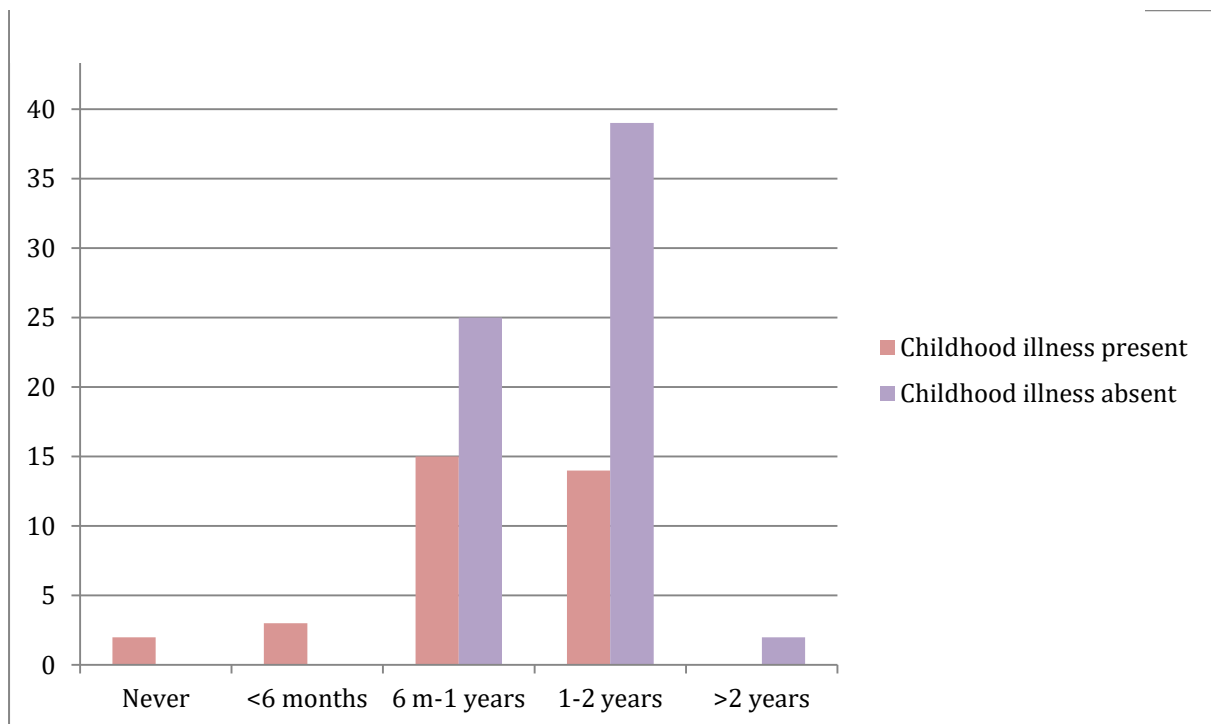
Association between duration of breastfeeding and frequency in getting sick



Types of childhood illness present among IMS students



ASSOCIATION BETWEEN DURATION OF BREASTFEEDING AND NUMBER OF STUDENTS THAT HAVE CHILDHOOD ILLNESS

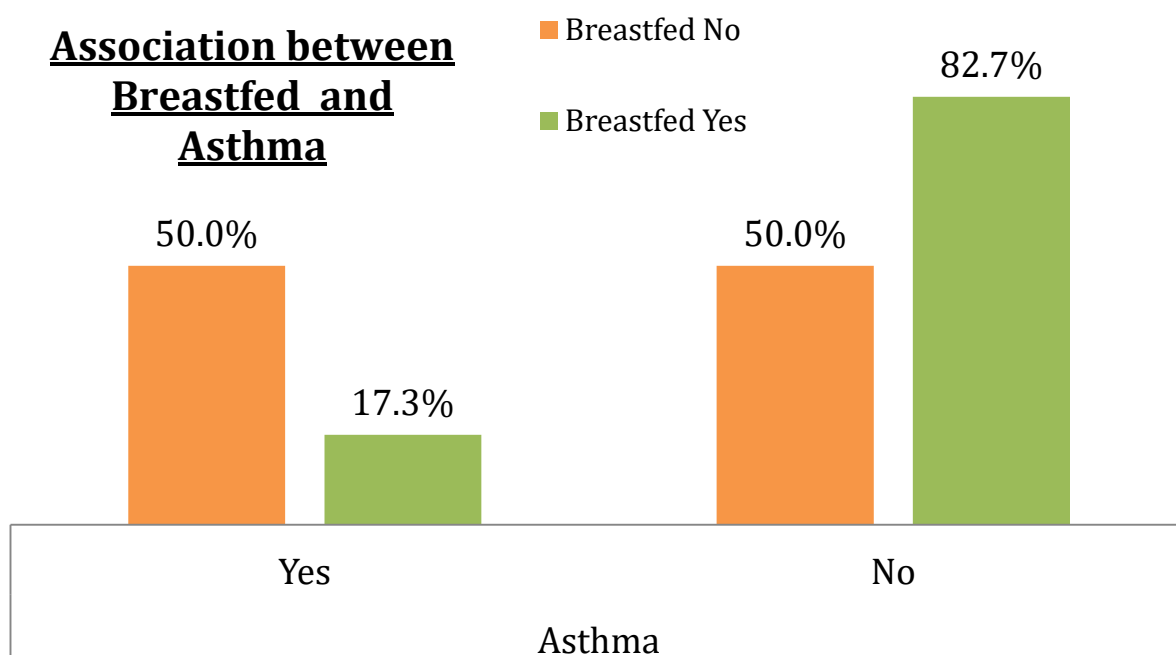


Association of participants who have been breastfed and non-breastfed during childhood with asthma

			Asthma	
			Yes	No
Breastfed	No	Count	1	1
		% within Breastfed	50.0%	50.0%
	Yes	Count	17	81
		% within Breastfed	17.3%	82.7%

In this study, from percentage of participants that have not been breastfed during childhood, the chances of getting asthma is 50% while from a percentage of participants that have been breastfed during childhood, the chances of getting asthma is 17.3% .

The association of breastfed participants and non-breastfed participants with asthma is significant

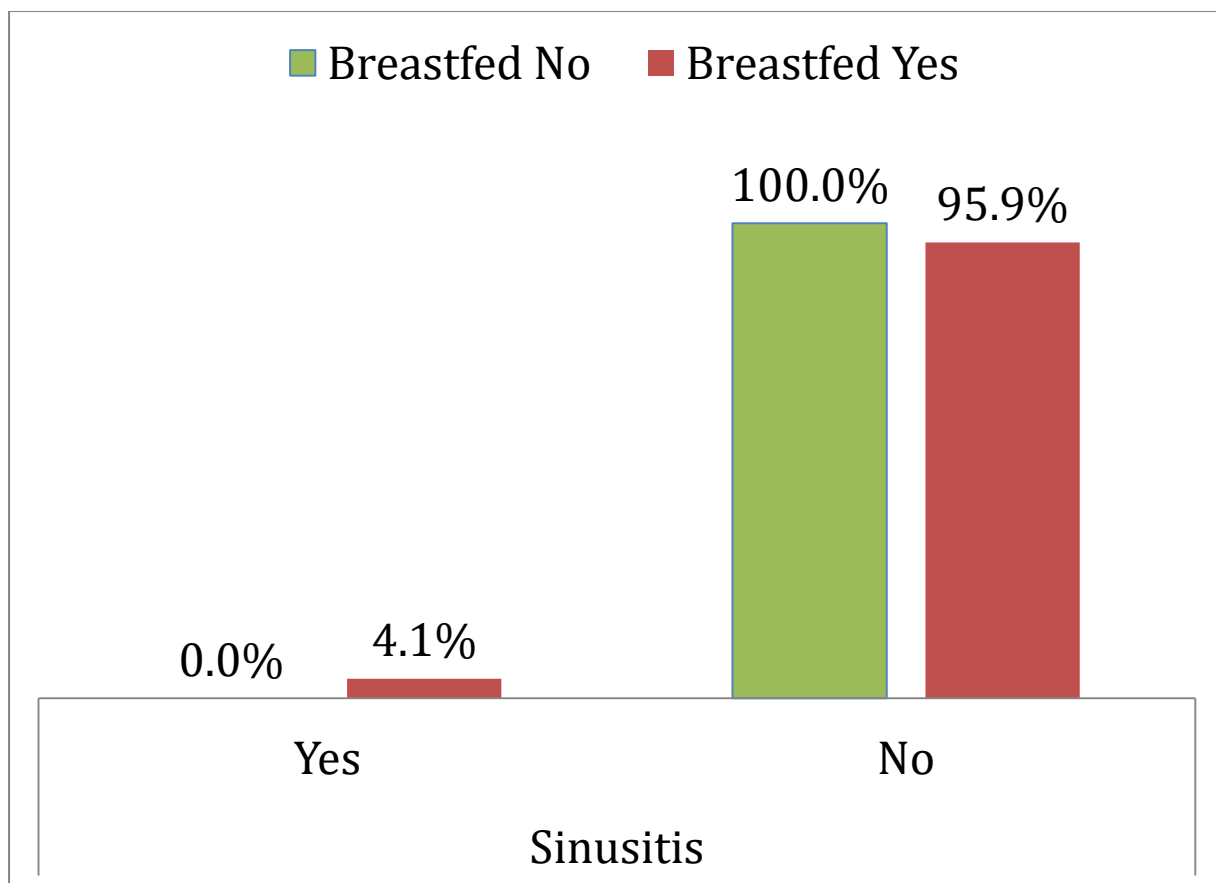


Association of participants who have been breastfed and non-breastfed during childhood with sinusitis.

			Sinusitis	
			Yes	No
Breastfed	No	Count	0	2
		% within Breastfed	0.0%	100.0%
	Yes	Count	4	94
		% within Breastfed	4.1%	95.9%

In this study, based on the percentage of participants that have not been breastfed during childhood, 2 (100%) participants do not have sinusitis while there is 0 (0.0%) participant have asthma. From percentage of participants that have been breastfed during childhood ,94(95.9%) participants do not have asthma while 4(4.1%) have asthma.

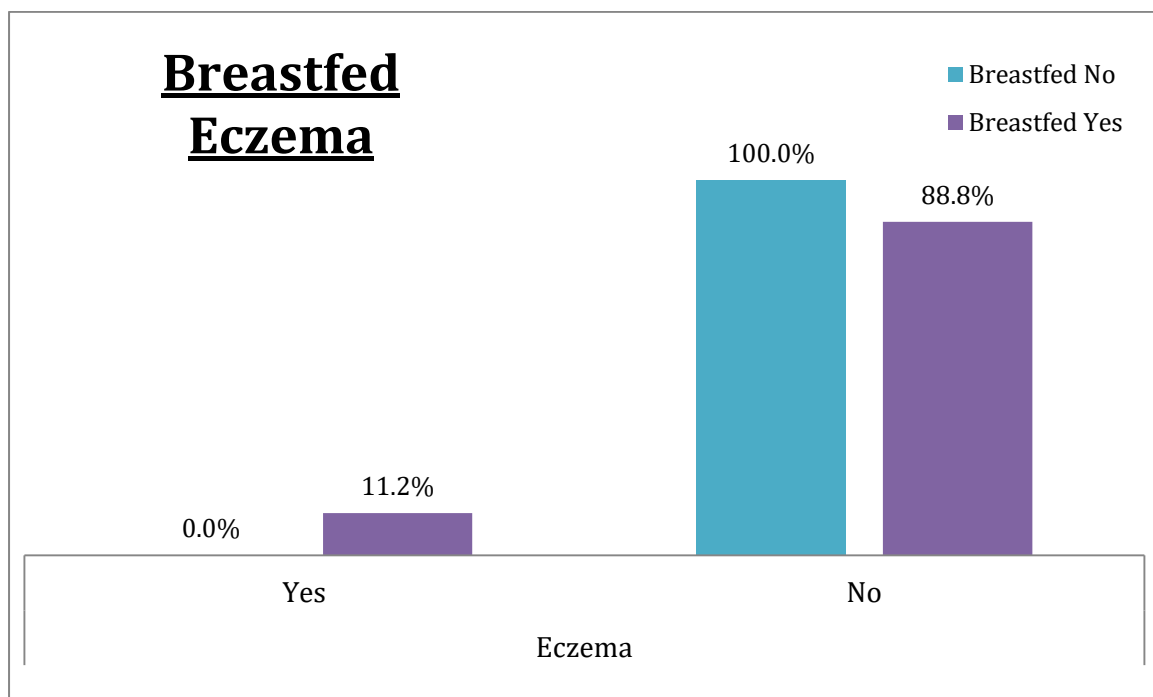
The association between participants who have been breastfed and non-breastfed during childhood with sinusitis is not significant.



Association of participants who have been breastfed and non-breastfed during childhood with eczema

			Eczema	
			Yes	No
Breastfed	No	Count	0	2
		% within Breastfed	0.0%	100.0%
	Yes	Count	11	87
		% within Breastfed	11.2%	88.8%

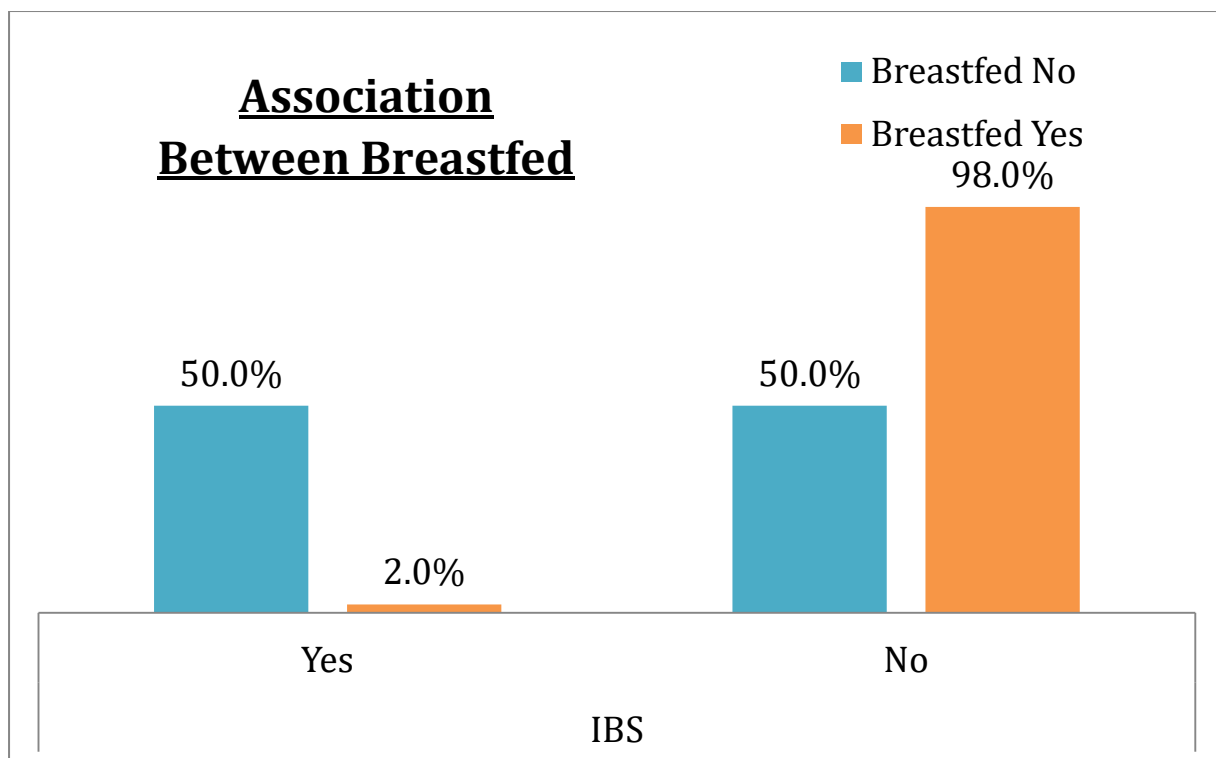
In this study, based on the percentage of participants that have not been breastfed during childhood, 2(100%) participants do not have eczema while 0 (0.0%) participants have asthma. From percentage of participants that have been breastfed during childhood,87(88.8%) participants do not have eczema while 11(11.2%) have eczema. The association between participants who have been breastfed and non-breastfed during childhood with eczema is not significant



Association of participants who have been breastfed and non-breastfed during childhood with Inflammatory Bowel Syndrome

			IBS	
			Yes	No
Breastfed	No	Count	1	1
		% within Breastfed	50.0%	50.0%
	Yes	Count	2	96
		% within Breastfed	2.0%	98.0%

In this study, from percentage of participants that have not been breastfed during childhood, the chances of getting IBS is 50% while from a percentage of participants that have been breastfed during childhood, the chances of getting IBS is 2.0% .
The association of breastfed participants and non-breastfed participants with IBS is significant

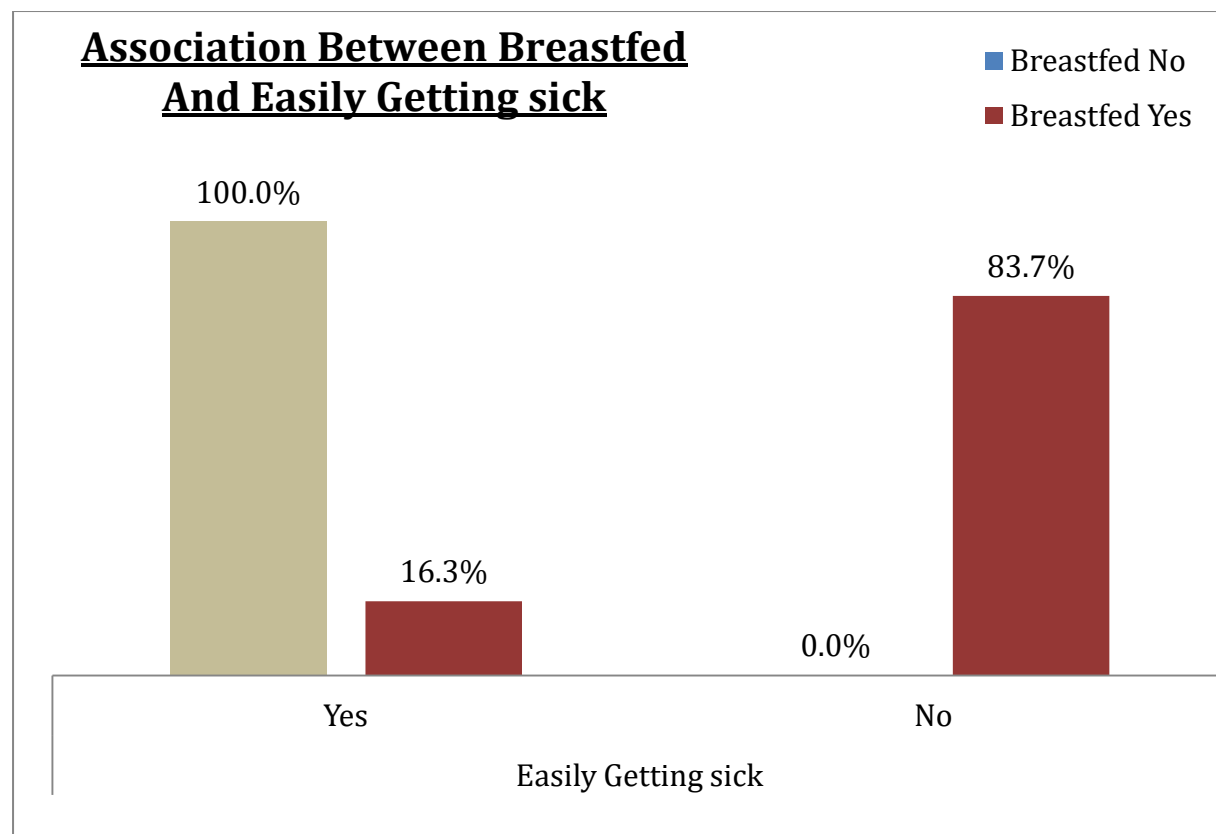


Association of participants who have been breastfed and non-breastfed during childhood with easily getting sick

			Easily Getting sick	
			Yes	No
Breastfed	No	Count	2	0
		% within Breastfed	100.0%	0.0%
	Yes	Count	16	82
		% within Breastfed	16.3%	83.7%

In this study, from percentage of participants that have not been breastfed during childhood, the chances of getting sick easily is 100% while from a percentage of participants that have been breastfed during childhood, the chances of getting sick easily is 16.3% .

The association of breastfed participants and non-breastfed participants with getting sick easily is significant

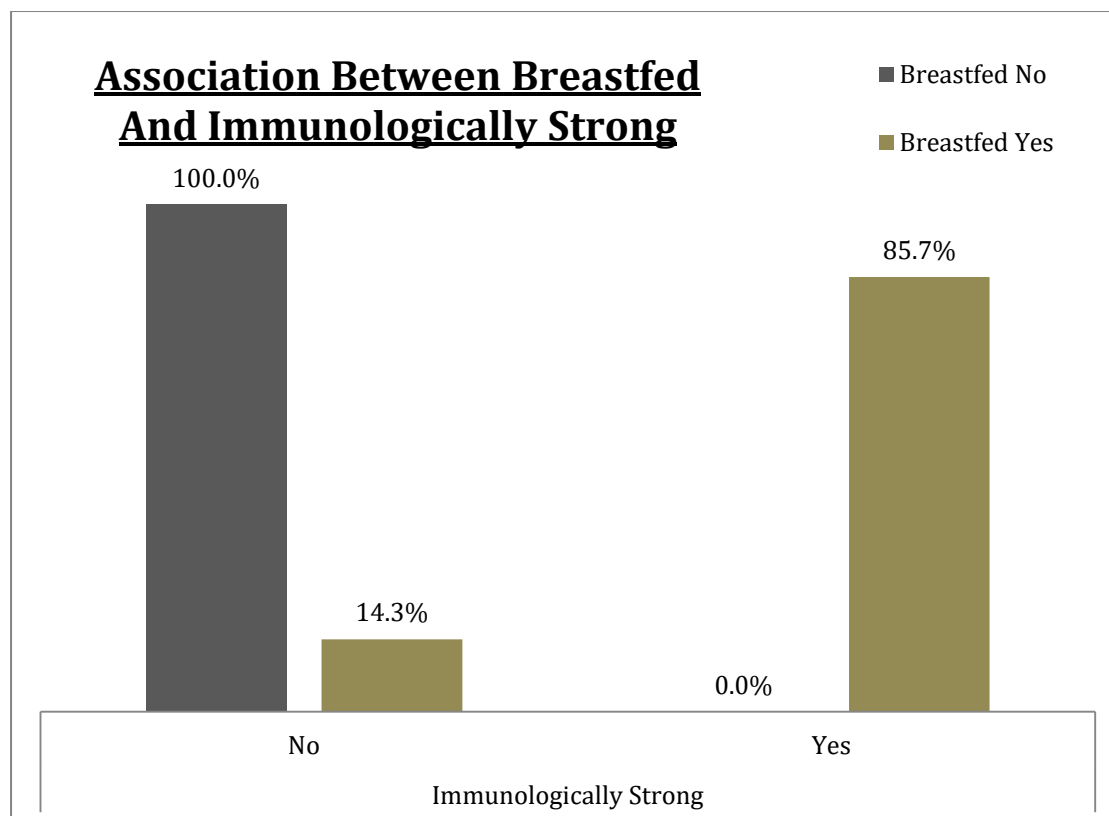


Association of participants who have been breastfed and non-breastfed during childhood with getting immunologically strong

			Immunologically Strong	
			No	Yes
Breastfed	No	Count	2	0
		% within Breastfed	100.0%	0.0%
	Yes	Count	14	84
		% within Breastfed	14.3%	85.7%

In this study, from percentage of participants that have not been breastfed during childhood, the chances of getting immunologically strong is 0.0% while from a percentage of participants that have been breastfed during childhood ,the chances of getting immunologically strong is 85.7%

The association of breastfed participants and non-breastfed participants with getting immunologically strong is significant.



Association between Duration of Breastfed with presence of Asthma

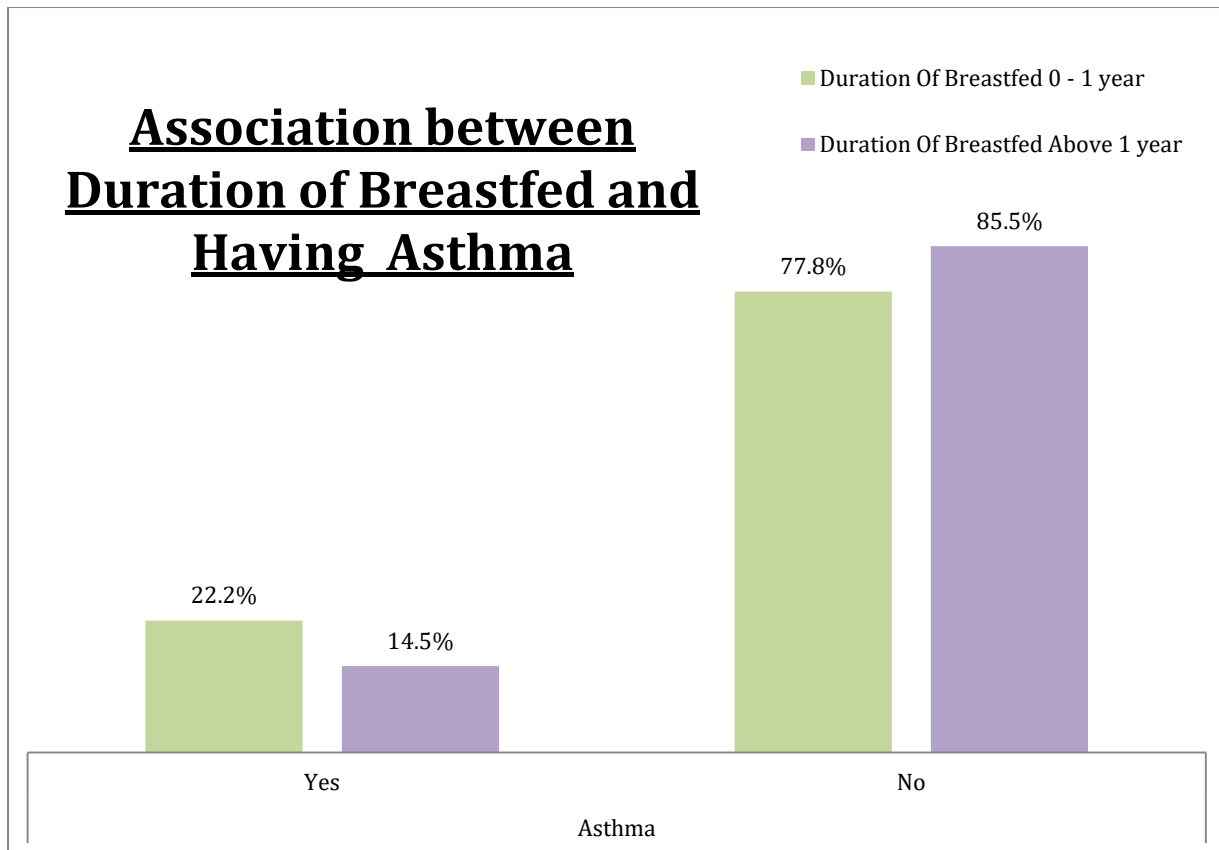
			Asthma	
			Yes	No
Duration Of Breastfeeding	0 - 1 year	Count	10	35
		% within dur_breast_feeding	22.2%	77.8%
	More 1 year	Count	8	47
		% within dur_breast_feeding	14.5%	85.5%

Chi square = 0.606

In this study, from percentage of participants that have been breastfed for 0-1 year, 22.2% participant has asthma. while from percentage of participants that have been breastfed more than 1 year, 14.5% participants have asthma.

The association between participants that have been breastfed for duration of (0-1) year and more than 1 year with presence of asthma is statistically significant

Association between Duration of Breastfed and Having Asthma



Association between Duration of Breastfed with presence of Sinusitis

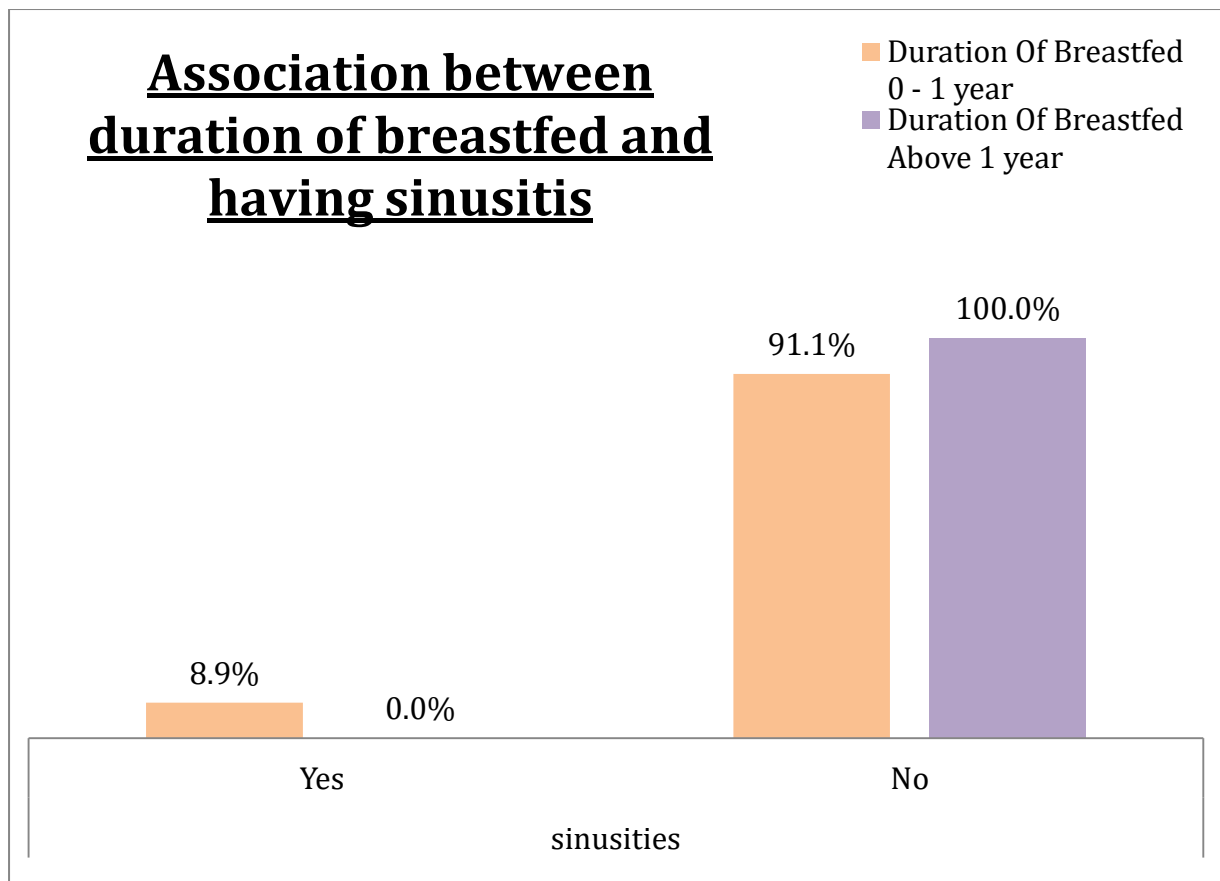
			Sinusitis	
			Yes	No
Duration Of Breastfeeding	0 - 1 year	Count	4	41
		% within dur_breast_feeding	8.9%	91.1%
	Above 1 year	Count	0	55
		% within dur_breast_feeding	0.0%	100.0%

Chi square = 0.034

In this study, from percentage of participants that have been breastfed for 0-1 year, 8.9% participant has sinusitis while from percentage of participants that have been breastfed more than 1 year, no participants have sinusitis.

The association between participants that have been breastfed for a duration 0-1 year and above 1 year with presence of sinusitis is statistically significant

Association between duration of breastfed and having sinusitis



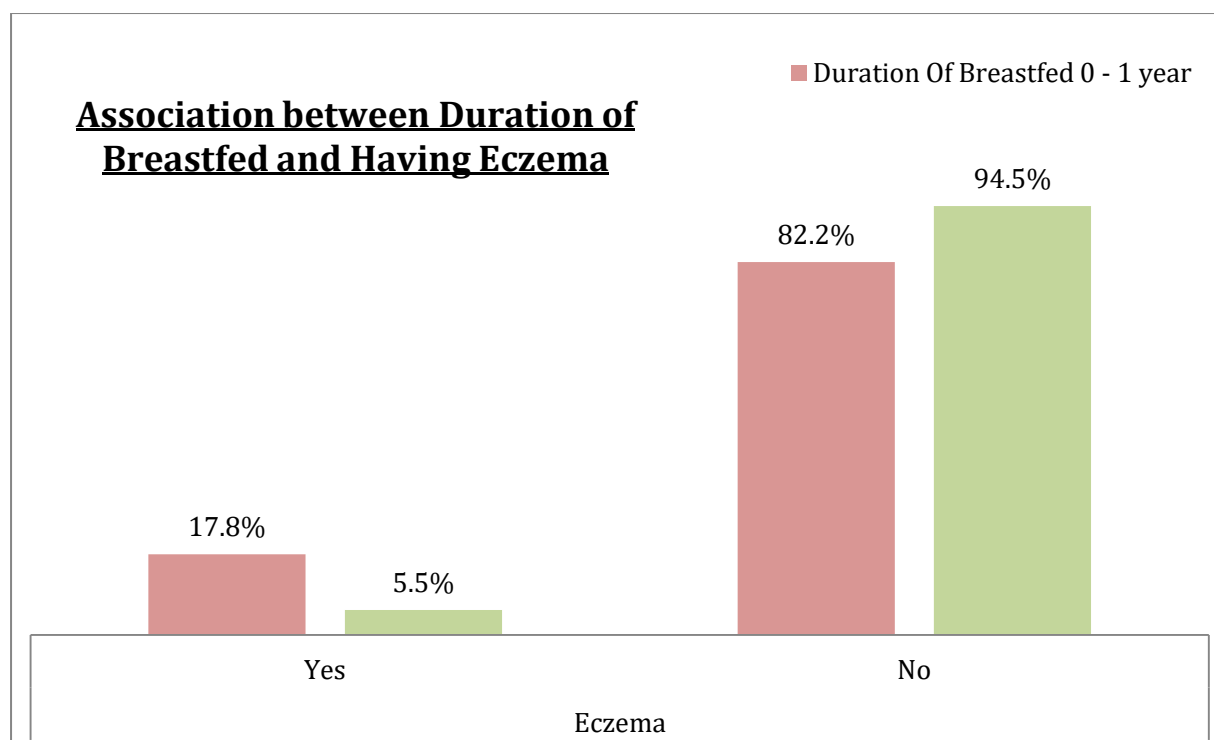
Association between Duration of Breastfed with presence of Eczema

			Eczema	
			Yes	No
Duration Of Breastfed	0 - 1 year	Count	8	37
		% within dur_breast_feeding	17.8%	82.2%
	Above 1 year	Count	3	52
		% within dur_breast_feeding	5.5%	94.5%

Chi square = 0.258

In this study, from percentage of participants that have been breastfed for 0-1 year, 17.8% participant has eczema while from percentage of participants that have been breastfed more than 1 year, 5.5% participants have eczema.

The association between participants that have been breastfed for a duration 0-1 year and above 1 year with presence of eczema is statistically significant



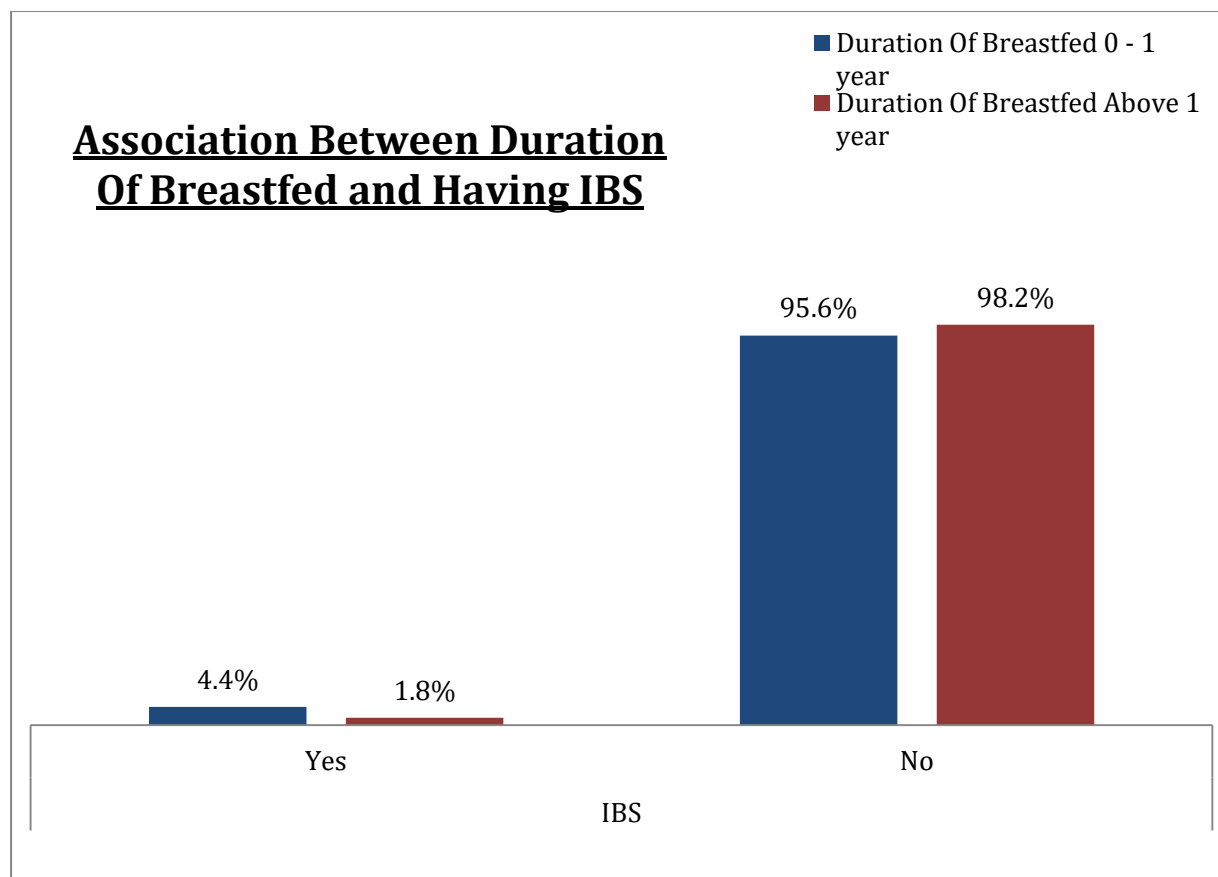
Association between Duration of Breastfed with presence of Inflammatory Bowel Syndrome

			Inflammatory Bowel Syndrome	
			Yes	No
Duration Of Breastfed	0 - 1 year	Count	2	43
		% within dur_breast_feeding	4.4%	95.6%
	Above 1 year	Count	1	54
		% within dur_breast_feeding	1.8%	98.2%

Chi square = 0.0036

In this study, from percentage of participants that have been breastfed for 0-1 year, 4.4% participant has IBS while from percentage of participants that have been breastfed more than 1 year, 1.8% participants have IBS.

The association between participants that have been breastfed for a duration 0-1 year and above 1 year with presence of IBS is statistically significant.



Association between Duration of Breastfed with participants easily getting sick

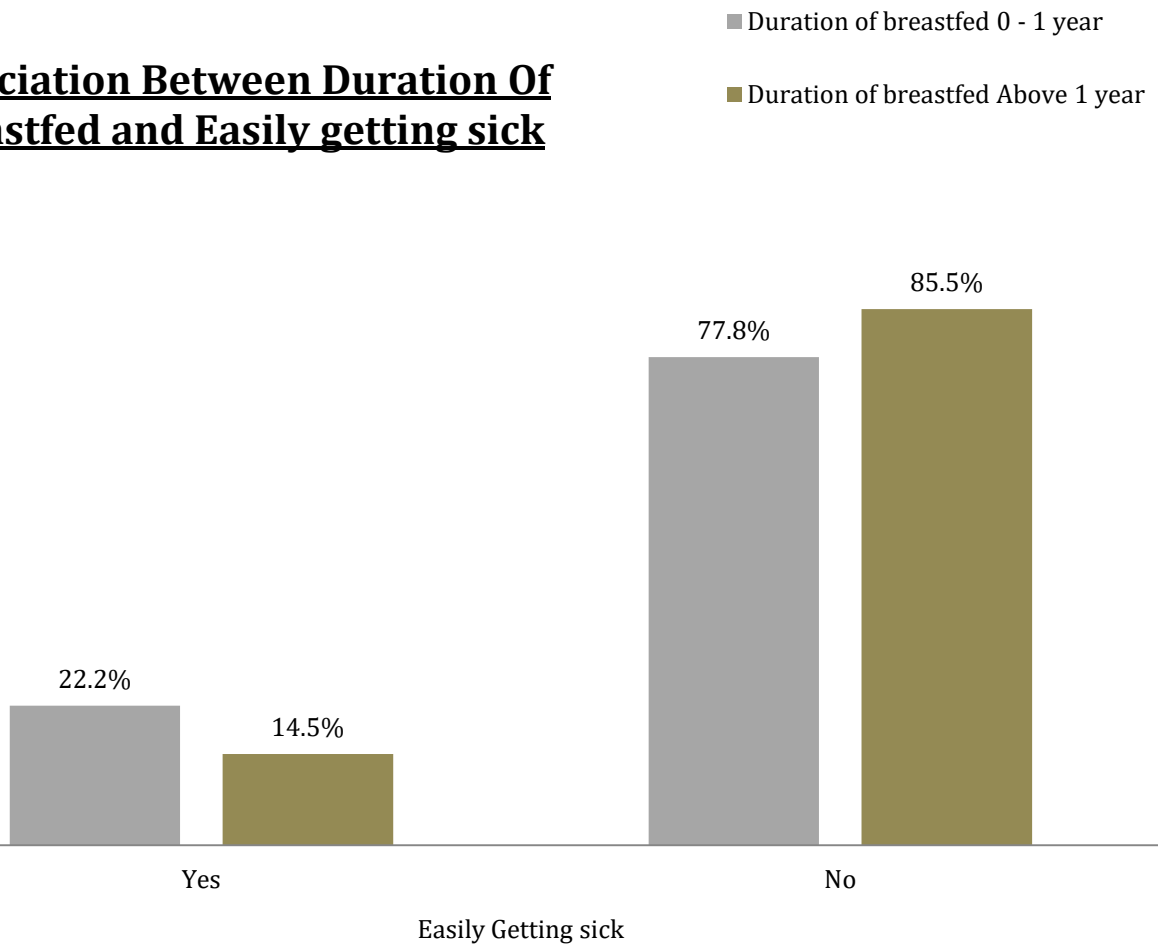
			Easily Getting sick	
			Yes	No
Duration of breastfed	0 - 1 year	Count	10	35
		% within dur_breast_feeding	22.2%	77.8%
	Above 1 year	Count	8	47
		% within dur_breast_feeding	14.5%	85.5%

Chi square = 0.031

In this study, from percentage of participants that have been breastfed for 0-1 year, the chances of getting sick easily is 22.2% while from percentage of participants that have been breastfed more than 1 year, the chances of getting sick easily is 14.5%.

The association between participants that have been breastfed for a duration 0-1 year and more than 1 year with participants getting sick easily is statistically significant.

Association Between Duration Of Breastfed and Easily getting sick



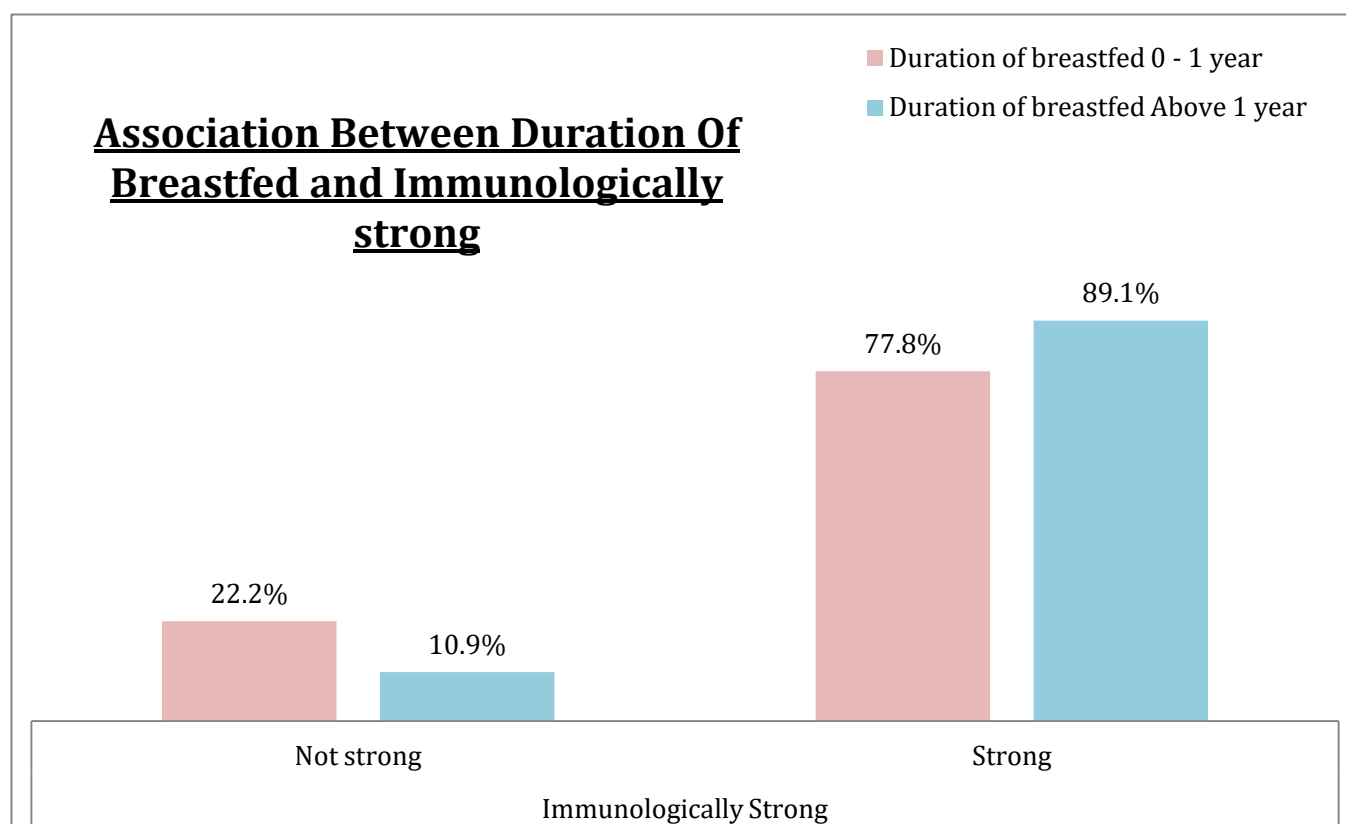
Association between Duration of Breastfed with participants g immunologically strong

			Immunologically Strong	
			Not strong	Strong
Duration of breastfed	0 - 1 year	Count	10	35
		% within dur_breast_feeding	22.2%	77.8%
	Above 1 year	Count	6	49
		% within dur_breast_feeding	10.9%	89.1%

Chi square = 0.012

In this study, from percentage of participants that have been breastfed for 0-1 year, the chances of getting immunologically strong is 77.8% while from percentage of participants that have been breastfed more than 1 year, the chances of getting immunologically strong is 89.1%.

The association between participants that have been breastfed for a duration 0-1 year and above 1 year with feeling immunologically strong is statistically significant.



Association between participants who have been breastfed and non-breastfed during childhood with overweight problem

			Overweight Problem	
			No	Yes
Breastfeeding	No	Count	2	0
		% within Breastfed	100.0%	0.0%
	Yes	Count	78	20
		% within Breastfed	79.6%	20.4%

Chi square test: 0.475

In this study, from percentage of participants that have not been breastfed during childhood, the chances of getting overweight problem is 0% while from a percentage of participants that have been breastfed during childhood, the chances of getting overweight problem is 20.4% . The association between participants that have been breastfed and non-breastfed during childhood with overweight problem is not significant. This is because of insufficient sample size.

Discussion

The purpose of study is to understand the effects of breastfeeding with immunity and the likelihood of getting childhood illnesses. Thus, the results that we have found show that there is significant relation between them.

Human milk provides virtually all the protein, sugar, and fat an infant needs to be healthy, and it also contains many substances that benefit of the infant's immune system, including antibodies, immune factors, enzymes, and white blood cells. These substances protect it against a wide variety of diseases and infections not only while it is being breastfed but in some cases long after it has weaned. Formula cannot offer this type of protection.(4)

Breastmilk is a natural, renewable food source that needs no packaging, no transportation, no storage, no cooking, and no refrigeration. It goes with you, and it is environmentally friendly. It is a win-win for the health of the mother and the child. It creates lower infant mortality, creates benefits for maternal health. It reduces the lifelong risk of noncommunicable chronic diseases for the child, and of course it promotes all that tremendous emotional bonding that comes with breastfeeding. It's a win-win for the child's education because it helps ensure a healthy brain development, longer school attendance, and higher IQ.(5)

The concept of the immune system in human milk emerged in the 1970s from clinical and laboratory observations made between the late 18th through the mid-20th centuries. The discovery of living leukocytes in human milk in 1970 was the final link to the chain of evidence that culminated in the concept. The concept was later expanded to include not only antimicrobial but also anti-inflammatory and immunoregulatory agents. These agents evolved to compensate for developmental delays in the immune system during infancy. Indeed, that explains the defence by human milk against common infectious diseases in infancy, necrotizing enterocolitis in preterm infants, and immune-mediated disorders such as Crohn's disease in later childhood (6)

This defence against illnesses significantly decreases the chances that the baby, that have been breastfed, from suffering afflictions such as ear infections, vomiting, diarrhoea, pneumonia, urinary tract infections, or certain types of spinal meningitis. Infants under the age of one who were breastfed exclusively for at least four months, for instance, were less likely to be hospitalized for a lower respiratory tract infection, such as croup, bronchiolitis, or

pneumonia, than were their formula-fed counterparts. Even infants in group child care programs, who tend to catch more germs due to their close proximity, are less likely to become ill if they are breastfed or fed their mother's' milk in a bottle.

The first 2 years of a child's life are particularly important, as optimal nutrition during this period lowers morbidity and mortality, reduces the risk of chronic disease, and fosters better development overall. Optimal breastfeeding is so critical that it could save about 800 000 under 5 child lives every year. Breastfeeding confers short term and long term benefits on both child and mother, including helping to protect children against a variety of acute and chronic disorders.(7)

Breast milk is a known source of molecules that act synergistically to protect the gut barrier and enhance the maturation of the gut-related immune response. Host-microbe interactions in preterm infants and the protective role of diet focused on breast milk impact are beginning to be unveiled. Current evidence supports the role of microbiota in promoting and maintaining a balanced immune response and the establishment of the gut barrier in the immediate postnatal life.(8)

All humans have a very large number of bacteria that normally reside in their intestines. Some of the bacteria serve normal and healthy functions, and some can cause disease such as diarrhoea. Human milk encourages the growth of healthy bacteria in the intestinal tract of the breastfed baby. It does this by promoting a generally healthy environment and, in part, through substances called prebiotics, which are found in human milk. Since human milk stimulates the growth of these "friendly" strains of bacteria, other bacteria such as *E. coli*, which are more likely to cause disease, are inhibited from growing, multiplying, and attaching to the lining of the intestine, where they can cause infection. It has been well established that formula-fed infants have much higher rates of diarrheal diseases which may require visits to the doctor or sometimes to the hospital for intravenous fluids.(9)

Breastfeeding protects the neonate against pathogen infection. Major mechanisms of protection include human milk glycoconjugates functioning as soluble receptor mimetics that inhibit pathogen binding to the mucosal cell surface, prebiotic stimulation of gut colonization by favorable microbiota, immunomodulation, and as a substrate for bacterial fermentation products in the gut. Human milk proteins are predominantly glycosylated, and some biological functions of these human milk glycoproteins (HMGP) have been reported.(10)

Breastfeeding is recommended for many reasons. With regard to allergy prevention, there is some evidence that breastfeeding protects babies born to families with a history of allergies, compared to those babies who are fed either a standard cow's milk based formula or a soy formula. In these "at risk" families, breastfed babies generally had a lower risk of milk allergy, atopic dermatitis (commonly known as eczema), and wheezing early in life, if they

were exclusively breastfed for at least four months. It is presumed that immune components in maternal milk provide protection against these allergic diseases.

Transfer of the human milk antibodies and other immunologic substances may also explain why children who breastfeed for more than six months are less likely to develop childhood illness such as asthma, sinusitis, eczema and etc. than those who receive formula. Recent research even indicates that breastfed infants are less likely to be obese in adolescence and adulthood.

It should be noted that modern prevention and medical care of infectious diseases tend to be organism specific. For example, influenza vaccination protects against influenza but not against other respiratory virus or bacterial pathogens, and antibiotic therapies can target classes of bacterial pathogens but have no effects on viral or protozoal pathogens. In comparison, human milk feeding is clearly protective against enteric infections caused by multiple bacterial, protozoal, and viral pathogens, aerodigestive tract infections caused by bacteria and viruses and even against bacterial urinary tract infections (UTIs) (11)

Based on the results above it is shown that, there is a significant association between breastfeeding practices and breastfeeding duration with a greater immunity and thus reduces the risk of childhood illness and infections in adulthood.

Hence, it is necessary to educate all the women and mothers to be to practice breastfeeding in terms of good positioning and longer duration despite being a working woman or not. As it is shown that breastfeeding during childhood has absolutely greater benefits.

Breastfeeding provides ideal infant nutrition and is physiologic for mothers and children. Pregnant women often make a decision regarding breastfeeding early in pregnancy, and many have already decided whether to breastfeed prior to conception. Encouragement and education from healthcare providers result in increased breastfeeding initiation, exclusivity, and duration. Yet, healthcare providers consistently overestimate the amount and adequacy of counseling and support that pregnant women receive. (11)

A comprehensive approach to standardizing preterm infant nutrition is essential to optimize the collection, storage, fortification and delivery of human milk to preterm neonates by initiating the development of the Supporting Premature Infant Nutrition (SPIN) program. (12)

Today, mothers are discharged from hospital earlier than before; thus, efforts to promote breastfeeding need to focus more on the community. While the PROBIT study and most systematic reviews have looked at the combined effect of breastfeeding interventions in hospitals and primary care. This review found that breastfeeding interventions could be more effective than usual care in increasing breastfeeding rates (13)

Members of the board in hospital administration should endorse in developing breastfeeding friendly office spaces, including safe, clean, and comfortable spaces for patient and staff to breastfeed or express milk, as well as posters and artwork supporting breastfeeding.

Whenever possible, healthcare providers should use motivational and self-efficacy supporting techniques when discussing breastfeeding, for example: guiding a pregnant woman to consider her own knowledge of and reasons for breastfeeding, helping to think through barriers or helping to associate breastfeeding with other successes in a woman's life.(14)

From this study, it can be concluded that the breastfeeding knowledge, breastfeeding practice and longer duration of breastfeeding are the complement indicator towards a healthy individual with a greater and stronger immunity in adulthood life.

Conclusion

Based on the findings of this study, we can determine that there is a large amount of students from IMS who were breastfed during their childhood despite most of them have mothers with careers.

An infant's immunity development is highly dependent on antibodies that it obtained from milk of a mother. Thus, it is proved that individuals who were breastfed have stronger immunity and has less risk for getting sick.

It is vital that infants and newborns acquire antibodies during childhood in order to build strong immunity. Hence, we strongly encourage that all women, including mothers and mothers-to-be, to have adequate knowledge about breastfeeding and to practice it.

Furthermore, it is important for the government, especially Ministry of Health, to take this matter into considerations. There should be public awareness on benefits of breastfeeding and importance of it in order to educate all the women. This may prevent any diseases or illness to develop among the future generation.

Limitations

There are certain limitations and technical errors that might occur during the whole process of this study. The below mentioned are some of the foreseeable limitations that took place which conducted our research project.

1. As it is a questionnaire based study, it is difficult to collect a fair and sincere data from every single sample subject as some of them might not have an interest in filling up the questionnaire.
2. Accurate data would be difficult to achieve as this study was done only in a small sample group, which are only among 100 individuals. As this study is conducted only towards the IMS medical students, the results may not be generalized to other population groups.
3. Each person may have different level of assessing different criteria based on their own judgement and knowledge according the nutritional.
4. There may be a possibility of self-recall bias, social desirability bias and errors in self-observation.

5. Since the questionnaire is a self-made and mainly based on our own medical knowledge, the face validity for this questionnaire is deemed to be imprecise.
6. Proper percentage of the awareness and knowledge on this study matter and the factors affecting it cannot be calculated as some of the subjects do not give their particular reason and some provide more than one reason.

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Chemical and microbiological composition and stability of selected south african honeys

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Abstract

Honey samples from the Eastern Cape Province and the Mpumalanga province were obtained commercially in the cities of Grahamstown and Nelspruit. The focus of this study was placed at determining the potential chemical and microbiological changes in the composition of the honey samples during storage for 0 week, 2 week and 4 weeks. The average physicochemical parameters ranged from 4.3 to 4.9 for pH and from 508 to 970 $\mu\text{S}/\text{cm}$ for electrical conductivity. The moisture content of the honey samples varied between 7.6 and 12.4 % (w/w). At the same time, the total ash content for all the samples ranged from 0.10 – 0.28 % (w/w). The Nelspruit honey contained a honeycomb, while the Grahamstown honey did not. The microbial concentrations in both honey samples differed with the source of the samples, but the Nelspruit honey had lower levels of microorganisms than Grahamstown honey and *Bacillus* and *Staphylococcus* were identified in the Grahamstown honey. Both samples were found to meet the imposed limits in all parameters except for electric conductivity. Storage conditions seemed to have an effect on the compositional properties of honey after 2 weeks and 4 weeks as the temperature increased. The dominant peaks (ppm) observed for the ^1H NMR and ^{13}C NMR shifted after 2 weeks for the Grahamstown honey and after 4 weeks for the Nelspruit honey. The results of this study indicate that the storage of honey can have an effect on the quality of the product.

Keywords: storage, *Micrococcus spp.*, short-term stability, long-term stability, NMR.

1. Introduction

Honey is defined as the natural sweet substance produced by honey bees, from nectar, blossoms or the secretion of living parts of plants or the excretions of plants, which they collect, transform and then combine with specific substances of their own to ripen and mature and has been used by man kind since ancient times (Adenekan *et al.*, 2010). It can be used for nutritional purposes as it provides energy at 64 calories per table spoon and thus provides fuel to working muscles and is also used for medicinal purposes due to its anti-inflammatory and anti-bacterial activity (Khan *et al.*, 2007; Manyi-Loh *et al.*, 2011). The viscosity of honey has an influence on the physicochemical and sensory properties, and this information assists in the handling, processing and storage of the honey (James *et al.*, 2009). Temperature, water content and chemical constitutions are some of the factors that the viscosity of honey is dependent on (James *et al.*, 2009).

Several types of honey are produced due to the wide variety of botanical sources which are associated with the markedly different climatological and orographic conditions (Soria *et al.*, 2004). Due to an increase in the interest of honey characterization, several studies have been done relating to the physicochemical parameters to botanical and geographical origins (Ferlsner *et al.*, 2004). This is to test the quality of honey in order to verify the authenticity of the product and to reveal possible artificial components or adulterants that maybe present as well as to address the processing and market needs (Meda *et al.*, 2005). Even though many scientific investigations on the physicochemical properties of honeys have been carried out, further investigations are required in South Africa which still lacks this data. South Africa has a broad range of floral diversity which the honeybees use to produce honey and therefore can be expected that honeys from different regions may have different properties.

Honey consists of a complex mixture of carbohydrates accounting for 80-85 % with glucose and fructose being the predominant sugars, and has a content of 15-17 % water, 0.3 % proteins, 0.2 % ashes, low quantities of vitamins and amino acids as well as other minor substances present at low concentrations depending on the floral origin (Cantarelli *et al.*, 2008). Honey of good quality should have a fructose percentage that exceeds that of glucose and the higher the glucose content, the greater the tendency toward granulation (Kaakeh and Gadelhak 2005).

There are approximately 26 amino acids in honey whose concentrations depend on the floral source (Hermosin *et al.*, 2003). Distase, invertase and glucose oxidase are the most important enzymes in honey (National Honey Board, 2005). Honey is rich in phenols which can be used as markers for studying botanical and geographical origins of honey and also as antioxidants (Yao *et al.*, 2003). The water content in honey varies tremendously, depending largely on its floral source (Adenekan *et al.*, 2010). It is usually about 15-17 % and if its concentration increases, honey becomes less viscous and making it easy to support bacteria growth due to sufficient water (James *et al.*, 2009). Gluconic acid is the predominant acid in honey and its presence in all types of honey originates from the activity of glucose oxidase responsible for the bactericidal action of honey, due to its production of hydrogen peroxidase (Adenekan *et al.*, 2010). The composition of honey is associated to its botanical source as well as the geographical area from where it originated (Manyi-Lo *et al.*, 2011). It can be characterized based on the determination of its chemical, physical or biological properties and its quality is based on these parameters (Soria *et al.*, 2004).

Honey is of importance in the food industry and cosmetic industry (Manyi-Loh *et al.*, 2011). It can be used as used alone or in combination with other food products or part of a nutraceutical drug (Hosny *et al.*, 2009). In the pharmaceutical industry, it is used in honey cough syrup and also in hand lotions (Ankrah, 1998). Due to the beneficial uses of this product, it is important to recognize the concentration levels and types of microorganisms in honey. Honey has antioxidant activity which is influenced by the botanical origin (Al-Mamary *et al.*, 2002). Recently, Ghedldof and co-workers (2002) have recently demonstrated that many kinds of antioxidant components such as

polyphenols present in honey may play important roles in combinative or synergistic contribution to its total antioxidant activity (Blasa *et al.*, 2007).

Despite of the beneficial uses of honey, it is also known to contain certain microorganisms that can pose a potential risk to human health (Oliver *et al.*, 2012). The presence of microorganisms can sometimes influence the stability of honey and as well as its hygienic quality (Vica *et al.*, 2009). It contains minimal types and levels of microorganisms but can also carry spores of yeast, mold and bacteria which can persist (Hosny *et al.*, 2009). These microorganisms are very important in determining the shelf-stability and safety of honey (Snowdon and Cliver, 1996). Therefore identifying the microorganisms present in honey is important in terms of quality and safety (Martins *et al.*, 2003).

Low pH levels and high sugar concentrations inhibit or kill most microorganisms (Snowdon and Cliver, 1996; Olaitan *et al.*, 2007; Gomes *et al.*, 2010). However, microorganisms which surround the environment around honey are highly likely to be found in honey (Gomes *et al.*, 2010). The primary sources of microorganisms include pollen, digestive tracts of honey bees, dust, air, dirt as well as flowers, and secondary sources include humans, equipment used during packaging of honey, water, insects and wind (Hosny *et al.*, 2009). Microorganisms that are commonly found in honey are bacteria, fungi and moulds (Olaitan *et al.*, 2007). These microorganisms play a vital role in the characterization of honey (Hosny *et al.*, 2009). They can be involved in activities such as spoilage of food, the production of enzymes, antibiotics, mycotoxins, growth factors such as vitamins and amino acids, and also inhibition of competing microorganisms (Martins *et al.*, 2003).

Honey is known to occasionally contain *Clostridium botulinum* spores which can be picked and carried by bees (European Commission, 2002). This bacterium produces seven (A to G) structurally related protein neurotoxins which bind to distinct combining sites of antibodies and are there ones responsible of causing botulism (Sharma *et al.*, 2005). *Bacillus spp.* are endospore-forming gram-positive bacteria found everywhere regarded not be harmless to mammals except for *Bacillus cereus* and *Bacillus anthracis*. The spores make them to be heat-resistant enabling them to colonize environments such as honey (Hamouda and Abouwarda, 2011). Due to the risks imposed to human health by honey containing pathogenic microbes, a sensitive method to analyze all the biological components in honey is very important in order to ensure safety and quality of honey and honey products (Olivieri *et al.*, 2012). Therefore microbial identification has undergone a revolutionary change by the introduction of Polymerase Chain Reaction (PCR)-based techniques, where total DNA is extracted and amplified in order to identify the microorganisms present in the sample (Hugenholtz, 2002).

Values of pH and electric conductivity are dependent on sample dilutions because of the changes of the physical and also chemical environment of the ions and to the interactions with the different components present (sugar, amino acids, salt) (Acquarone *et al.*, 2007). Electric conductivity is dependent on the mineral content, organic acids, proteins and some complex sugars and polyols and it varies with botanical origin (Perez-Arquillue *et al.*, 1994). It is within a limit of 0.8 mS/cm (Gomest *et al.*, 2010). It correlates with the mineral content of honeys and has proven to be very useful in discriminating honeys of different origins (Bogdanov *et al.*, 2004, Acquarone *et al.*, 2007). Both properties are related to the water content of honey or honey products (Acquarone *et al.*, 2007).

Moisture content of honey is dependent on the environmental conditions, manipulation by beekeepers and the vegetation season (Yanniotis *et al.*, 2006; Gomes *et al.*, 2010). Honey of good quality has moisture content that is below or equal to 20% (Yanniotis *et al.*, 2006). It is an important factor that contributes to the stability of honey by suppressing fermentation and

granulation during storage (Nanda *et al.*, 2003). It also has an influence the quality and texture of honey as well as storage after extraction from the bee hive (Kaakeh and Gadelhak, 2005).

Crystallisation can be accelerated by high moisture content in certain types of honey and the water activity which is the ratio of the water vapour pressure of honey compared to pure water at the same temperature, can be increased as well to values where certain yeast can grow (Yanniotis *et al.*, 2006). Fermentation that occurs during storage is due to the osmotolerant yeasts producing ethanol and carbon dioxide, the ethanol is then further oxidised to acetic acid and water, causing honey to have a sour taste (Nigussie *et al.*, 2012). Yeast are regarded as the most common osmophilic microbes found in non-ionic environments of high osmolarity such as foods which contain high concentrations of sugar including honey (Jay, 2000). They are sugar tolerant and are of economic importance in the food industry due to food losses (Jay, 2000).

Ash content is one of the parameters of honey to be associated with floral sources of honey samples (Felsner *et al.*, 2004). It is also associated with the colour of honey which is dependent on various factors including minerals content (Gomes *et al.*, 2010). Light coloured honeys are defined by low ash content and dark coloured honey by higher ash content values (Gomes *et al.*, 2010). Harvesting processes, beekeeping techniques, as well as the material collected by the bees during the foraging on the flora could likely be the cause of the variability in the ash content of honeys (Nigussie *et al.*, 2012).

Nuclear magnetic resonance (NMR) is a technique that has been used to determine the geographical origin of honeys (Consonnia and Cagliani, 2008). Current legislation on the composition and manufacturing of honey in some countries have stimulated research on the physicochemical, organoleptic and microscopical characteristic related to the floral and geographical origins so as to determine the quality of honeys (Felsner *et al.*, 2004). Storage conditions of honey can have an effect on the physical and chemical properties of honey causing honey to lose its aroma, flavours, and making it susceptible to microbial contamination, thus compromising its quality. This affects the economy due to food loss and also making it risky to use honey for its beneficial uses as presence of pathogenic microbes can have serious health implications. Honeys of different geographical origins may have different properties due to floral sources and climatological conditions and therefore may require different storage conditions. The effects of storage conditions on the sensory properties and microbial properties and also the evaluation of honey using NMR have not been reported much on literature. The aim of the study was to assess the effects of shelf life and storage conditions on the properties of honey from Grahamstown and Nelspruit stored at different temperature conditions. This objective was based on the hypothesis that storage conditions can have an effect on the compositional properties of honey.

2. Methodology

Nutrient agar, m-FC agar, Potato Dextrose agar, Bacteriological agar, meat extract agar, peptone powder, tryptic soy broth/agar, sodium carbonate, hydrochloric acid, sodium hydroxide, methylene blue, glucose, starch, ethanol, bromocresol purple, kobalt chloride were purchased from Merck (Pty.) Ltd. South Africa. Oil-red, yeast extract, furazolidone, sodium chloride, L-cystein and agarose were purchased from Sigma-Aldrich (Johannesburg, South Africa). Casamino acids were bought from (Difco laboratories, South Africa) and sodium acetate (Analar, BDH, South Africa). Urine jars for microbial sampling and dilutions were purchased from EC labs (Spellbound Inc., South Africa). O'Gene Rule 1kb plus DNA ladder were purchased from Inqaba (Fermentas Life Sciences, South Africa). The ZR Fungal / Bacterial DNA miniprep kit, Wizard SV gel and PCR clean-up system were purchased from Promega, and Primers 9F and 1541R were donated by Dr Susan Van Dyk. MilliQ water (Milli-RO 15 water purification system, Millipore Co., Bedford, MA, USA).

Two natural honeys from different geographical origins were purchased from Grahamstown and Nelspruit. Two kilograms of honey was purchased in Grahamstown situated in the Eastern Cape and 1.5 kilograms of honey with honey combs was purchased from an informal trader in Nelspruit situated in Mpumalanga province. In Nelspruit the local beekeepers from that area have no knowledge on honey processing and therefore, honey is removed from the honeycomb plates and sold with no processing. This system of beekeeping has been used for many years in the area and the honeycomb honey has been long used for the beneficial uses of honey by the people of Nelspruit. The honey samples were weighed out to four decimal places using OHAUS (PA214, AHAUS Corp. Pine Brook, NJ USA) into urine jars then stored for 0 week, 2 weeks and 4 weeks at 25°C, 60 % relative humidity and 40°C, 75 % relative humidity BINDER stability chambers prior to analysis and then at 7°C between individual experiments or after sampling and before analyses. The Nelspruit honey samples (weighed in grams) were divided into two batches, one batch was placed in an incubator set 25°C with Cobalt chloride (104 g/1L MilliQ water) solution and the other batch in an incubator set at 40°C with sodium chloride (333 g/ 1L 1L MilliQ water) in order to provide the same humidity in the incubators used as in the stability chambers (Labcon low temperature incubators). All honey samples were tested by the usual available physicochemical tests (pH, electrical conductivity, moisture content, ash content) and also for the presence of microbes using molecular techniques. ¹H NMR and ¹³C NMR were used to analyse any chemical shift in the honeys during the storage duration and conditions.

To examine the presence of microorganisms in the investigated honeys; approximately 2 g (wet weight to four decimal places) scale was weighed out and homogenized into 10 mL of sterile physiological saline solution for the Nelspruit honey and for the Grahamstown honey, approximately 26 g (into four decimal places) was weighed out and homogenized into 13.5 mL of physiological saline solution. This was done in order to ensure a complete dissolution of the honey samples.

Decimal dilutions were prepared using the same homogenized solutions and 100 µL aliquots of each dilution was spread-plated on nutrient agar, potato dextrose agar and m-FC agar prepared by following the manufacturer's instructions in order to test for the presence of aerobic and anaerobic bacterial spp, fungi and fecal coliforms respectively. *Micrococcus* spp. were tested on agar composed of; tryptic soy agar (40.01 g/L), yeast extract (1.00 g/L) autoclaved at 121°C for 15 min. A 25 mL of 5 g/L of oil red solution and 100 mL of 0.5 g/L of furazolidone were prepared with acetone. A volume of 1000 µL of the oil red solution and 100 mL furazolidone were added to the agar far away from a flame as possible as acetone is highly flammable. *Clostridium* spp. were tested on agar composed of; meat extract (10.5 g/L), peptone (10.05 g/L), yeast extract (3.03 g/L), glucose (5.01 g/L), starch (1.03g/L), sodium chloride (5.05 g/L), sodium acetate (3.05 g/L), L-cystein (0.51 g/L) and bacteriological agar (12.52 g/L) autoclaved (Model RAU-53Bd REX MED autoclave, Hiayama Manufacturing, Tokyo, Japan at 121°C for 15 min. *Bacillus* spp. were tested on agar composed of; Bacteriological agar (15.0453 g/L), casamino acids (10.092 g/L), glucose (10.0266 g/L), sodium chloride (5.0053 g/L) and bromocresol purple (0.0154 g/L) heated on Gallenkamp magnetic stirrer regulator hotplate until the solution was dark blue with no granules.

Inoculated agar plates were incubated using Labcon low temperature incubators as follows: nutrient agar (37°C/ 24 h for anaerobic and 48 h for anaerobic. However for anaerobic bacteria, plates were placed in large jars with a gas generating kit (Oxoid, anaerobic system BR0038B, UK) inserted in the jar prior to incubation, PDA (28°C/ 7 days), faecal coliforms (44.6°C/24 h). *Micrococcus* (37°C/4 days), *Clostridium* (37°C/24 h) and *Bacillus* (37°C/24 h). Microbial counts were expressed as colony-forming units per gram of honey (CFU / g) and fungi from PDA plates were viewed under an optical microscope for identification. All microbial tests were performed in triplicate.

Genomic DNA was extracted on isolated colonies from agar plates of Grahamstown honey. The randomly picked colonies were transferred to a conical flask which contained on 150 mL of tryptic soy broth and grown for 48 h on a shaker and DNA was extracted using ZR Fungal / Bacterial DNA miniprep kit (following the manufacturer's instructions). Genomic DNA and O'Gene Rule 1kb plus DNA ladder were run on 0.8% agarose gel containing 2 µl ethidium bromide and bands were visualised using a chemiluminescence and fluorescence documentation system (UviproChem, UK). All agarose gels were run on TAE buffer for approximately an hour.

Genomic DNA was amplified using PCR with (9F/1541R) primers. Colony PCR was performed using colonies from Nelspruit agar plates. The PCR reactions contained; MgCl₂ (2 µL), thermophilic buffer (3.5 µL), forward primer 9F (3.5 µL), reverse prime 1541R (3.5 µL), dNTP mix (1 µL), nuclease-free water (21 µL), DNA extract as template (2 µL)/ (single colony) and *Taq* DNA polymerase (0.5 µL). The amplifications were performed in a Labnet Multi Gene thermocycler.

Thermal cycling parameters were an initial denaturation at 95°C for 1 min, followed by 30 cycles of 30 s at 98°C, 30 s at 58°C and 1 min at 68°C with a final extension of 5 min at 72°C and finally held at 4°C. The PCR products were quantified on 0.8 % agarose with 2 µL ethidium bromide using O'Gene Rule 1kb plus DNA ladder. The PCR products were purified using Wizard SV gel and PCR clean-up system by following the manufacturer's instructions. The cleaned up samples were then sequenced. The bacterial sequences were cleaned-up using Chromas-Lite software and identified using BLAST (Basic Local Alignment Search) software provided by the NCBI (National Centre for Biotechnology Information)

To measure pH of the Grahamstown honey samples, a solution was prepared by weighing out 10 g (to two decimal places) of honey and dissolving it in 75 mL of MilliQ water. The pH was then measure using a Model HI 98129 HANNA combo pH & EC meter (Mauritius; Gomes et al., 2010). The Nelspruit honey's pH was measure by weighing out 3.334 g of honey and dissolving it in 25 mL of MilliQ water in a beaker and the pH readings were taken using the Model HI 98129 HANNA combo pH & EC meter. The same protocol outline above to test for pH was used to test for the electric conductivity of the honey samples and experiments for both parameters measured in triplicate.

Moisture content of the Grahamstown and Nelspruit honey samples was determined by weighing out empty crucibles which were then placed in an oven set at 55°C overnight in order to remove any moisture on them. Crucibles were removed from the oven and placed on a dessicator for 20 min to cool. Approximately 1g (four decimal places) of honey was weighed out into the crucibles which were re-weighed again and freeze-dried for 5 days. Crucibles were re-weighed again after 5 days of freeze-drying and moisture content was determined using Equation (1):

$$\text{Moisture (\%)} = (W_1 - W_2) / (W_1 - W) \times 100 \quad (1)$$

W = weight in grams of crucible

W₁ = weight in grams of crucible with wet honey before lyophilisation

W₂ = weight in grams of crucible with dry honey after lyophilisation

Total ash was determined by weighing out the freeze-dried honey to four decimal places. The dried honey was combusted at 407°C for approximately an hour. After combustion, crucibles with total ash were re-weighed out into four decimal places. Total ash was then calculated using Equation (2).

$$\text{Ash (\%)} = (M_1 - M_2) / (M_0) \times 100 \quad (2)$$

M_0 = weight of dry honey weighed out
 M_1 = weight of crucibles with total ash
 M_2 = weight of crucible

Chemical shift in the composition of honey due to storage were determined using ^1H NMR and ^{13}C NMR spectrums. A tip of a spatula of honey sample was dissolved with 0.5 mL deuterium oxide solvent. Spectrums reading for hydrogen and carbon molecules were all aligned together in order to observe any shift due to storage. The spectrums were characterized by strong proton and carbon signals.

Statistics software PAST version 2.16 (Hammer *et al.*, 2001) was used to perform statistical analyses of the data obtained. The Kruskal-Wallis test tested for any variations in the parameters caused by storage conditions while the Mann-Whitney showed where the variation is occurring. H_0 was accepted if (p-value) was higher than $\alpha=0.05$. H_0 states that the storage over 2 weeks or 4 weeks does not change the given parameter of the honeys and H_a states that the storage conditions have an influence on the given parameters of the honeys.

3. Results and Discussion

Aerobic, anaerobic, *Bacillus*, fungi, fecal coliforms and *Micrococcus* bacterial colonies were counted in all the samples. *Clostridium* bacterial colonies were only evaluated in the Grahamstown honey at 0 week storage conditions. Nelspruit honey seemed to have less types of bacterial counts with counts ranging from 1.48×10^3 (*Bacillus*) colonies/1g dry honey to 7.5×10^{10} (anaerobic) colonies/1g dry honey, while Grahamstown honey had more types of bacterial counts and ranged from 164 (aerobic) colonies/1g dry honey to 369 203 41 (fungi) colonies/1g dry honey to 36 920 341. Both samples did not contain any *Micrococcus* and fecal coliforms bacteria counts (Table 1).

Table 1: Microorganisms reported to be found in Grahamstown and Mpumalanga honey							
Grahamstown honey							
Storage conditions	Aerobic Colonies/1g dry honey)	Anaerobic Colonies/1g dry honey)	Bacillus Colonies/1g dry honey)	Clostridium Colonies/1g dry honey)	Fungi Colonies/1g dry honey)	Faecal coliforms Colonies/1g dry honey)	Micrococcus Colonies/1g dry honey)
O week	164	1652981	36644	17457	36920341	< 1	< 1
2 weeks (25°C, 60 % RH)	0	0	13297	-	5990	< 1	< 1
2 weeks (40°C, 75 % RH)	6371	17862	2042	< 1	20848845	< 1	< 1
4 weeks (25°C, 60 % RH)	384881	6635	0	< 1	1922	< 1	< 1
4 weeks (40°C, 75 % RH)	218674	812485	198612	< 1	3979771	< 1	< 1
Mpumalanga honey							
Storage conditions	Aerobic Colonies/1g dry honey)	Anaerobic Colonies/1g dry honey)	Bacillus Colonies/1g dry honey)	Clostridium Colonies/1g dry honey)	Fungi Colonies/1g dry honey)	Faecal coliforms Colonies/1g dry honey)	Micrococcus Colonies/1g dry honey)
O week	< 1	3428	< 1	< 1	< 1	< 1	< 1
2 weeks (25°C, 60 % RH)	< 1	7.5×10^{10}	1475	< 1	< 1	< 1	< 1

2 weeks (40°C, 75 % RH)	< 1	< 1	< 1	< 1	< 1	< 1	< 1
4 weeks (25°C, 60 % RH)	175347222	105219	< 1	< 1	17361	< 1	< 1
4 weeks (40°C, 75 % RH)	7.1×10^{10}	< 1	< 1	< 1	< 1	< 1	< 1

Genomic DNA was extracted from isolated single colonies picked from bacillus agar, nutrient agar and clostridium agar plates after incubation and was successfully extracted with visible band fragments corresponding to 20 000 bp on 0.8% agarose gel viewed using a chemiluminescence and fluorescence documentation system (UviproChem, UK) (Figure 1).

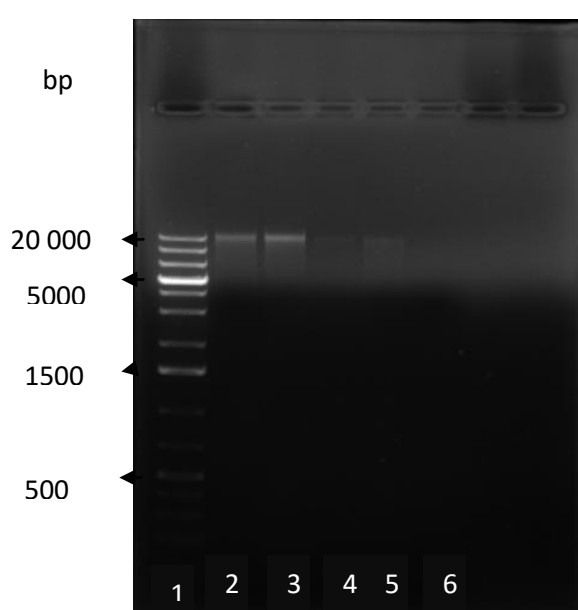


Figure 1: A 0.8 % agarose gel electrophoresis of genomic DNA extracted from isolated bacterial colonies. Lane 1: O'Gene Rule 1kb plus DNA ladder, lane 2: DNA extracted from a colony from *Bacillus* agar plate; lane 3: aerobic spp; lane 4: anaerobic spp; lane 5: DNA extracted from a colony from *Clostridium* agar plate, lane 6; negative control (no template added).

Universal PCR primers (9F/1541R) were used in the PCR reaction of the DNA extracts from the Grahamstown honey bacterial colonies. PCR was successful in lane 2, 4 and 5 and band fragments sizes corresponded to the 1 500 bp of the O'Gene Rule 1kb plus DNA ladder (Figure 2).

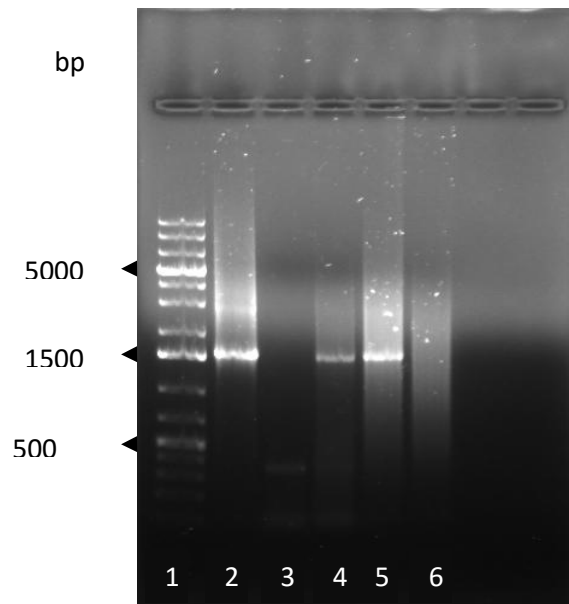


Figure 2: Agarose gel electrophoresis of PCR products obtained bacterial isolates of the Grahamstown honey sample. Electrophoresis was performed on 0.8 % agarose and viewed using a chemiluminescence and fluorescence documentation system (UviproChem, UK). Lane 1: O'Gene Rule 1kb plus DNA ladder; lane 2: DNA extract from a colony from *Bacillus* agar plate; lane 3: aerobic spp; lane 4: anaerobic spp; lane 5: DNA extract from a colony from *Clostridium* agar plate; lane 6: negative control (no template added).

Colony PCR was used to identify the bacterial species from the different agar plates inoculated with 100 μ L aliquots of honey dilutions. A single colony instead of a DNA extract was used as a template in the PCR reaction with primers (9F/1541R). During PCR thermocycling, initial denaturation was 95°C for 10 minutes in order to provide sufficient time to break bacterial cell wall and denature DNA. Only lane 2 was successful with a visible band corresponding to 1 500 bp.

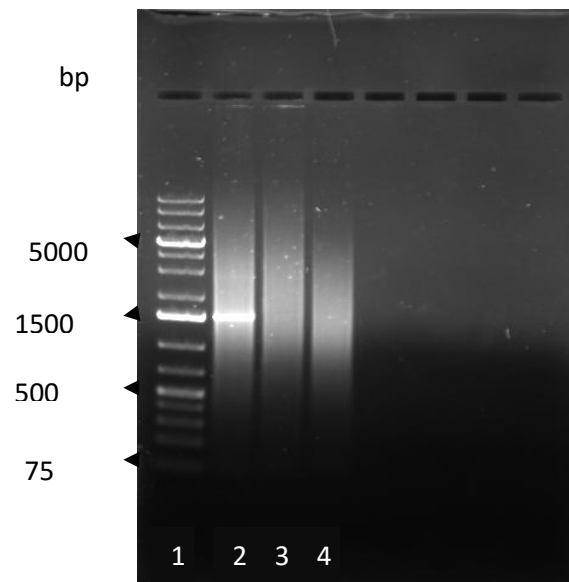


Figure 3: 0.8 % agarose gel electrophoresis of colony PCR products from bacterial isolates of honey samples from Nelspruit. Lane 1: O'Gene Rule 1kb plus DNA ladder; lane 2: bacterial colony from a *Bacillus* agar plate; lane 3; anaerobic spp; lane 4: negative control (no template added).

In the PCR agarose gels, the lanes had smears in the gel and in (Figure 2) there were multiple bands visible in some lanes. Therefore PCR product bands (1 500 bp) were excised with a sterile blade

and purified using the Wizard SV gel and PCR clean-up system by following the manufacturer's instructions prior to sequencing. The obtained sequences were compared to the already available sequences in Genbank database by means of the BLAST programme. In the four samples sequenced only two were able to give results when compared to the Genbank database sequences and were found to be *Bacillus* spp and *Staphylococcus* spp.

Table 2: Comparison of bacteria sequences from Grahamstown and Nelspruit honey samples to those from the GenBank.

PCR products samples	Blast sequence description	E value	Maximum identity
(<i>Bacillus</i>) Grahamstown honey	<i>Bacillus</i> spp.	0.0	98%
(<i>Clostridium</i>) Grahamstown honey	<i>Staphylococcus</i> spp.	2e-102	94%

Studies were performed to examine the effects of storage duration and temperature conditions on the chemical composition of honeys from Grahamstown and Nelspruit by testing the parameters; pH, Electric conductivity, moisture content and ash content. Table 3 shows the averages and standard deviations of triplicate analysis for each parameter at 0 week, after 2 weeks at 25°C and 40°C and after 4 weeks at 25°C and 40°C of storage for both honey samples. All the samples tested were found to meet the imposed limits for honey quality in all parameters except for electric conductivity ($\leq 800 \mu\text{S}/\text{cm}$).

Table 3: Physicochemical parameters of honey samples (averages and standard deviation of three measurements).

Parameters	Grahamstown					Nelspruit				
	0week	2weeks (25 °C)	2weeks (40 °C)	4weeks (25 °C)	4weeks (40 °C)	0week	2weeks (25 °C)	2weeks (40 °C)	4weeks (25 °C)	4weeks (40 °C)
pH	4.6±0.1	4.9±0.03	4.8±0.0	4.8±0.2	4.8±0.0	4.5±0.3	4.3±0.0	4.4±0.2	4.4±0.1	4.5±0.1
Electric conductivity ($\mu\text{S}/\text{cm}$)	940±5	970±35	940±10	952.7±24	923.3±6	508±89	529±13	704±23	568±51	838±39
Moisture content (%)	12.3±0.2	9.6±0.0	9.6±0.3	9.5±0.0	12.4±0.0	7.6±0.5	8.3±0.9	11.2±0.8	8.9±0.2	10.8±0.7
Ash content (%)	0.18±0.03	0.21±0.05	0.27±0.02	0.23±0.07	0.28±0.04	0.21±0.02	0.13±0.04	0.14±0.05	0.10±0.01	0.10±0.02

Statistic analysis using Kruskal-Wallis and Mann-Whitney test were possible in order to determine any trends in the composition of the honeys due to the storage conditions used. The Kruskal-Wallis test (Table 4) was used to determine if the samples were taken at 0 week, 2 weeks at 25°C and 40°C then 0 week versus 4 weeks at 25°C and 40°C where from the same population meaning that storage conditions had no effect on the composition of the honey and there is no significant change for example in the pH levels, pH remained the same after 2 weeks at 25°C and 40°C then 4 weeks at 25°C and 40°C of storage. However if there is any changes in the composition, Kruskal-Wallis does not specify where the change is thus the Mann-Whitney test was used to identify where the significant change occurs. Table 4 showed that the null hypothesis for the Kruskal-Wallis test was accepted for all the parameters in all the samples except for pH in both samples and EC for the Grahamstown honey. Table 5 showed that the pH level is affected as the temperature increases after 2 weeks in both honey samples and the EC for the Grahamstown honey is affected by the duration storage and the temperature conditions as well.

Table 4: Statistical data analysis of investigated honey samples using Kruskal-Wallis test.

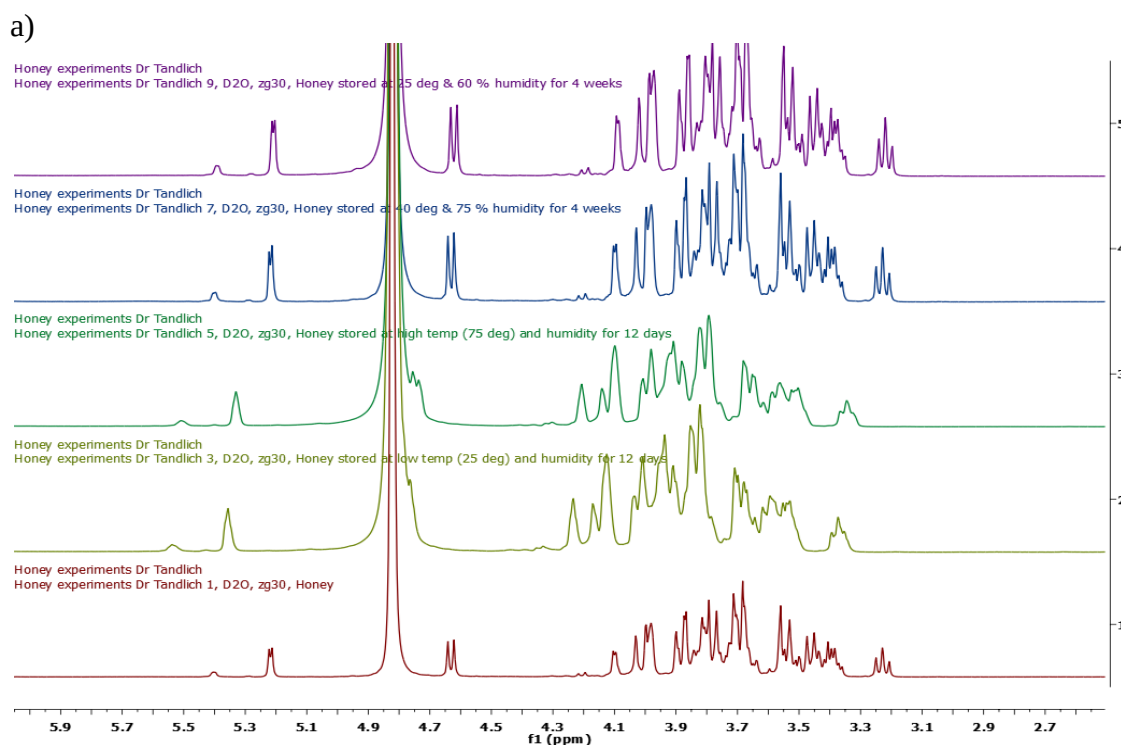
Parameters	Grahamstown			Nelspruit		
	Kruskal-Wallis test	p-value	H ₀	Kruskal-Wallis test	p-value	H ₀
pH	0 wk vs 2 wks	0.0427	reject	0 wk vs 2 wks	0.08824	accept
	0 wk vs 4 wks	0.03794	reject	0 wk vs 4 wks	0.3679	reject
EC	0 wk vs 2 wks	0.11	reject	0 wk vs 2 wks	0.06081	accept
	0 wk vs 4 wks	0.06497	accept	0 wk vs 4 wks	0.05091	accept
Moisture Content (%)	0 wk vs 2 wks	0.06081	accept	0 wk vs 2 wks	0.05091	accept
	0 wk vs 4 wks	0.06081	accept	0 wk vs 4 wks	0.02732	accept
Ash (%)	0 wk vs 2 wks	0.05091	accept	0 wk vs 2 wks	0.06646	accept
	0 wk vs 4 wks	0.07939	accept	0 wk vs 4 wks	0.06646	accept

Table 5: Comparison of storage condition in determining any significant difference

Grahamstown			
Parameters	Mann-Whitney	p-value	H ₀
pH	0 week vs 2 weeks (25°C)	0.07652	Accepted
	0 week vs 2 weeks (40°C)	0.07652	Accepted
	2 week (25°C) vs 2 weeks (40°C)	0.2683	Rejected
EC	0 week vs 2 weeks (25°C)	0.07652	Accepted

	0 week vs 2 weeks (40°C)	1	Rejected
	2 week (25°C) vs 2 weeks (40°C)	0.1642	Rejected
Nelspruit			
Parameters	Mann-Whitney	p-value	H ₀
pH	0 week vs 4 weeks (25°C)	0.8137	Accepted
	0 week vs 4 weeks (40°C)	0.8222	Accepted
	4 week (25°C) vs 4 weeks (40°C)	0.1573	Rejected

Examples of the NMR spectra for both honey samples are shown in Figures 4 and 5. Chemical composition of both honey samples was analysed using NMR which is a technique that provides information about the chemical components present in a complex sample while still maintaining the natural ratio of the substances present. A tip of in a spatula was mixed with deuterium oxide solvent and analysed using ¹H NMR and ¹³C NMR spectrums to investigate if the storage duration and temperature conditions cause any chemical shifts with regards to the hydrogen and carbon molecules in the honeys. The results showed chemical shift in ¹H NMR and ¹³C NMR spectrums after 2 weeks of storage for the Grahamstown honey and after 4 weeks of storage for the Mpumalanga honey which was observed by noting the positions of the dominant peaks in parts per million (ppm).



b)

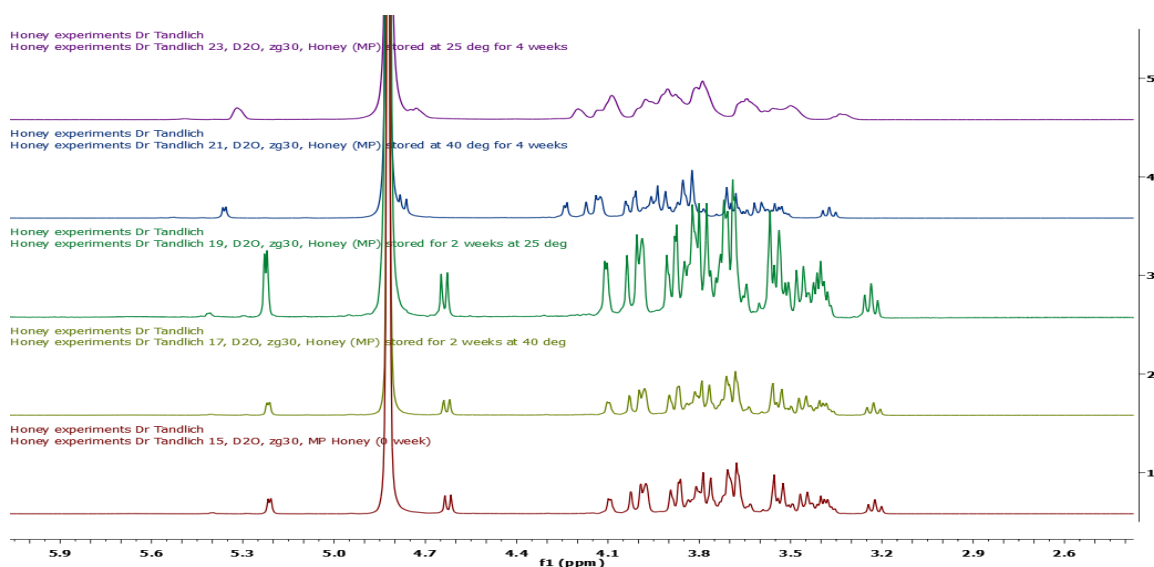
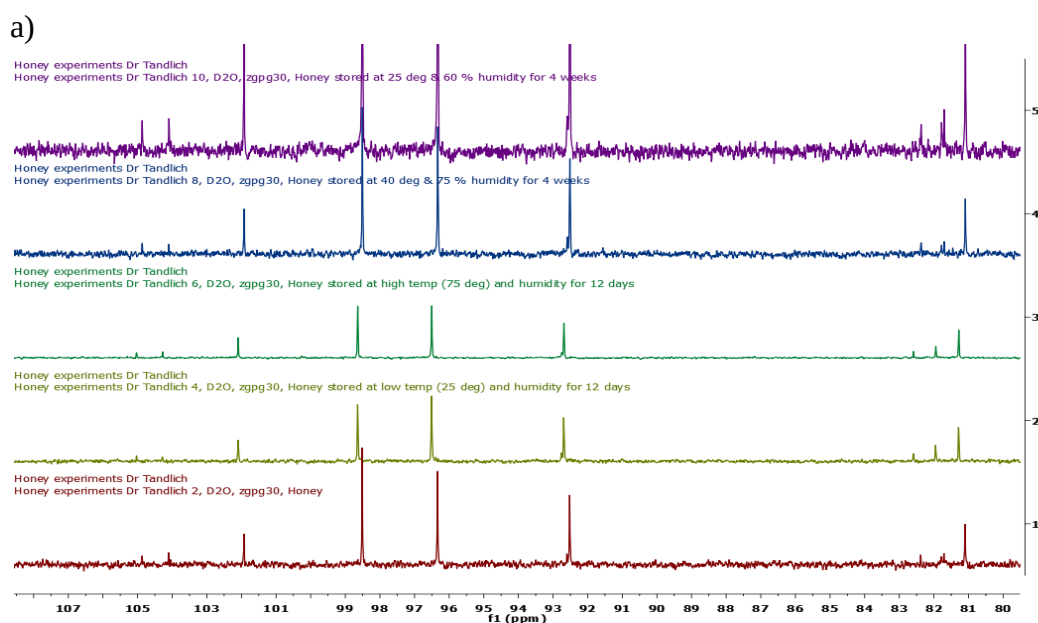


Figure 4. ^1H Spectra for Grahamstown Honey (a) and the Mpumalanga honey (b).

Studies on characterization of microorganisms on honey of different origins and the physico-chemical qualities of honey have been conducted by (Iurlina and Fritz, 2005; Kacaniova *et al.*, 2007). Studies on the characterization of honey properties using nuclear magnetic resonance have not been reported much in literature but recently, Consonni and Cagliani (2008) have used nuclear magnetic resonance to geographically characterize polyfloral and acacia honeys. All these studies have provided information that honeys of different origins may have different compositional properties but not much data is available as to how the storage conditions influence these compositional properties. In this study the type and level of microorganisms, pH, EC, moisture content, ash content and chemical shifts in the investigated honey samples were evaluated after 0 week, 2 weeks at 25°C and 40°C and 4 weeks at 25°C and 40°C of storage conditions using molecular and biochemical techniques. Levels of microorganisms after storage in the investigated honey samples were determined by microbial counts, where by colonies were counted for each dilution on the agar plates after incubation (Table 1). The results showed that both honey samples did not contain any *Micrococcus* or fecal coliforms bacteria species and that the Grahamstown honey contained more types of microorganism and at higher levels than the Nelspruit honey.



b)

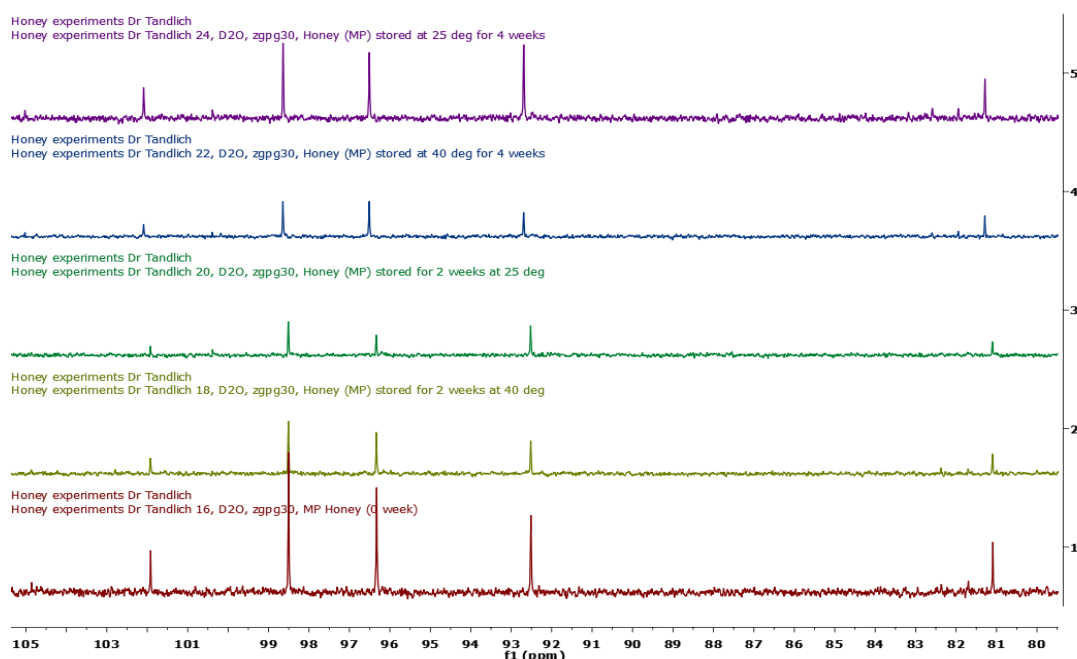


Figure 5. ^{13}C Spectra for Grahamstown Honey (a) and the Mpumalanga honey (b).

In the Grahamstown honey, aerobic species increased with storage conditions, anaerobic and *Bacillus* species levels decreased with storage conditions, however high levels were observed after 4 weeks of storage at 40°C, *Clostridium* species were found at low levels of 17 457 (colonies/1g dry honey) after 0 weeks of storage and fungi was found at higher levels than the other bacteria species and seemed to have low levels after 2 and 4 weeks of storage at 25°C and higher levels at 0, 2 and 4 weeks of storage at 40°C. In the honey from Nelspruit, aerobic species were found at higher concentrations after 4 weeks of storage conditions, anaerobic species concentration increase after 2 and 4 weeks at 25°C and bacillus and fungi were found at very low concentrations of 1 475 and 17 361 (colonies/1g dry honey) respectively. The difference in the level of microorganisms between the samples may be due to the Grahamstown honey was a finished product honey while the Nelspruit honey was raw honey which contained honeycombs and wax and more viscous and could possible had higher anti-microbial properties thus inhibiting the growth of honey.

Table 6: Consistent peaks on NMR spectrums showing chemical shifts

Sample type	Type of spectra	Dominant peaks on spectrums (ppm)				
GH:0 week	^1H NMR	5.22	4.64	4.1	3.7	3.25
	^{13}C NMR	109.9	98.5	96.4	92.5	81.1
GH:2 weeks (25°C)	^1H NMR	5.35	4.77	4.24	3.84	3.37
	^{13}C NMR	102.2	98.7	96.5	92.7	81.3
GH:2 weeks (40°C)	^1H NMR	5.33	4.75	4.19	3.8	3.5
	^{13}C NMR	102.2	98.7	96.5	92.5	81.3
GH:4 weeks (25°C)	^1H NMR	5.22	4.64	4.1	3.7	3.25
	^{13}C NMR	109.9	98.5	96.4	92.5	81.1
GH:4 weeks (40°C)	^1H NMR	5.22	4.64	4.1	3.7	3.25
	^{13}C NMR	109.9	98.5	96.4	92.5	81.1

NST:O week	¹ H NMR	5.2	4.62	4.09	3.69	3.24
	¹³ C NMR	101.9	98.5	96.4	92.5	81.2
NST:2 weeks (25°C)	¹ H NMR	5.2	4.62	4.09	3.69	3.24
	¹³ C NMR	101.9	98.5	96.4	92.5	81.2
NST:2 weeks (40°C)	¹ H NMR	5.2	4.62	4.09	3.69	3.24
	¹³ C NMR	101.9	98.5	96.4	92.5	81.2
NST:4 weeks (25°C)	¹ H NMR	5.38	4.76	4.24	3.8	3.35
	¹³ C NMR	102.2	98.7	96.5	92.7	81.3
NST:4 weeks (40°C)	¹ H NMR	5.34	4.7	4.2	3.79	3.29
	¹³ C NMR	102.2	98.7	96.5	92.7	81.3

GH: Grahamstown honey sample, NST: Nelspruit honey samples

Fungi were found in higher concentrations in the Grahamstown honey ranging from 1 922 to 36 9203 41 (colonies/1g dry honey) and found in lesser concentration in the Nelspruit honey. These results are different to those found by Iurlina and Fritz (2005) because their study they found low levels of fungi to be less than 300 cfu/g. Determining the presence and levels of microbes provides information on the shelf-life and quality of honey. High yeast counts that can result in spoilages and fermentation, an increase in moisture content which can cause granulation and also information about moderate temperature conditions for storage.

A variation in the concentration of the microbes present in the honey was observed. This occurs when for example, a 10^0 dilution will have less number of colonies compared to a 10^4 dilution. This variation could be because bacteria cells are relatively larger compared to the chemical components such as amino acids, sugars and proteins present in honey and therefore when honey is dissolved prior to conducting serial dilution. The microbes can not be evenly spread in the honey solution but settle at the bottom in the urine jar therefore causing variation in microbial counts which then makes it impossible to conduct statistical analysis.

To identify the microorganisms present in the honey samples genomic DNA, PCR and colony PCR were conducted on randomly isolated colonies from the different agar plates (a single colony per plate). The ZR Fungal / Bacterial DNA miniprep kit was used for the extraction of DNA and genomic DNA was successfully extracted from the isolated bacterial colonies of interest with fragments corresponding to 20 000 bp of the DNA marker as shown in (Figure 1). However, only lane 1, 2 and 3 showed bands of high intensities. Honey has a high concentration of sugar and is very complex matrix therefore these characteristics of honey can make DNA extraction a hard task and be an inhibitory factor for PCR (Olivieri *et al.*, 2012).

The extracted DNA was amplified using PCR and the same set of primers (16S rRNA primers) were used to amplify the DNA extracts and also for colony PCR because they are ubiquitous (meaning that they are found in all prokaryotes), they are structurally and functionally conserved and contain variable and highly conserved regions (Hugenholtz, 2002). The (9F/1541R) primers were used because they are able to bind to the 16S ribosomal RNA gene of bacteria. Due to time limits, colony PCR was used to analyze the bacterial isolates from the Nelspruit honey.

In Figure 2, in the four isolated bacterial colonies analyzed for the Grahamstown honey only three were of the DNA extracts were successfully amplified and showed fragments which corresponded to the 1 500 bp of the low molecular weight DNA marker and also to the 16S rRNA gene size. Lane

3 in figure 2 showed two fragments at the bottom of the gel which could be primer dimers. In the analysis of the Nelspruit isolated bacterial colonies using colony PCR, only the low molecular marker (lane 1) and the PCR product for the analyzed bacterial colony (lane 2) were obtained. The PCR product in lane 3 (Figure 3) corresponded to the expected 1 500 bp product.

The successful PCR products from the selected bacterial colonies were removed by excision from the gels and purified. Sequences were aligned with the sequences in the GeneBank database using BLAST search and the results obtained are summarized in Table 2. A 98 % maximum identity for the *Bacillus* species and 94 % for *Staphylococcus* species was obtained for the analyzed colonies in lane 2 and 5 (Figure 2). *Clostridium* species was expected for sample analyzed in lane 5 (figure 2), however despite the result it is a good sign that no *Clostridium* bacteria was found present in the honey. The presence of *Bacillus* species in honey has been reported by several authors including (Snowdon and Cliver, 1996). Despite of the obtained results, the analysis of the investigated honey samples fit with the model of Snowdon and Cliver, (1996) that bacteria found in the surroundings of honey is likely to be found in the honey.

Table 3 shows the results obtained for the physicochemical properties of the honey samples from Grahamstown and Nelspruit. All honey samples were found to meet the honey quality standards (EC Directive 2001/110) in all parameters except for electric conductivity as the samples were found to be above the imposed limit ($\leq 800 \mu\text{S}/\text{cm}$). The low pH of honey inhibits the growth of microorganisms in honey. pH levels ranged from 4.3 to 4.9 with the Nelspruit honey having lower pH levels compared to the Grahamstown honey. The range of the pH levels is different to the findings of Iurlina and Fritz (2005) who reported the pH levels of Argentinean honeys to range from 3,20 to 3.84. The low pH levels in the Nelspruit honey can also be used to explain the low levels of microorganisms making it impossible to support growth of any species. Initial pH for Grahamstown honey was 4.6 and after 2 weeks of storage at 25°C the pH increased to 4.9 and then at 40°C decreased to 4.8. The pH remained unchanged after 4 weeks of storage at 25°C and 40°C. In the Nelspruit sample, initial pH was 4.5 and pH decreased after 2 weeks and remained unchanged after 4 weeks at 25°C but then increase again to 4.5 at 40°C. However, the obtained pH values were found to be within the international limits of honey. pH in honey is influenced by organic acids with gluconic acid being the major one and also the concentration of mineral substances (Kacaniova *et al.*, 2007) which means that if there is a change in the organic acids and mineral concentrations there will be a change in the pH levels as well.

The electric conductivity values ranged from 529 $\mu\text{S}/\text{cm}$ – 970 $\mu\text{S}/\text{cm}$. The lowest was obtained from the Nelspruit sample after 0 wee of storage and was significantly different from the highest value obtained from the Grahamstown sample which also had values which exceeded the imposed limits for electric conductivity with the highest value after 2 weeks of storage at 25°C. The imposed limit for electric conductivity is $\leq 0.8 \text{ mS}/\text{cm}$ (Gomest *et al*, 20120) Nelspruit honey had EC values within the limit except for the sample store at 40°C after 4 weeks which represents good storage as statistical tests showed that there was no significant difference in the EC levels after 4 weeks of storage. In the Grahamstown honey the initial EC was 940 $\mu\text{S}/\text{cm}$ and after 2 weeks of storage at 25°C it increased and then started decreasing from 2 weeks of storage at 40°C while for the Nelspruit honey, initial EC was 529 $\mu\text{S}/\text{cm}$ and it increased with storage. The variation of EC can be explained by also taking into consideration the ash and acid content of honey as they reflect the presence of ions and organic acid and therefore the higher is their content, the higher is the electric conductivity (Adenekan *et al.*, 2010). There were no significant differences for the Nelspruit honey, using Man-Whitney test ($p < 0.05$).

Moisture content of honey depends on the environmental conditions and also depends on the handling of honey by the beekeepers during the harvest period (Gomest *et al.*, 2010). Higher moisture content is likely to increase crystalisation in other types of honey allowing the growth of

osmophilic yeast to produce ethanol and carbon dioxide making honey taste sour (Gomest *et al.*, 2010). The moisture content obtained from the investigated samples ranged from 7.6 % to 12.3 % which is lower than the results obtained by Gomes *et al.*, (2010) but still within the imposed limits for moisture content (<20%) thus the results indicate good storage stabilities of the investigated honeys. The low moisture content also plays a vital role in the inhibition of microbes and therefore meant that honey samples did not undergo any fermentation during storage.

Ash content is the representative of the direct measure of inorganic residues after honey carbonization (Adenekan *et al.*, 2010). The values for ash content varied from 0.10 – 0.28 % and where lower compared to the results of (Gomes *et al.*, 2010). The lowest value for ash content was obtained from the Nelspruit sample and the highest was obtained from the Grahamstown honey sample. The variability in the ash content can be explained by the floral sources of the honey samples as the two honeys are from different provinces with different botanical environments and climatic conditions. Grahamstown honey showed an increase in ash content with storage while the Nelspruit honey showed a decrease in ash content with storage.

Statistical analysis using Kruskal-Wallis and Man-Whitney test in Table 4 and 5 respectively showed that there are no significant differences in the parameters caused by storage conditions except for pH and EC after 2 weeks at 25°C and 40° for the honey samples. This indicates that after 2 weeks the composition of the honey is affected as the temperature increase.

Table 6 shows the dominant peaks observed from the ¹H NMR and ¹³C NMR spectrums for the investigated honeys. For both samples, the dominant peaks showed that the storage conditions do not cause any major chemical shifts in the honey samples as the peaks in (ppm) appear to be more or less in the same position even after 2 weeks and 4 weeks of storage. In the Grahamstown honey, chemical shifts occur after 2 weeks of storage in the ¹H NMR spectrum and ¹³C NMR spectrum. In the Nelspruit honey chemical shifts occur after 4 weeks of storage in ¹H NMR and ¹³C NMR spectrum, this can be clearly seen in Appendix 1. This could mean that the sugars such as glucose, fructose and sucrose in the honey are being reduced and as a results causing chemical shifts. However, because standards where not run on NMR in order to be able to align them standard peaks with the dominant peaks observed it was impossible to determine the structures of the molecules in the honey samples therefore unable to conclude the names of the sugars present in the investigated honeys.

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Determinants of community based HIV Testing and Counselling (HTC) services uptake in vulnerable households of Lagos State, Nigeria.

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Background: HIV Testing and Counselling (HTC) which is a well known strategy in the fight against HIV/AIDS has a consistently low uptake among the vulnerable population. The present study assessed the determinants of HTC uptake among vulnerable households in Lagos Nigeria.

Methods: This was a cross-sectional survey involving randomly selected 1,286 adult respondents from vulnerable households in five LGAs of Lagos. Data were collected using a semi-structured questionnaire; descriptive statistics and logistic regression were done to indentify risk factors of HTC uptake at 5% level of significance.

Results: Of 1286 respondents surveyed, 61% were aware of available HTC service, and 36% had never undertaken an HIV test. The proportion of HTC uptake was significantly higher among the highly educated (OR=1.09, 95% CI: 1.02, 1.18, p=0.018) and people who were aware of HTC availability (OR= 0.18, 95% CI: 0.14, 0.25, p=<0.001). Respondents who knew a place to access HTC were more likely to utilize it compared to people who don't know where to access HTC.

Conclusions: Respondents' level of education and awareness of the availability of HTC services in the community is highly correlated with HTC service uptake. This study recommends that community HTC services be scaled up to improve uptake.

Eliminating Cultural and Linguistic Boundaries in the American Healthcare System

Creating Standards and Funding for Medical Interpreters

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Abstract

The U.S. has increasingly become more culturally and linguistically diverse with the influx of migrants from around the world. The number of Americans speaking a language besides English at home has increased by almost fifty percent, thereby also increasing the number of patients with limited English proficiency (LEP) by over fifty percent. However, weak federal regulation has allowed states to leave the use of appropriate language services at the discretion of individual hospitals, creating a gap in care between English-speakers and patients with limited English proficiency and a surge in the use of untrained ad hoc interpreters. The miscommunication that results from the underutilization of professional language services has inescapable consequences for health outcomes in LEP patients. New federal funding for interpreters is available via the Affordable Care Act, and states should be required to use these funds to implement a standard of interpreter of their choice in their hospitals.

Key-words: accessibility to healthcare, health communications, health policy, equity issues in public health

Thesis

Weak regulation has allowed states to leave the use of appropriate language services up to individual hospitals. Congress should require states to implement a standard level of interpreter to all limited English proficiency (LEP) patients in all healthcare settings.

Background and Context

The U.S. has increasingly become more culturally and linguistically diverse with the influx of migrants from around the world. As a result, the number of Americans who speak a language besides English at home has increased by almost 50 percent in the last two decades.ⁱ Additionally, the number of patients with LEP has increased by more than 50 percent over the last ten years.ⁱⁱ

For LEP patients, healthcare providers use varying forms of language services. *Ad hoc* interpreters, such as family members, friends, or other untrained personnel, are the most readily available type of interpreter.^{iii,iv} However, generally more than half of physicians' questions are miscommunicated by these interpreters, negatively affecting patients' quality of care and their satisfaction.^{v,vi} Additionally, LEP patients who do not receive language services are more likely to incur unnecessary charges by means of longer hospital stays and additional diagnostic tests.^{vii,viii}

Funding for interpreters is available through Medicaid and State Children's Insurance Programs in all fifty states.^{ix} Only thirteen states reimburse through these programs for language services, despite findings that it would cost only \$4.04 more per visit to provide proper language services to all U.S. LEP patients—only \$4 more to provide safe, high quality medical care to 49.6 million Americans.^x Most of the remaining states opt out of providing language services on account of rising costs.^{xi}

No stringent regulation regarding *ad hoc* interpreters exists.^{xii} In fact, physicians in regions with large LEP patient populations are less likely to provide appropriate language services.^{xiii} Existing contradictory recommendations allow hospitals to implement language services at their discretion.^{xiv} Immediate action is necessary to properly meet the needs of an increasing LEP patient population.

Language should not be barrier to quality healthcare, but currently it can be. Ethnically and racially diverse states such as Texas, Florida, Hawaii, and Illinois have the greatest need of language services, yet they have failed to pass any legislation requiring standardized language services to every LEP patient. Funding for language services exists for patients covered by Medicaid and SCHIP. The number of LEP patients will only continue to grow and LEP patients will suffer if states remain inactive.

Proposed Solution

The U.S. Congress should introduce a bill requiring states to fund more interpreter positions via a standard medium of their choice (telephone, professional interpreter, or bilingual provider) to serve LEP patients on Medicaid or State Children's Health Insurance Programs

using reimbursement schemes through the respective third-party program (Medicaid or SCHIP). The medium should be certified by The National Board of Certification for Medical Interpreters, ensuring a consistent standard of interpreting regardless of medium. These funds should be disbursed with the stipulation that the hospitals reduce use of *ad hoc* interpreters by 50 percent and increase certified interpreter use by 50 percent over the next ten years. Hospitals not meeting the aforementioned targets will not receive the maximum reimbursement for the language services they provide.

Analysis

The policy's funding is modeled after a bill proposed to tackle California's shortfall of interpreters. The bill had the state spend \$200,000 to gain access to \$270 million in federal funds authorized under the Affordable Care Act to fund a state-certified interpreter system.^{xv} States are allowed to choose the standard of language services they wish to provide so long as they hold all hospitals to the same standard. All hospitals and individual providers are eligible for reimbursements from Medicaid or SCHIP as long as they used a certified service. Physicians have been shown to use professional language services more often when third-party reimbursement is available, because they do not have to bear the full cost themselves.^{xvi} After ten years of this policy, hospitals must show that they have reduced *ad hoc* interpreter use by 50 percent and increased certified interpreter use by 50 percent to retain the maximum reimbursement.

LEP patients will benefit from standardized language services and a reduction in the use of *ad hoc* interpreters. Professional language services avoid unnecessary diagnostic tests and prolonged hospital stays, saving up to \$11 per LEP patient visit on average.^{xvii} The use of interpreters substantially increases patient-provider satisfaction with communication during visits.^{xviii} Implementing a similar policy of providing language services in most healthcare settings nationwide could save over \$300 million in unnecessary charges incurred by LEP patients.^{xix} Though the cost of these changes would be about \$268 million, there would still be a net benefit of about \$30 million nationwide.^{xx,xxi}

Conclusion

Congress must act to establish a standard of language services across the country and eliminate use of *ad hoc* interpreters. The Office of Minority Health would support the policy, because it enforces its published standards regarding appropriate language services in healthcare.^{xxii} Within a year of implementation, providers will be required to provide baseline data regarding their *ad hoc* interpreter use. This data must be tabulated by an unaffiliated third-party such as a local health department.

The LEP community overlaps significantly with the Hispanic community, making Latino advocacy groups such as The National Alliance for Hispanic Health and The National Council of La Raza key advocates. Both groups are dedicated to improving health outcomes, which would be the case as more Hispanics would be able to communicate with their providers and would spend less money and time on visits. Other minority rights advocacy

groups, such as the Southeast Asia Resource Action Center, would also be important advocates.

ⁱ Glenn Flores, “Language Barriers To Health Care In The United States,” *New England Journal of Medicine*, 2006, 229-31.

ⁱⁱ Ibid.

ⁱⁱⁱ Louis C., Hampers and Jennifer E. McNulty, “Professional Interpreters and Bilingual Physicians in a Pediatric Emergency Department,” *Archives of Pediatrics & Adolescent Medicine*, 2002, 1108.

^{iv} Ann D. Bagchi, Stacy Dale, Natalya Verbitsky-Savitz, Sky Andrecheck, Kathleen Zavotsky and Robert Eisenstein, “Examining Effectiveness Of Medical Interpreters In Emergency Departments For Spanish-Speaking Patients With Limited English Proficiency: Results Of A Randomized Controlled Trial,” *Annals of Emergency Medicine*, 2010, 248-56.e4.

^v Hampers, “Professional Interpreters and Bilingual Physicians in a Pediatric Emergency Department.”

^{vi} Bagchi, “Examining Effectiveness Of Medical Interpreters In Emergency Departments For Spanish-Speaking Patients With Limited English Proficiency: Results Of A Randomized Controlled Trial.”

^{vii} Amy Wilson-Stronks and Erica Galvez, “Hospitals, Language, and Culture: A Snapshot of the Findings from the National Study of 60 Hospitals,” The Joint Commission, 2007.

^{viii} Hampers, “Professional Interpreters and Bilingual Physicians in a Pediatric Emergency Department.”

^{ix} Flores, “Language Barriers To Health Care In The United States.”

^x Ibid.

^{xi} Bagchi, “Examining Effectiveness Of Medical Interpreters In Emergency Departments For Spanish-Speaking Patients With Limited English Proficiency: Results Of A Randomized Controlled Trial.”

^{xii} Hampers, “Professional Interpreters and Bilingual Physicians in a Pediatric Emergency Department.”

^{xiii} Bagchi, “Examining Effectiveness Of Medical Interpreters In Emergency Departments For Spanish-Speaking Patients With Limited English Proficiency: Results Of A Randomized Controlled Trial.”

^{xiv} Flores, “Language Barriers To Health Care In The United States.”

^{xv} Steven Mikulan, “California Translation Bill Veto Misinterprets An Urgent Medical Need,” *Huffington Post*, October 13, 2013, accessed November 28, 2015, http://www.huffingtonpost.com/2013/10/18/california-translation-bill_n_4124476.html.

^{xvi} “National Standards for Culturally and Linguistically Appropriate Services in Health Care: Final Report,” *PsycEXTRA Dataset*, 2000.

^{xvii} Ibid.

^{xviii} Mikulan, “California Translation Bill Veto Misinterprets An Urgent Medical Need.”

^{xix} Flores, “Language Barriers To Health Care In The United States.”

^{xx} Ibid.

^{xxi} Bagchi, “Examining Effectiveness Of Medical Interpreters In Emergency Departments For Spanish-Speaking Patients With Limited English Proficiency: Results Of A Randomized Controlled Trial.”

^{xxii} “National Standards for Culturally and Linguistically Appropriate Services in Health Care: Final Report.”

Evaluation of the willingness to do Genetic Screening Hemoglobinopathies in Saudi Arabia using the Precaution Adoption Model (PAPM)

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ABSTRACT

This study applies the Precaution Adoption Processing Model(PAPM)to understand the barriers of not undergoing genetic screening of hemoglobinopathies in Saudi Arabia. The PAPM seeks to identify all stages involved when people commence in health- protective behaviors (e.g. screening for breast cancer), and determine factors that lead people to move from one stage to the next. The cross-sectional study was based on 1016 participants who were surveyed during August 2015 to October 2015 in five cities of Saudi Arabia. Survey measures included: sociodemographic characteristics, self-reported genetic screening, health system characteristics, attitudes, beliefs and Knowledge about genetic screening. population in Riyadh city showed low level of awareness towards genetic screening. In the cities of Muhayil Asir and Jazan, participants reported a number of barriers related to small number medical care facilities and the geographical nature. We also found older people and females are at more advanced stages of the model. The younger respondents who were of age 18-24 years had no knowledge about genetic disease and genetic testing in comparison to the older respondents. Also, 61% of females had knowledge about genetic screening compared to 45% of males. The presence of a family history of Hemoglobinopathies was strongly associated with being in the advanced Stage 7 (maintaining of genetic testing). Logistic regression analyses revealed that being at young age, being a male or not having a bachelor degree increased the chance of not committing to genetic screening. The combination of PAPM stage assignment and other factors provides useful information for designing tailored interventions. Awareness program and knowledge in the Saudi Arabia should be extended to the community to identify barriers that prevent people from undertaking genetic screening, and committing to follow-up health care. An awareness plan needs to be developed for the young males and also those who are uneducated.

Key words

Genetic disorder, Saudi Arabia, PAPM, Hemoglobinopathies, Sickle Cell Anemia, Thalassemia and G6PD

INTRODUCTION

In developing countries the most common genetic disorder and inherited diseases are the haemoglobinopathies (thalassemia and sickle-cell disorder) which are globally widespread. Every year around 300,000 infants are born with haemoglobinopathies. Over the world 4.5% people carry haemoglobin pathogen.⁴ The evidence reports that the carriers of thalassemia are more than that of SCD. But the most common hemoglobin disorder worldwide is SCD with the prevalence of 70%. Moreover in Africa up to 2% of all children are born with Sickle cell disease (SCD).

Studies and statistics have proven that most common hemoglobinopathies are sickle cell⁸. In Saudi Arabia the sickle cell gene and B-thalassemia occur at the rate of 1% - 20% with 2000 affected new born add to the pool annually. Study has recommended that the prevention is possible by either pre implantation genetic diagnosis or prenatal diagnosis⁵.

Saudi Arabia has a high prevalence of hereditary hemoglobin disorders⁵. The ministry of health is making efforts to control and prevent the genetic disorders, but Saudi Arabia is facing a lot of challenges for the control of genetic disorders.

The eastern region ranked first in the genetic blood diseases in the Kingdom, and the southern region was occupied first place in the overall genetic diseases.

Nevertheless, there are many families in Saudi Arabia suffering from genetic disorder which lead to substantial economic and psychosocial burdens on the family with negative reflection on the community at large.

A hemoglobinopathy is status (disease or trait) caused by a defect in the genetic code for hemoglobin synthesis, there are over 600 known hemoglobin variants reported⁹. They can result from the production of an abnormal hemoglobin chain¹⁰. Hemoglobinopathies can be either inherited, in which case people are born with them, even if they are not noticeable at first or in some cases develop spontaneously when disease-causing mutations occur during cell division.

Despite over the years in Saudi Arabia the rate of Hemoglobinopathies decreased slowly but it is still higher than the global average.

One of the major contributing factor behind the increased incidence of genetic and Hemoglobinopathies disorder in Saudi Arabia is the high rate of consanguinity²².

Our study is the first study in the kingdom that aimed to explore the genetic screening adoption based on the Precaution Adoption Process Model (PAPM)²⁰.

The Precaution Adoption Process Model (PAPM) seeks to identify all the stages involved when people commence health-protective behaviors and to determine the factors that lead people to move from one stage to the next and explain how a person comes on decisions of taking action and how he or she translates that decision into action (Weinstein and Sandman, 1992)²⁰ **Fig. 1**,

Furthermore, a still-unanswered question that needs our attention is that if we can apply PAPM to evaluate willingness to do the genetic pre-marital screening of Hemoglobinopathies in Saudi Arabia in order to motivate the community for doing genetic screening in early stage of their life.

We assessed the applicability of PAPM to genetic screening by examining people through seven-stage based on PAPM to classify people who share same pattern of knowledge, beliefs, attitudes and barriers for each stage and often have a different pattern of these attributes compared to those in other stages.²¹.

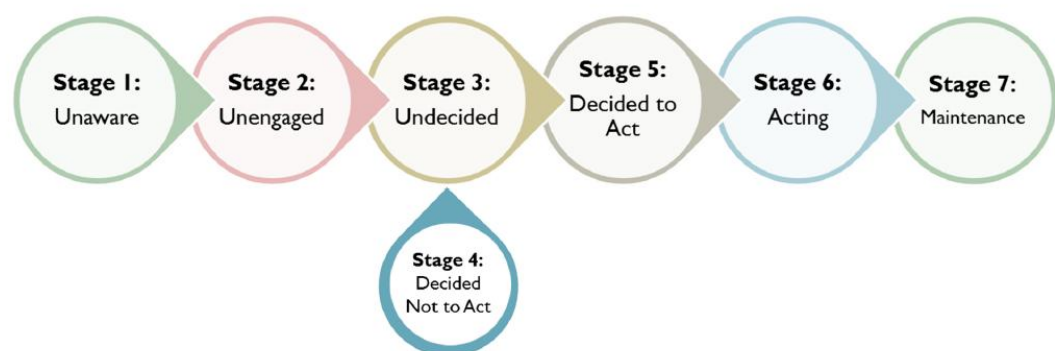


Figure 1 Stages of the Precaution Adoption Process Model (source: Ref. [20]).

This study aimed to apply the Precaution Adoption Process Model (PAPM) in order to evaluate willingness to undergo genetic pre-marital screening of Hemoglobinopathies in Saudi Arabia.

The main hypothesis we are studying here is that Saudi individuals have low level of willingness to undergo genetic screening and that their behavior can be explained using the precaution adoption Process model.

DATA AND METHDOLOGY

Study design

This study uses is a cross-sectional observational survey, with some analytical, a descriptive approach, and quantitative components.

Study setting

The sample was collected primarily from Riyadh region and four other major cities (**Riyadh , Dammam, Alhasa , Jazan and Mahaval asir**) across Saudi Arabia. The aim of expanding the recruitment area is to enhance the generalizability of the study. The study was conducted in three major areas in Saudi Arabia from august 2015 to October 2015.



Figure 2Saudi map (source: Ref. [29]).

Sample size

Sample collecting based on Geographic Area Sampling

Number of people in each rejoin= X1 or X2 or X3

Add all =x1+x1+x3

*proportional allocation

$N = \frac{1200 * X}{N+N+N}$

Sample Size =1200 Expected Non-response rate around 20% Sample size after adjustment =1016

Data Source

We analyzed data from different regions of Saudi Arabia to find out the Saudi population willingness to undergo genetic screening for Hemoglobinopathies in early stage of their life in age 18-24 years old and to find out the reasons that prevent them to do so. Both qualitative and quantitative data was taken and analyzed.

The instrument use in study

A developed questionnaire (described below) self-administered to participants. Firstly, the questionnaire was translated to Arabic and run for validation and reliability test. For content validity first we met experts in genetic field who understand the topic gave us their comment for modification. Secondly, the questionnaire was checked by consulting relevant literature and several expertise in the area (genetics and genetic counselors). The experts around four expert add five questions in order to capture the topic under investigation effectively. Thirdly we printed the questionnaire to fill out the survey while scribbling notes. Lastly we administered the questionnaire to 30 male and female individuals of different age group to see the functioning of questionnaire among them

Moreover, the questionnaire was checked for accuracy after translation 10 bilingual individuals. Reliability of the questionnaire checked by running the questionnaire twice on 20 individuals, 2 weeks apart.

Theoretical Framework:

The theoretical framework for the study and the questionnaire was based on popular theories of health behavior Weinstein's²⁰ PAPM might ask a sample of patient about the disease cause and the effectiveness of various precautions, the social consequences of taking such precautions. The PAPM is based on a stage-based model of health behavior change with roots in social learning approaches to health behavior.

The questionnaire:

The current questionnaire assess knowledge, perception of Hemoglobinopathies in Saudi Arabia and determine different factors with the PAPM that affects people's willingness to undergo genetic screening for Hemoglobinopathies. The questionnaire consists of five components that include socio demographic factors, assessment of medical history, assessment of present Hemoglobinopathies illness, assessment of the knowledge about genetic screening of Hemoglobinopathies, and lastly perception of genetic testing.

This part tried to assess what prevents/affects individuals when taking decisions regarding genetic screening.

This index was evaluated by five questions concerning the knowledge of genetic screening. Scores were given according to the number of correct answers. A binary outcome of whether the knowledge or no knowledge was given based on a cut off value of the final score.

We created the knowledge score: The participants were asked some questions in questionnaire that measured their overall knowledge by taking into account all the variables.

Study Subjects

In the current sample we include male and female Saudi young individuals (ages 18-35) and young families with two children at most. Subjects are recruited from public venues: schools, universities, and large gathering places. The recruited subjects also include subjects with sibling(s) affected with one or more of the Hemoglobinopathies and normal subject that does not have hemoglobinopathies.

Data collection took place over 3-month period. Inclusion criteria included Data collection took place over 3-month period. Inclusion criteria included

- patients age 18 up to 35 years old.
- young families with two children at most.
- Both male and female
- Saudi Nationals

Exclusion criteria included

- Non Saudi,
- age groups (<18 and >35)

Total of the participant 1016 individuals were recruited

Ethical consideration.

Permission to carry out the study was requested first from research committee in College of Public Health and Health Informatics, King Saud Bin Abdul-Aziz University for Health Science.

Second, after the college committee approve, we start to take permission from King Abdullah International Medical Research Center. Purpose of the study and its significance was provided to all participants in a text format before survey and proper consent was taken before the conduct of survey.

Data Management and Analysis

1. Outcome measurement and assessment of independent variables

I. Primary outcome

- Genetic screening: history and intention

The participants were asked whether they had heard of the test, if they ever had the test, and, if applicable, the date of the most recent test was asked. They were also asked if they were thinking about and/or intending to get genetic screening test in the future. The responses were combined to categorize whether respondents were up-to-date on each test, and/or up-to-date with the current health care flow up.²¹

- PAPM stage

The participants were asked regarding Perception of genetic testing. Also asked what prevents/affects individuals when taking decisions regarding genetic screening.

II. Secondary outcome

- Socio demographic and other characteristics

The questionnaire contained standard questions regarding age, gender, city, highest level of education, occupation, marital status, total number of children and income level. Questions about the respondent's medical history and care was included. Further more perception of current health, family history of Hemoglobinopathies disorder and how often s/he receives regular medical checkups or physical exams.

The first components evaluate different variables of **socioeconomic status** with the ultimate purpose of evaluating the effect of social determinants on different stages of the PAPM. The **socioeconomic status** in our questionnaire consists 7 question describe the participants age , gender , city , occupation, education level, marital status and income level.

The second component will include 10 questions to assess **past medical history** of genetic hemoglobiopathies; we ask the participants if they have any health problem, suffered from difficulty in breathing at higher altitude, and if they have a first, second, a close third, fourth -degree relative and had anyone in your family or any in your big trip (Qublatk) suffered from these disorders (Metabolic disorder disease, Blood disorders, Sickle cell anemia, Thalassemia). In this part we also inquired about any genetic test or a full examination of their health. Lastly we asked about consanguinity in their family

The third component assessed present medical illness related to Hemoglobinopathies, We asked them if they had screening for hemoglobinopathy such as (Sickle cell disease. Thalassemia disease and G6PD) or not .

The purpose of both components that are second and third component was to evaluate how they may affect individuals' perception of genetic screening.

The fourth component consists of 11 questions that assessed the knowledge about inherited Hemoglobinopathies and the knowledge about genetic screening. We asked the participants, in the knowledge part about the genetic blood diseases. Also we inquired them about the reason that could prevent them to follow up treatment plan in the hospital. Furthermore, we asked them if they know about the consequences of genetic diseases in their life.

The fifth component consists of 16 questions to evaluate the Perception of genetic testing. This the last and most important part of the questionnaire was designed to apply the PAPM to estimate the distribution of the interviewed subjects into the different stages of the PAPM in order to develop a tailored intervention scheme to increase participation of the public in the genetic screening for Hemoglobinopathies. This part tried to assess what prevents/affects individuals when taking decisions regarding genetic screening.

This index was evaluated by five questions concerning the knowledge of genetic screening. Scores were given according to the number of correct answers. A binary outcome of whether the knowledge or no knowledge was given based on a cut off value of the final score.

- **Socio demographic and other characteristics**

The questionnaire contained standard questions regarding age, gender, city, highest level of education, occupation, marital status, total number of children and income level. Questions about the respondent's medical history and care was included. Further more perception of current health, family history of Hemoglobinopathies disorder and how often s/he receives regular medical checkups or physical exams. Questions 1-7 were used to assess Socio demographic and other characteristics.

- Family history

The participants were asked about the family history and from their answer we measured the correlation between the relative effect and health factor. Questions 10-14 were used to assess family history.

- Knowledge score

The participants were asked some question in questionnaire which measured their knowledge by taking cumulative responses. Knowledge was assessed by inquiring about transmutation of hemoglobinopathies , hemoglobinopathies trait, diagnosis, Gen transmutation and early diagnosis of genetic disease. By using these questions we divided the responses in to 2 categories that is knowledgeable and not knowledgeable. We created the knowledge score: The participants were asked some questions in questionnaire that measured their overall knowledge by taking into account all the variables.

The knowledge part assessed the participants' knowledge based on five questions that inquired about causes, mode of transmission, types, diagnosis and parental transmission to children, and its impact on later life stages. A final score was given based on the number of correct answers, and the total score of 3 and more (out of 5) was considered to be knowledgeable while scores less than 3 was considered not knowledgeable.

7.2 Data analysis

I. Data cleaning and preparation

Data were initially entered into an excel sheet and then inspected for uniformity and missing values. Data were sorted out and then transferred into Stata. Raw data were xt processed in accordance with the best practices to identify any inaccuracies or incompleteness prior to the statistical analysis³⁷.

The data analysis was performed using two statistical analysis system (a) Small Stata version 12 and SAS version 9.4. P-values less than 0.1 in the bivariate analysis and P-values less than 0.05 in the multivariate analysis were considered statically significant. The SAS statistical software (version 9.4) was used to for multivariate logistic regression analysis.

We further created binary outcome from combining the different stages into two main groups **Action**: which included the stage 5,6,7 and **inaction** which included 1,2,3,4 For the purposes of logistic analyses in the SAS software, we considered action to represent 0 outcome which is good outcome while 1 outcome represents inaction which is bad.

II. Descriptive analysis

All variable were summarized and reported across the study using descriptive statistics. Interval variable such as age, gender, education level, graphical area and family history were summarized and reported in terms of number and frequency.

$$g(x) = \ln \left[\frac{\pi(x)}{1 - \pi(x)} \right] \\ = \beta_0 + \beta_1 x .$$

38

Categorical variable such as gender, family history were summarized and reported in terms of frequency distribution. All categorical and interval variable were compared statically across the study using chi-square test and T-test, respectively. All statistical tests were declared significant at alpha level of 0.05 or less.

III. Bivariate analysis

Bivariate analysis was performed to test the association between stage and the independent variables. (Pearson correlations)

IV. Cross-classification and logistic regression

We used cross-classification and logistic regression analysis to describe the sample and assess association of potential predictor variables with PAM stage of genetic screening adoption.

We used cross-classification and logistic regression analysis to explore multivariable associations. The purpose of the analysis is to evaluate the participant in which stage they are, if they in action to do screening or inaction to do not do screening³⁷, for that we created binary outcome from combining the different stages into two main groups **Action**: which included the stage 5, 6, 7 and **inaction** which included 1, 2, 3,4. For the purpose of logistic analyses in the SAS software, we considered action to represent 0 outcome while 1 represents inaction (event). Odds ratios and 95% CI were obtained for the outcome measure with regard to different levels of the independent variables (e.g. gender, age, education, city ...)

RESULTS

1. Univariate analysis

The mean age of the participants was 24 years with a standard deviation of 0.78. With respect to age groups, 52 % of subject were between 18 to 24 years of age, followed by 28% belonged to the age group of 25 to 30 years and 20% within the age group of 31 to 35 years. The total number 85 % response rate.

The age group distribution was different between different cities with statistical significance with p-value <0.001.

The majority of the participants (65%) were female. The most common occupation was student (45%) followed by 16% were in administrative field. The percentage of students was high in Riyadh and Dammam compared to Alhassa. The majority of respondents (64%) had completed college and a quarter had high school education.

About 62% of the respondents had family income between 1331-3993 USD or more. Sixty-two percent were single.

The majority of subjects (81%) in the current sample didn't have children. The percentage of participants who had family history of Hemoglobinopathies was 43%. The highest of rate of respondent who had family history was reported in Jazan by 77% and in Dammam by 57% while in the Riyadh the rate was as low as 27%. The respondents who don't have family history, 73% were from Riyadh. Socio and health system characteristics of the study sample are shown in Table 1.

Table 1 Socio-demographic and other health characteristics of study population (N=1016)

Characteristic	Riyadh		Dammam		Alhassa		Muhayil Asir		Jazan		All city		P value
	N	%	n	%	N	%	N	%	N	%	N	%	
Age													
18-24	300	61	86	57	34	27	48	34	59	53	527	52	0.00
25-30	107	22	38	25	54	44	59	42	30	27	288	28	
31-35	83	17	26	17	36	29	34	24	22	20	201	20	
Gender													
Female	378	77	73	49	90	73	77	55	39	35	657	65	0.00
Male	112	23	77	51	34	27	64	45	72	65	359	35	
Occupation													
Administrate	62	13	22	15	37	30	30	21	9	8	160	16	0.00
Private company	17	3	11	7	8	6	6	4	2	2	44	4	
Teacher	15	3	10	7	4	3	11	8	10	9	50	5	
Health provider	24	5	19	13	17	14	24	17	6	5	90	9	
Solider	30	6	6	4	6	5	8	6	9	8	59	6	
Student	274	56	78	52	30	24	35	25	39	35	456	45	
Not employ	28	6	3	2	2	2	6	5	26	24	65	6	
House wife	40	8	1	1	20	16	21	15	10	9	92	9	
Level of education													
Postgraduate	22	4	7	5	5	4	3	2	2	2	39	4	0.00
Under graduate	336	69	122	81	79	64	70	50	47	42	654	64	
High school	112	23	20	13	35	28	55	39	51	46	273	27	
Elementary school	14	3	1	1	4	3	11	8	6	5	36	4	
Primary school	4	1	0	0	1	1	1	1	3	3	9	1	
Illiterate	2	0.41	0	0	0	0	0	0	2	2	5	0.49	
Marital status													
Single	336	69	114	76	42	34	70	50	71	64	633	62	0.00
Married	127	26	35	23	70	56	61	43	35	32	328	32	
Divorced	23	5	0	0	9	7	7	5	4	4	43	4	
Separated	0	0	0	0	3	2	2	1	1	1	3	0.3	
Widowed	4	1	0	0	0	0	1	1	0	0	8	1	
Other	0	0	0	0	0	0	0	0	0	0	1	0.1	
Child number													
No children	428	87	137	91	70	56	96	68	87	79	818	81	0.00
One child	24	5	7	5	19	15	17	12	7	6	74	7	
Two children	38	8	6	4	35	28	28	20	15	17	124	12	
Income level													
1331-3993 USD	305	62	37	25	89	72	117	83	84	76	632	62	0.00
Above 3993 USD	132	27	101	67	26	21	12	9	19	17	290	29	
Less than1331USD	49	10	12	8	9	7	0	0	8	7	90	9	
Missing	4	1	0	0	0	0			0	0	4	0.39	

Table 1 continued

Characteristic	Riyadh		Dammam		Alhassa		Muhayil Asir		Jazan		All city		P value
	n	%	N	%	n	%	N	%	n	%	N	%	
Family history													
Hemoglobinopathie s relatives	13	27	85	57	65	37	65	46	80	72	441	43	
No	3												
Hemoglobinopathie s relatives	35	73	65	43	78	63	76	54	31	28	575	57	0.00

Tables 2 summarize the comparison of the overall stage distribution in different cities. Thirty-Six percent of subjects in Stages 1 were being unaware about the genetic screening and also that government facilities provided it for free. Large percentage of the participants (45%) in stage 1 were from Riyadh followed by (37%) from Dammam and (25%) from AlAhssa. Stage 3 (undecided about doing genetic screening) also showed second highest percentage distribution among subjects and in this stage Jazan had the highest percentage followed by Riyadh (18%). The city with the lowest percentage in this stage was Al Ahssa (12%). Moreover 33% of the respondents who take action for doing genetic screening (stage 6) were from Muhayil Asir while 29% were from Alhassa and only 8% from Riyadh. In other hand, the respondents who refused to do genetic screening, 18% were from Dammam.

*Table 2 Summary of the comparison of the overall stage distribution in different cities
(N=1016)*

PAPM stage of adoption		Riyadh		Dammam		Alhassa		Muhayil Asir		Jazan		All city		P value
		N	%	N	%	N	%	N	%	N	%	N	%	
		49	48	150	15	124	12	141	14	111	11	101	10	
		0										6	0	
Stage 1: Unaware	1:	22	45	55	37	31	25	31	22	28	25	367	36	0.00
Stage 2: Unengaged	2:	25	5	4	3	1	1	5	4	9	8	44	4	0.026
Stage 3: Deciding	3:	89	18	22	15	15	12	18	13	38	34	182	18	0.00
Stage 4: Decided No	4:	41	8	27	18	13	10	19	13	14	13	114	11	0.00
Stage 5: Decided Yes	5:	68	14	16	11	14	11	15	11	10	9	123	12	0.302
Stage 6: Action	6:	40	8	18	12	36	29	46	33	10	9	150	15	0.00
Stage 7: Maintenance	7:	5	1	8	5	14	11	7	5	2	2	36	4	0.00

- **Socio demographic characteristics**

There was significant association of gender with stage of adoption and age with p value <0.001. Overall there was higher percentage of those undecided and unengaged among the youngest age group (18-24). In general, percentage of females was higher in the advanced stage of the model. Elder respondents were in the advanced stage of the model while younger respondents were in the early stage of the model. Moreover, females were in advanced stage of model, for instance in stage 7, 72% were females compared to 28% males. Similarly, in stage 5, 74% were females compared to 26% males. Respondents in Stage 1, 2,3,4,5 the majority of respondent were of age group

18 -24 years and majority of them were female while the age of sample between 25-30 years were more in stage 6 action.

The city and stages in table 3: there was a significant difference in the percentage distribution of subjects in the different stages according to the city with p value <0.001 . Participants in early stage of model that is 1,2,3,4 (in inaction) majority were from Riyadh while in the later stage that is 5,6,7 (action stage) majority were from Mahayel Asir. For example, 31% in stage 6 were from Mahayel Asir while 8% from Riyadh. Also in Stage 7 39% were from Alhassa by 39 % and 22% from Dammam. There was also a significant difference of stage distribution of subjects according to their occupation with P value < 0.001 . Most of the respondents found in stage 1,2,3,4 were students while the health providers were in the advanced stages of the model.

In additions, there was a significant difference with education. Most of the respondents who had college certificate were early stage. Fifty percent in stage 2 had done intermediate. The respondent in stage 1,2,3,4 were single than later stage who were married and there was significant association with stages with p value <0.001 . There was significant difference in the percentage distribution in the different stages according to whether or not participants have children. We found the respondents in early stage they don't had children while those in later stage had at most one child.

There was also a significant difference among stages according to the family history where 35% of those who had family history were in stage 1 (unaware) while majority who had relatives with hemoglobinopathies were in later stage. The stage 3, 84% of the respondents didn't have children and 56% of those in this stage didn't have family history. (Table 3)

Table 3 Distributions of the subjects in the different PAPM stages according to different categorical variables (N=1016)

Factor effect	Stage1:		Stage2:		Stage3:		Stage4:		Stage5:		Stage6:		Stage7:		P value
	Unaware		Unengaged		Deciding		Decided no		Decided yes		Action		Maintenance		
	N	%	n	%	N	%	N	%	n	%	n	%	N	%	
	367	36	44	4	182	18	114	11	123	12	150	15	36	4	
Age															
18-24	206	56	33	75	105	58	46	40	71	58	53	35	13	36	0.00
25-30	99	27	6	14	47	26	32	28	36	29	56	37	12	33	
31-35	62	17	5	11	30	16	36	32	16	13	41	27	11	31	
Gender															
Female	241	66	29	66	103	57	68	60	91	74	99	66	26	72	0.055
Male	126	34	15	34	79	43	46	40	32	26	51	34	10	28	
City															
Riyadh	222	60	25	57	89	49	41	36	68	55	40	27	5	14	0.00
Dammam	55	15	4	9	22	1	27	24	16	13	18	12	8	22	
Alhassa	31	8	1	2	15	8	13	11	14	11	36	24	14	39	
Muhayil Asir	31	8	5	11	18	10	19	17	15	12	46	31	7	19	
Jazan	28	8	9	20	38	2	14	1	10	8	10	7	2	6	
Occupation															
Administrative	51	14	1	2	24	13	27	24	23	19	29	19	5	17	0.00
Private company	14	4	1	2	7	4	6	5	5	4	8	5	3	8	
Teacher	14	4	2	5	11	6	12	11	4	3	5	3	2	6	

Table 3.... continued

Factor effect		Stage1: Unaware		Stage2: Unengaged		Stage3: Deciding		Stage4: Decided no		Stage5: Decided yes		Stage6: Action		Stage7: Maintenance		P value	
		N	%	N	%	N	%	N	%	n	%	n	%	N	%		
		367	36	44	4	182	18	114	11	123	12	150	15	36	4		
Occupation																	
Health provider		24	7	3	7	10	5	9	8	15	12	24	16	5	14	0.00	
Solider		25	7	1	2	11	6	9	8	3	2	9	6	1	3		
Student		192	52	27	61	86	47	35	31	58	47	46	31	12	33		
Not employed		21	6	8	18	16	9	7	4	5	4	6	4	2	6		
House wife		26	7	1	2	17	9	9	8	10	8	23	15	6	17		
Education																	
	Postgraduate	Under graduate	7	2	1	2	8	4	10	9	5	4	7	5	1	3	0.00
	High school		265	72	19	43	95	52	78	68	85	69	91	61	21	58	
	Intermediate –school		76	21	22	50	69	38	25	22	31	25	11	7	11	31	
	Primary school		13	4	1	2	7	4	0	0	1	1	2	1	3	8	
	Illiterate		3	1	0	0	3	2	1	1	0	0	0	0	0	0	
	Missing		3	1	1	2	0	0	0	0	1	1	3	2	0	0	
Marital status																	
Single		268	73	36	81	123	68	62	54	81	66	48	32	15	42	0.00	
Married		78	21	8	18	50	27	50	44	38	31	85	57	19	53		
Divorced		15	4	0	0	7	4	1	1	4	3	14	9	2	6		
Separated		1	0.27	0	0	0	0	1	1	1	1	1	1	0	0		
Widowed		4	1	0	0	2	1	0	0	2	1	2	1	0	0		
Other		1	0.27	0	0	0	0	0	0	0	0	0	0	0	0		
Children Number																	
No children		319	87	38	86	153	84	83	73	103	84	95	63	27	75	0.00	
One child		11	3	1	2	8	4	17	15	11	9	22	15	4	11		
Two children		37	10	5	11	21	12	14	12	9	7	33	22	5	14		
Income level																	
1331-3993 USD		206	56	26	59	124	68	68	60	78	63	110	73	20	56	0.00	
Above 3993 USD		125	34	14	32	41	23	42	37	31	27	31	21	8	22		
Less than1331USD		36	10	4	9	17	9	4	4	12	10	9	6	8	22		
Family history																	
Yes		130	35	14	32	80	44	52	46	56	46	81	54	28	78	0.00	
No /do not know		237	65	30	68	102	56	62	54	67	55	69	46	8	22		

Factors affecting knowledge towards genetic screening.

Table 4 shows factors affecting knowledge towards genetic screening. This index was evaluated by five questions concerning the knowledge of genetic screening. Scores were given according to the number of correct answers. Based on the cut off value of final scores we created binary variable that is knowledgeable and not knowledgeable. We then examined the effects of different demographic variables on the knowledge level towards genetic screening there was significant difference in the knowledge ($p=0.006$) and this knowledge increased with age. In general female were more knowledgeable of genetic screening (61% compared to 55% in males). With regard to the city, there was significant difference between cities with p value <0.001 . Dammam had the highest percentage of participants having knowledge about genetic screening (85%) followed by AlAhssa (76%) and then Muhayl Asir (57%). In addition, percentage of respondents with knowledge was significantly different according to education with $p<0.001$) and occupation with (p value <0.001); where the percentage of knowledge increased by level of education and with more professional jobs such as health provider and teachers.

Table 4 The Knowledge towards genetic screening with factor effect (N=1016)

Factor effect	No knowledge		Knowledge		P value
	N	%	n	%	
	419	41	597	59	
Age					
18-24	242	46	285	54	0.006
25-30	108	38	180	63	
31-35	69	34	132	66	
Gender					
Female	257	39	400	61	0.063
Male	162	45	197	55	
City					
Riyadh	253	52	237	48	0.00
Dammam	22	15	128	85	
Alhassa	30	24	94	76	
Muhayil Asir	60	43	81	57	
Jazan	54	49	57	51	
Occupation					
Administrate	63	39	97	61	0.00
Private company	12	27	32	73	

Table 4 continued

Factor effect	No knowledge		Knowledge		P value
	n	%	n	%	
	419	41	597	59	
Occupation					
Teacher	12	27	38	76	0.00
Health provider	10	11	80	89	
Solider	35	59	24	41	
Student	198	43	258	57	
Not employed	41	63	24	37	
House wife	48	52	44	48	
Education					
Postgraduate	9	23	30	77	0.00
Under graduate	226	35	428	65	
High school	155	57	118	43	
Elementary school	21	58	15	42	
Primary school	6	67	3	33	
Illiterate	2	40	3	60	
Marital status					
Single	279	44	354	56	0.106
Married	121	37	207	63	
Divorced	13	30	30	70	
Separated	1	33	2	67	
Widowed	5	63	3	38	
Other	0	0	1	100	
Children number					
No children	344	42	474	58	0.423
One child	27	36	47	64	
Tow child	48	38	76	62	
Income level					
1331-3993 USD	289	46	343	54	0.00
Above 3993 USD	83	29	207	71	
Less than1331USD	44	49	46	51	
Missing	3	75	1	25	
Family history					
Yes	282	48	309	52	0.00
No /do not know	137	32	288	68	

Table 5 shows the predictors for inaction (stage: 1-4) with reference to genetic screening.

Using post graduate as the reference under graduate, high school and illiterate were positively associated with inaction with regard to genetic screening however the association was not significant (OR: 1.14, 1.23 and 2.00 respectively).

When Age was taken as continuous variable significant association was found with inaction, with every unit increase in age the risk of inaction decreases with OR 0.81 and CI: 0.68-0.96. when age range 18-24 was taken as reference older age group that is 23-30 was significantly associated with lower risk of inaction with OR 0.62 and CI 0.45-0.84.

When taking female as reference male had higher risk of inaction with OR 1.41 and CI 1.06-1.88. We finally adjusted gender to see the effect of cities we found taking Riyadh as reference the risk for inaction was significantly lower for participants of ALhassa and Muhayil Asir with OR 0.256 and 0.291 respectively. (See Table 5)

Table 5 Multivariate logistic regression analysis to find predictor associated with PAMP stage of adoption

Factor effect	(Odds ratio)		95% wald Confidence limits
Education level			
Post graduate	1	-	-
Under graduate	1.14	0.57	2.25
High school	1.23	0.60	2.51
Intermediate school	0.70	0.27	1.79
Primary school	1.75	0.32	9.64
Illiterate	2.00	0.20	19.71
Age			
Age(cont)	0.81	0.68	0.96
Age (18-24)	1	-	-
age (25-30)	0.62	0.45	0.84
age (31-35)	0.71	0.49	1.00
Gender female	1	-	-
Gender male	1.41	1.06	1.88
City			
Riyadh	1	-	-
Dammam	0.75	0.49	1.13
Alhassa	0.26	0.18	0.40
Muhayil Asir	0.32	0.22	0.48
Jazan	1.36	0.81	2.31
Sex			
Sex	1.513	1.108	2.067
Stage effect by city controlling for sex			
Riyadh	1	-	-
Dammam	0.664	0.435	1.012
Alhassa	0.256	0.170	0.387
Muhayil Asir	0.291	0.195	0.435
Jazan	1.151	0.668	1.983

DISCUSSION

In this study, socio-demographic characteristics, Health effect, Knowledge, attitudes, and healthcare factors were evaluated with respect to PAMP stage of adoption of the genetic screening in Saudi community. A pervious study indicated the usefulness of PAMP in tailoring intervention^{20, 21}. We hypothesized that we would find important

differences among subjects across the stages that would be useful for tailoring intervention messages to increase genetic screening behavior. Results from the (PAM) can be used to tailor health promotion programs studying individual's behavior and increasing the individual's knowledge and change their attitude related to the genetic screening.

In our study we identified sociodemographic characteristics female more likely than male to intend to be screened, and these findings were similar to another study that applied PAM stage of adoption ²¹. The majority of respondent were between 18-24 years, which is our target group in this study in order to understand their attitudes and behaviors related to genetic screening as this is the age of marriages and also newlywed couples because we want reduced the number of voluntary cancelations of at-risk marriage proposals which lead to decrease the rate of disease.

As genetic screening is very important in this age group thus we recruited majority of participants of this age. However, we found that older age group had more knowledge about genetic screening then the young that is why we are facing higher prevalence of genetic disorder in our part of the world. As many young individuals are not aware about the importance of genetic screening thus leading towards high pool of burden of genetic diseases participants.

Our finding is inconsistent with the findings of other studies that have shown that knowledge is more prevalent among young individual. ²⁷⁻²⁸ This inconsistent finding make Saudi Arabia more prone for genetic disorders as our youth lacks basic knowledge about importance of genetic screening. Primary and secondary prevention can be improved through the training of health professionals, development of genetic counseling and testing protocols, and increasing the geographical and financial accessibility of healthcare services. In addition, increase public awareness in schools, communities, health institutions, the media, and medical associations; and to establish patient support groups, advocacy, and policies regarding employment for patients with haemoglobinopathy ¹³

In terms of education we found higher levels of education have predicted greater levels of intention to be screened which was also found in the previous study ²¹. As educated people have more knowledge about the benefits of screening and they as it is a blessing in disguise thus the finding of our study could be explained. Moreover,

educated people tend to inquire more about new techniques in order to save themselves from the side effects and worse outcome of disease thus the association seems to be more reasonable in our study.

One of the main findings regarding the distribution of different subjects by city is that Riyadh city had lowest level of awareness. This may be attributed to the fact that Riyadh population is a heterogeneous population and the rate of haemoglobinopathy might be low. About 8% of subjects in Jazan were found in the unengaged stage. Jazan is geographically a large city and it is possible that people face difficulty in accessing medical facilities. In Al Ahssa, in comparison, only about 1% were found in this stage probably because Alhassa doesn't had the same barriers like Jazan. We also found that the presence of a family history of Hemoglobinopathies was strongly associated with being in Stage 7: Maintenance, like Alhassa, Dammam and Muhaiyh asir all of this city had high rate of family history. In addition, those in Stages 1, 2,3,4,5 were also somewhat less likely to be married than those in other stages.

Family history of hemoglobinopathies influenced the stage distribution of subjects; where we found that participants who didn't have family history were in the early stages of the PAM model compared to those with family history who were found in late stage. Therefore, it seems that family history is one of the factors that increase the knowledge for participants and their motivation towards genetic screening. One of the study also reported the same finding.²¹ . The literature has generally associated positive family history with increased screening compliance, but we are not sure about the effect of gender and age in the effects of the factors²¹.

Family history of haemoglobinopathy in relatives first degree were highest in Jazan flowed by alhassa compared to Riyadh, who had the lowest rate over city. Population in both cities of a Al-ahssa and Jezan is generally homogeneous compared to Riyadh which is a metropolitan city, and the traditions normally encourages and sometimes forces marriage among relatives and thus the knowledge level is more among participants of these two city, same result found the highest in was 80% in Samtah jazan and lower in Riyadh 50 %³⁰.

One of the most important findings from this study is that the geographic area can be predictive factor for knowledge, for example, the respondents were in Riyadh area had no knowledge compared to respondents in Dammam and Al Ahssa who had high knowledge. One reason could be that residents in Riyadh have low level of hemoglobinopathies and therefore are not concerned about it. Riyadh population is also very heterogeneous and come from different parts of the country.

About 50 % of the respondents think that the screening program for haemoglobinopathy traits in Saudi Arabia is fair program, 20 % they see no is not fair program and 29 % they unsure if the program fair or not . We can see related to the literature^{22,5,8} the haemoglobinopathy traits in Saudi Arabia is not fair program because as developed countries the haemoglobinopathy traits must done in early stage of the life such as newborn screening while Saudi Arabia still not apply that even WHO recommended that for country who high risk for that.⁴

Respondents who had one child showed more **knowledge about Hemoglobinopathies disorder** compared those who had no children, and this is expected because parents do care more about genetic screening if they have children than if they didn't have. We also found those with income level less than 5000 SR had low level of knowledge, while those with income above 15000 had high knowledge. This be probably attributed to the fact that persons with high income has more access to facility for access to medical care more than those with low income.

The knowledge for percipient regarding Hemoglobinopathies disorder, in Muhayil Asir was very low while the Dammam was high knowledge. We can say that Muhayil Asir has many difficulties, one of that difficulties the health service there was low facility compared by other city that make the population their not wary about some health issue must the health service show them about it. also population in mahayl assir is relatively low educated. We found more **knowledge about Hemoglobinopathies disorder in** Respondents who had high level of education that related the increase knowledge they gained by education . The respondent who had single lower knowledge **about Hemoglobinopathies disorder** camper by who had married.

Muhayil Asir and Jazan they has many barriers related the decrees the facility in medical care and large graphical area in both city. In Riyadh by 23% mentioned that they don't follow up treatment plan because it is costly, the cause may related those can't go government hospital where the treatment free. In Muhayil Asir mentioned that they didn't not follow up treatment plan more than other city because feeling Stigma may cause of that , they are live in small city which they are respect the social culture.

The participants who not follow up treatment plan in the hospital because the far distance the hospital from their home were about 17%, we more seen this cause was more prevalent in n Muhayil Asir (y 37%) and in Jazan by 36%. Both cities have less health care facilities and they are usually mountainous areas ³¹. The treatment can increase the complication, this funding seen more in Muhayil Asir by 18% than other city related to low level of knowledge³².

The causes prevent follow up treatment plan in the hospital mention in under graduate level of education more than other level. The barriers can prevent to do genetic screening it clear with respondent who had college certificate from the other level. The barriers prevents from going to a medical laboratory for genetic tests. The reasons that prevented from not committing to the follow up health care both we can see clear cause in respondent who had under graduation degree, that related the knowledge less than who post graduate level.

Female had more Causes Prevent follow-up treatment plan in the hospital than male because the female don't had access to health service like male. women in general are more concerned about their family matters than men, especially when it comes to their children health ³³.

We found the Single they had more causes prevent to follow up treatment plan in the hospital because less committee than married statue³⁴.

The Under graduate was associated with increase risk of inaction stage with regard to genetic screening related the knowledge less with this level ³⁵⁻³⁶.

The older age group were associated with lower risk compared to the younger age group, the older age was associated with statically significant lower risk of inaction stage the older age more knowledge by years .

We found if live in Damamm , alhasa and Muhayl Asir were ever lower risk to be inaction stage because the population living in this cities more knowledge than other city.

Strength

This study applied the PAPM to explain people's behaviors and attitudes toward genetic screening. In this study we have: Multicenter study that covers major cities of the kingdom. Both homogenous and heterogeneous groups of population were recruited. Diverse group of variables were included to assess the study objective with all aspects. Sample size was reasonable. Comprehensive questionnaire was used for the first time.

Limitation

As Saudi culture and traditions hinder us to recruit equal number of males thus male to female ratio was not in proportion that is response rate was 35% amongst male thus generalizability is questionable. Also, time for data collection was limited however in this short time we have covered large area and reasonable number of participants. As the sampling was random we ended up recruiting more educated participants. This also limits us to conclude with cautions.

Conclusions

This cross-sectional study provides strong evidence that the PAPM stage criteria is a good tool that can be implemented to understand factors affecting people's behavior and attitude for genetic screening. It also helps in defining groups of individuals with similar attitudes, beliefs, and barriers related to genetic screening.

The Saudi community has low rate of Knowledge and Attitudes regarding to genetic screening. The geographic area can be predictive factor for knowledge, for example, the respondents were in Riyadh area had no knowledge compared to respondents in Dammam and Al Ahssa who had high knowledge.

The younger respondents had no knowledge in comparison to of the older respondents. Also female had knowledge more than male. Respondents who had one

child showed more **knowledge about Hemoglobinopathies disorder** compared those who had no children. We also found those with income level less than 5000 SR had low level of knowledge, while those with income above 15000 had high knowledge.

We found more **knowledge about Hemoglobinopathies disorder in** respondents who had high level of education. Those who were married had higher level of knowledge. Barriers identified from our study were distant hospital, family and culture barriers, long queue, inconvenience, problem of conveyance.

RECOMMENDATION

Evidence based awareness programs should be encouraged in order to educate people about the disorders and genetic screening in order to promote primary and secondary prevention. Strategies should be formulated in order to work upon the barriers that hinder population from genetic screening.

Different health centers should be open in different localities so that people can access medical facilities easily. The PAPM appears to be useful in applying for future study for all genetic type disease. We strongly recommend conducting similar studies to build upon the findings of current study. Screening is a cost-effective program should be encouraged in our society. Screening should be encouraged in young adults so that disease prevention can be done at that stage of life.

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Exposure to outdoor air pollutants (PM10 and O3) and physical fitness of 6-7 years old children from Poland

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Objective: The aim of this study is to determine the level of physical fitness components in children between 6 and 7 from Poland depending on two basic parameters of air pollution – PM10 and O₃.

Research material and subject selection procedure: The studies were carried out on a population of children aged between 6-7 living in Poland. The total number of subjects was 58231 children, including: 29 915 boys and 28316 girls. The population was selected using the procedure of stratified randomization. Body height was measured by means of a stadiometer with accuracy up to 0.5 cm. Body mass was measured on a standardized scale with an accuracy of 0.1 kg, with the use of Seca scales. On the basis of the measurements, the BMI indicator was calculated. Physical fitness was measured by means of a battery of tests the Polish version of Eurofit: total balance, arm movement speed, lower limb strength, body flexibility, abdominal muscle strength, arm strength, running speed. The studies also included a survey questionnaire addressed to the children's parents. It involved information related to the place of living (city (0)- village (1)), age, sitting behavior (0 – up to two hours a day, 1 – two hours or more) and also spontaneous physical activity (0 – up to one hour a day, 1 – one hour or more), mother's level of education (1-elementary and secondary school, 0 – high school) and also children's birth weight (0 – 2500grams and more, 1 – up to 2500 grams).

Statistical analysis: In order to determine the influence of air pollution PM 10 and O₃ on the level of physical fitness, GLM was applied.

Results: After adjustment of covariates, the significant differences were found in total balance, flexibility, abdominal muscles' strength, arms' strength and running speed between children from areas from high and low air pollution (PM10 and O₃).

Conclusion: In the studies carried out on the representative sample of 6 to 7-year-old children (boys and girls) from Poland, a significant influence of air pollution, especially O₃, on the level of physical fitness was observed. It seems crucial to organize physical activities in accordance with the recommendations of pediatric associations. The time recommended for physical activity, as well the time when it is organized and also the playground location seem to be of importance. The parents' support and engagement in physical fitness development of preschool children play significant role.

Key words: physical fitness, EUROFIT battery test, preschool children, air pollution

Extended Health Insurance Coverage for Young Adults under Affordable Care Act Lowered Hospitalization Use

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Abstract

Background and aims: The Affordable Care Act (ObamaCare) allows young adults to stay on their parents' health care plan until age 26. This policy was implemented September 23, 2010. This study aimed to evaluate the potential impact of this extended health insurance coverage for young adults aged 18-25 because of Affordable Care Act on hospitalization use, emergency room use, and related cost.

Data and methods: Medical Expenditure Panel Survey (MEPS) data in year 2009 (before policy change) and year 2013 (after policy change) were used to conduct a pre-post analysis. All participants in this study were between 18-25 years old as the last day of survey year. The primary outcomes included emergency room (ER) visits and hospitalizations; the secondary outcomes were health care cost, ER cost, and hospitalization cost. All the costs in year 2009 were adjusted to 2013 US dollar using Personal Health Care Index. Logistic regressions were used to assess the likelihood to go to ER or be hospitalized 2009 versus 2013. Sex, race, age were controlled for in the multivariable analysis.

Results: A total of 4225 in year 2009 and 4277 in year 2013 were included in the final analysis. Approximately 14.3% of the participants in 2009 went to ER versus 14.7 in 2013 ($p>0.05$). Approximately 6.8% were hospitalized in 2009 versus 5.2% in 2013. According to logistic regression, young adults in year 2013 were 25% less likely to be hospitalized (odds ratio (OR)=0.74, 95% confidence interval: (0.62-0.89), $p=0.002$).

The overall health care expenditure went down from \$1991 per person in 2009 to \$1812 in 2013, representing an 9% decline. The ER cost declined from \$420 per person in 2009 to \$372 in 2013. The hospitalization cost got 20% lower, from \$1639 per person in 2009 to \$1319 in 2013.

Conclusions: Extended health insurance coverage under Affordable Care Act lowered the likelihood to be hospitalized for young adults and lowered the total healthcare cost among this population, especially the cost due to hospitalization. This study is among the first to examine the potential impact of this extended health insurance coverage for young adults aged 18-25 because of Affordable Care Act.

1. Introduction

Before the Affordable Care Act was signed into law by President Obama, many health plans and issuers removed young adults from their parents' policies once they reached 18 years old. It left many college graduates and others with no insurance. At that time, young adults had the highest rate of uninsured of any age group. About 30% of young adults were uninsured, representing more than one in five of the uninsured. Further, most young adults only source of health insurance coverage was through their workplace. This could keep workers in jobs that did not match their career and life plans but offered health insurance. This phenomenon is often referred to as "job lock." Job lock might cause serious the economic consequences for young workers.

Contrary to the myth that young people don't need health insurance, one in six young adults has a chronic illness like cancer, diabetes or asthma. Nearly half of uninsured young adults report problems paying medical bills. To solve this issue, the Affordable Care Act requires plans and issuers that offer coverage to children on their parents' plan to make the coverage available until the adult child reaches the age of 26. The goal of this new policy is to cover as many young adults under the age of 26 as possible with the least burden. Plans and issuers that offer dependent coverage must offer coverage to enrollees' adult children until age 26, even if the young adult no longer lives with his or her parents, is not a dependent on a parent's tax return, or is no longer a student. Effective for Plan or Policy Years began on or after September 23, 2010.

In 2009, nearly one-third of young adults ages 18-25 lacked health insurance, more than twice the rate for Americans overall. But the nation has since made dramatic progress in expanding coverage among young adults, thanks to the Affordable Care Act's provision allowing young adults to remain on a parent's plan through age 26. From the time the first of a variety of provisions helping young adults took effect in 2010 through the second quarter of

2014, the uninsured rate among young adults dropped by more than 40 percent, corresponding to 4.5 million additional insured young adults¹. Nevertheless, the potential impact of this extended health insurance coverage for young adults aged 18-25 because of Affordable Care Act on hospitalization use, emergency room use, and related cost remains unknown. This study aimed to answer these research questions.

2. Method

2.1 Data

Medical Expenditure Panel Survey data in year 2009 (before policy change) and year 2013 (after policy change) were used to conduct a pre-post analysis. The Medical Expenditure Panel Survey, which began in 1996, is a set of large-scale surveys of families and individuals, their medical providers (doctors, hospitals, pharmacies, etc.), and employers across the United States. MEPS collects data on the specific health services that Americans use, how frequently they use them, the cost of these services, and how they are paid for, as well as data on the cost, scope, and breadth of health insurance held by and available to U.S. workers. During the household interviews, MEPS collects detailed information for each person in the household on the following: demographic characteristics, health conditions, health status, use of medical services, charges and source of payments, access to care, satisfaction with care, health insurance coverage, income, and employment. The panel design of the survey, which features several rounds of interviewing covering two full calendar years, makes it possible to determine how changes in respondents' health status, income, employment, eligibility for public and private insurance coverage, use of services, and payment for care are related.

2.2 Statistical Analysis

¹ White House. 4.5 Million Young Adults Have Gained Coverage Since 2010, Improving Access to Care and Benefitting Our Economy. Jan 2015

All participants in this study were between 18-25years old as the last day of survey year 2009 and year 2013. The primary outcomes included ER visits and hospitalizations; the secondary outcomes were health care cost, ER cost, and hospitalization cost. All the costs in year 2009 were adjusted to 2013 US dollar using Personal Health Care Index. Logistic regressions were used to assess the likelihood to go to ER or be hospitalized 2009 versus 2013. Sex, race, age were controlled for in the multivariable analysis.

Logistic regressions were used to assess the likelihood to go to ER or be hospitalized 2009 versus 2013. Sex, race, age were controlled for in the multivariable analysis. Logistic regression is a part of a category of statistical models called generalized linear models, and it allows one to predict a discrete outcome from a set of variables that may be continuous, discrete, dichotomous, or a combination of these. Typically, the dependent variable is dichotomous and the independent variables are either categorical or continuous.

The logistic regression model can be expressed with the formula:

$$\ln(P/P-1) = \beta_0 + \beta_1 * X_1 + \beta_2 * X_2 + + \beta_n * X_n$$

To facilitate interpretation, e^{β_n} , a transformation of the original regression coefficient β_n can be derived, which can be interpreted as follows:

If $e^{\beta_n} > 1$, $P/(1-P)$ increases.

If $e^{\beta_n} < 1$, $P/(1-P)$ decreases.

If $e^{\beta_n} = 1$, $P/(1-P)$ stays unaffected.

3. Results

A total of 8502 participants were included in the final analysis, 4225 participants in year 2009 and 4277 in year 2013. The average age in year 2009 cohort was 21.4 years and 21.5 years old in year 2013. Approximately 50% male and 50% female were in each year. In year 2009,

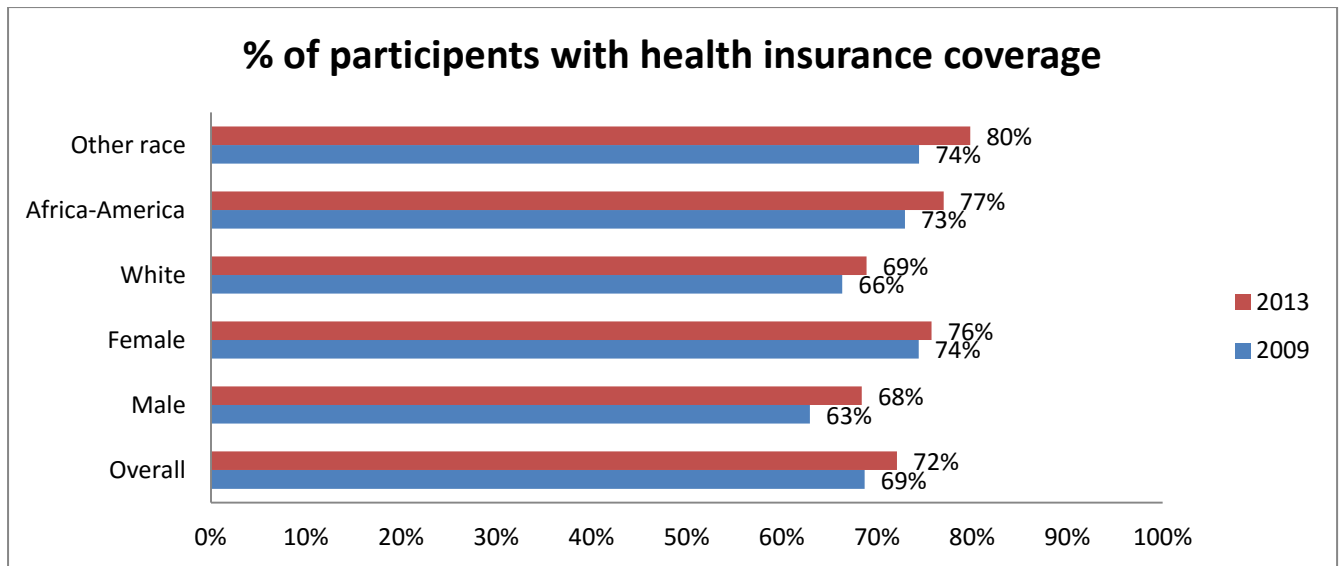
67% were white, 23% were black, and 10% were other races; in year 2013, 65% were white, 24% were black, and 11% were other races.

Table 1: Characteristics of young adults included in this study

	2009 (n= 4225)	2013 (n= 4277)	Overall (N= 8502)
Age, mean(std)	21.4 (2.30)	21.5 (2.29)	21.4 (2.30)
Sex			
Male	2095 (50%)	2127 (50%)	4222 (50%)
Female	2130 (50%)	2150 (50%)	4280 (50%)
Race			
White	2812 (67%)	2759 (65%)	5571 (66%)
Black	975 (23%)	1043 (24%)	2018 (24%)
Others	438 (10%)	475 (11%)	913 (11%)

In year 2009, only 68.7% of young adults with insurance coverage and it increased to 72.1% in year 2013. The insurance coverage increased from 63% to 68% among the male, from 74% to 76% among the female. It went up from 66% to 69% for the white, 73% to 77% for Africa-Americans, and from 74% to 80% for other races.

Figure 1: Percent of participants with health insurance coverage in 2009 versus 2013



Approximately 14.3% of the participants in 2009 went to ER versus 14.7 in 2013 ($p>0.05$).

The average ER visits were 0.21 per person in year 2009 versus 0.22 per person in year 2013.

Approximately 6.8% were hospitalized in 2009 versus 5.2% in 2013.

The overall health care expenditure went down from \$1991 per capita in 2009 to \$1812 in 2013, representing a 9% decline. The ER cost declined from \$420 per capita in 2009 to \$372 in 2013. The hospitalization cost got 20% lower, from \$1639 per capita in 2009 to \$1319 in 2013.

Table 2: Health care utilization and related cost of young adults in 2009 versus 2013

	2009	2013	2013-2009
% with ER visit(s)	14.20%	14.70%	0.5%
# of emergency room visits	0.21	0.22	0.01
% with hospitalization use	6.80%	5.20%	-1.6%
# of hospital discharges	0.08	0.06	-0.02
# of nights in hospital for discharges	0.31	0.27	-0.04

Total health care expenditure	1991	1812	-179
Average ER cost per capita	420	372	-48
Average hospitalization cost per capita	1639	1319	-320

Figure 2a: Percentage of participants with receipt of ER and inpatient service 2009 versus 2013

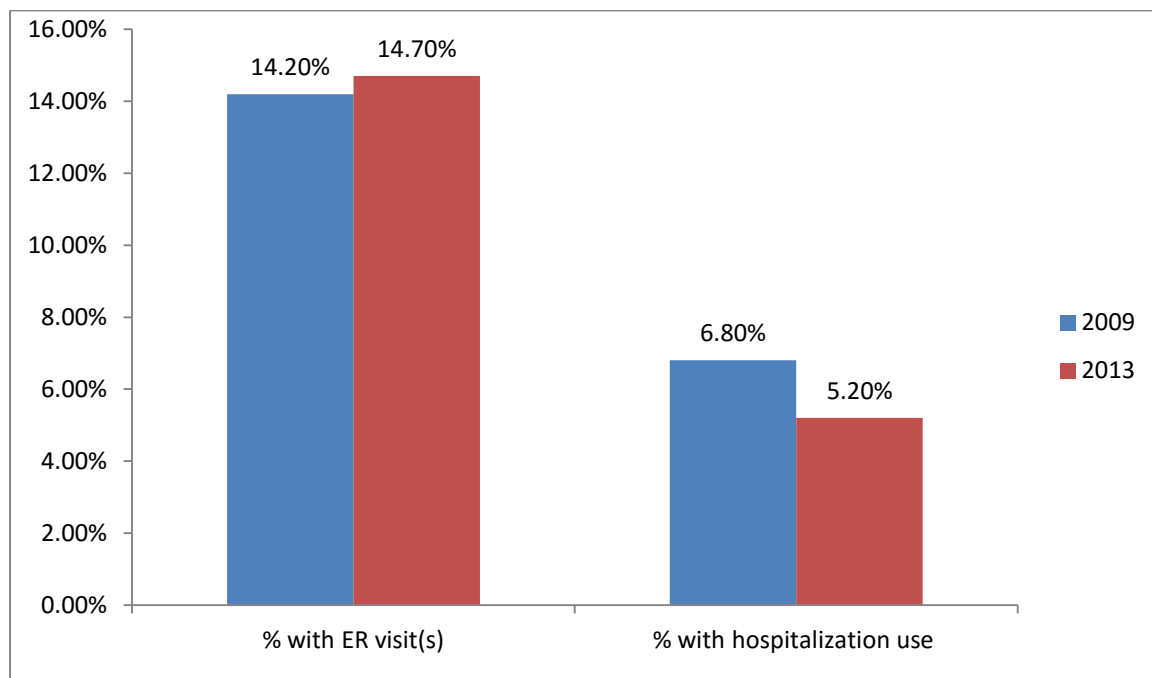


Figure 2b: Use of ER and Hospitalization Per Capita 2009 versus 2013

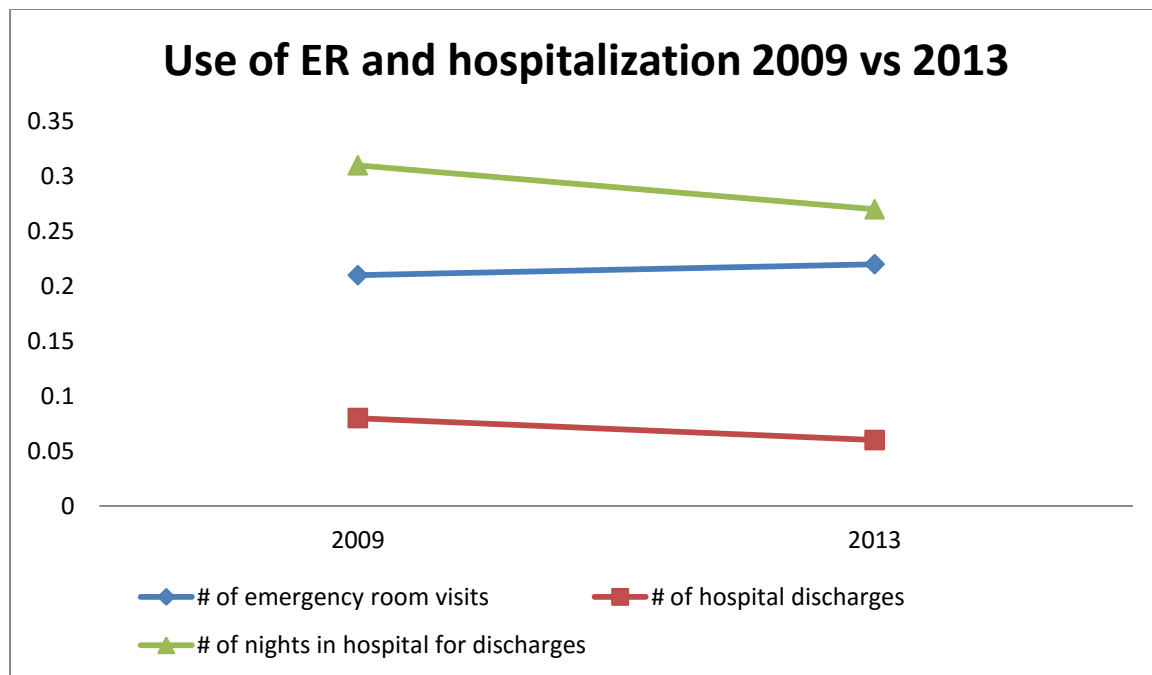
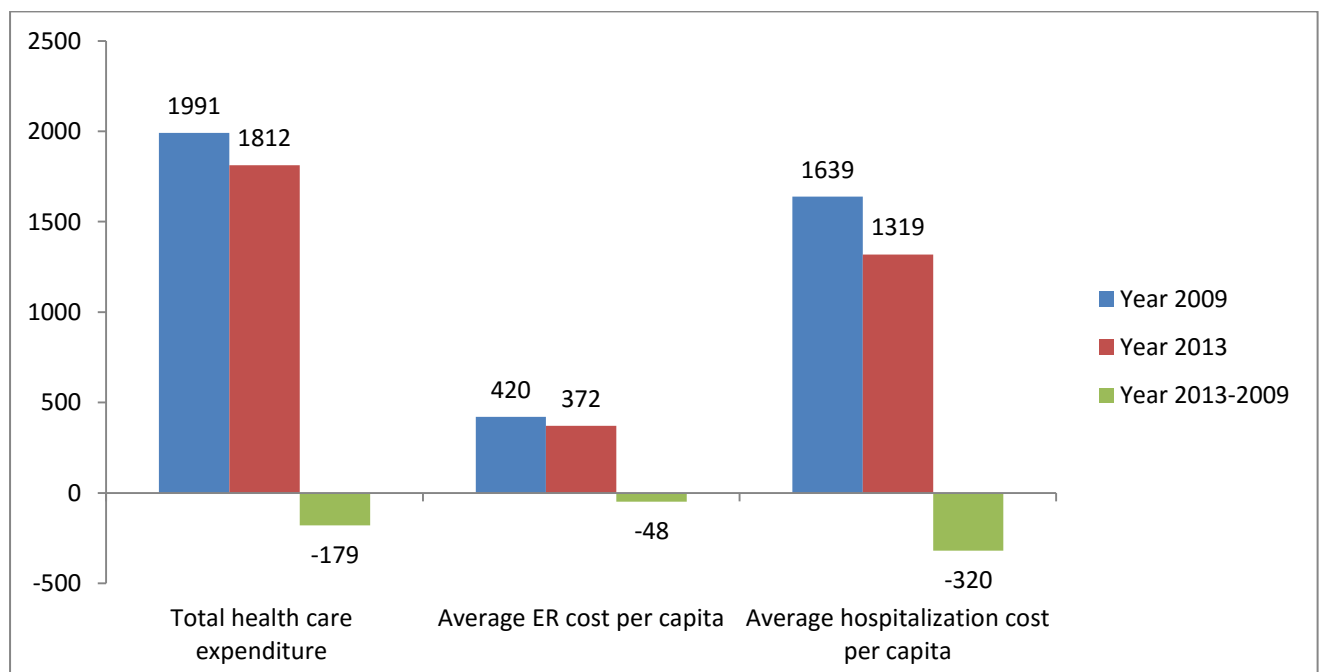


Figure 2c: Cost for total healthcare, ER and hospitalization per capita 2009 versus 2013



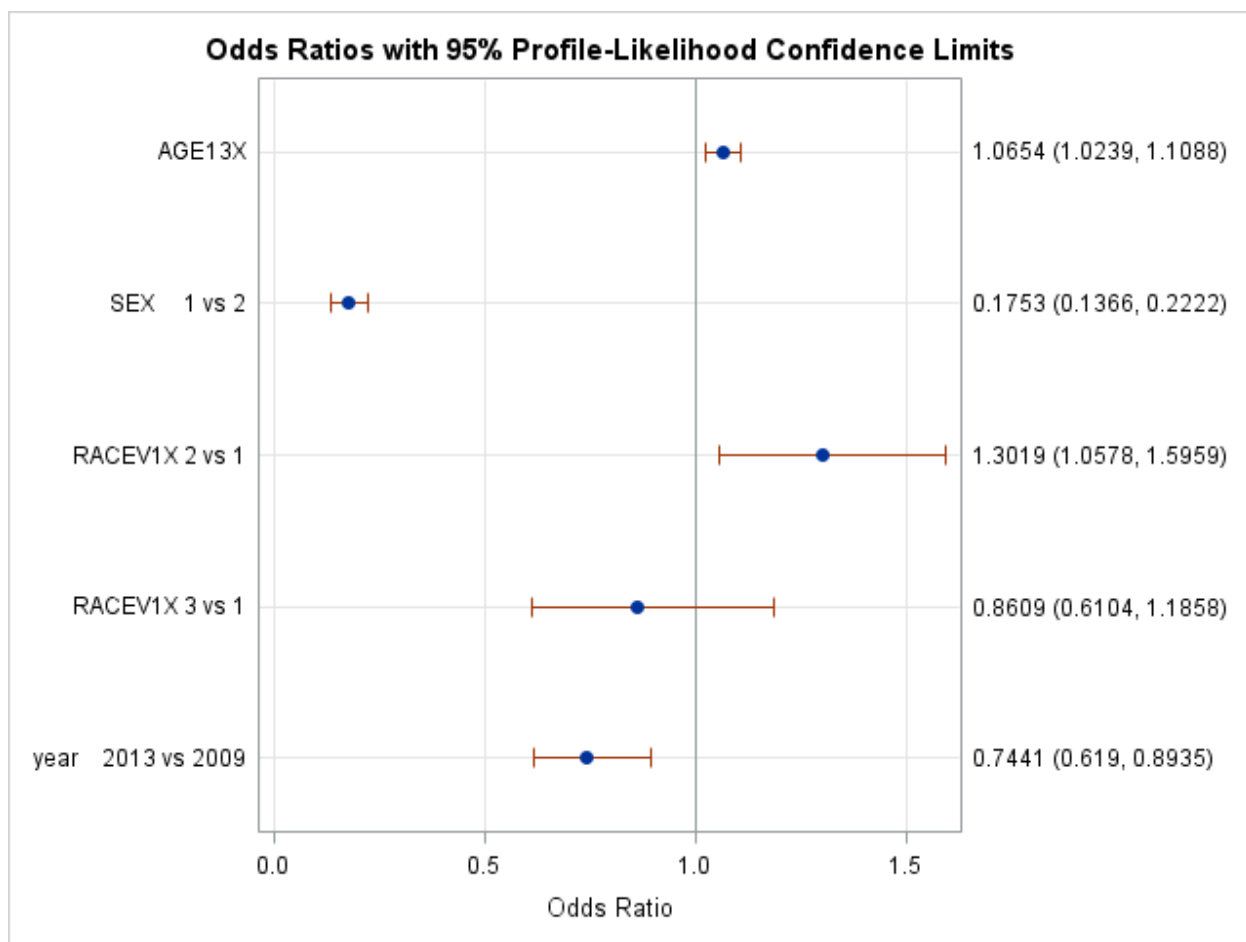
According to logistic regression, young adults in year 2013 were 25% less likely to be hospitalized (odds ratio (OR)=0.74, 95% confidence interval: (0.62-0.89), $p=0.002$) compared to young adults in year 2009. The older participants were more likely to be hospitalized (OR=1.07, 95% CI: 1.02-1.11, $p=0.002$). Also the male were 82% less likely to be

hospitalized than female (OR=0.18, 95% CI: 0.14-0.22, $p<0.001$). Compared to whites, Africa-Americans were 1.3 times more likely to be hospitalized than female (OR=1.30, 95% CI: 1.06-1.60, $p=0.005$); other races were less likely but it was not statistically significant ($p=0.092$).

Table 3: Logistic regression results to predict the likelihood to have inpatient visits

DF	OR	Lower Limit of OR	Upper limit of OR	P-value
Age	1.065	1.024	1.109	0.002
Sex (reference=female)				
Male	0.175	0.137	0.223	<.0001
Race (reference=white)				
Black	1.302	1.06	1.599	0.005
Other race	0.861	0.618	1.199	0.092
Cohort (reference=2009)				
Year 2013	0.744	0.619	0.894	0.002

Figure 3: Odds ratio and 95% confidence interval from Logistic regression to predict the likelihood to have inpatient visits



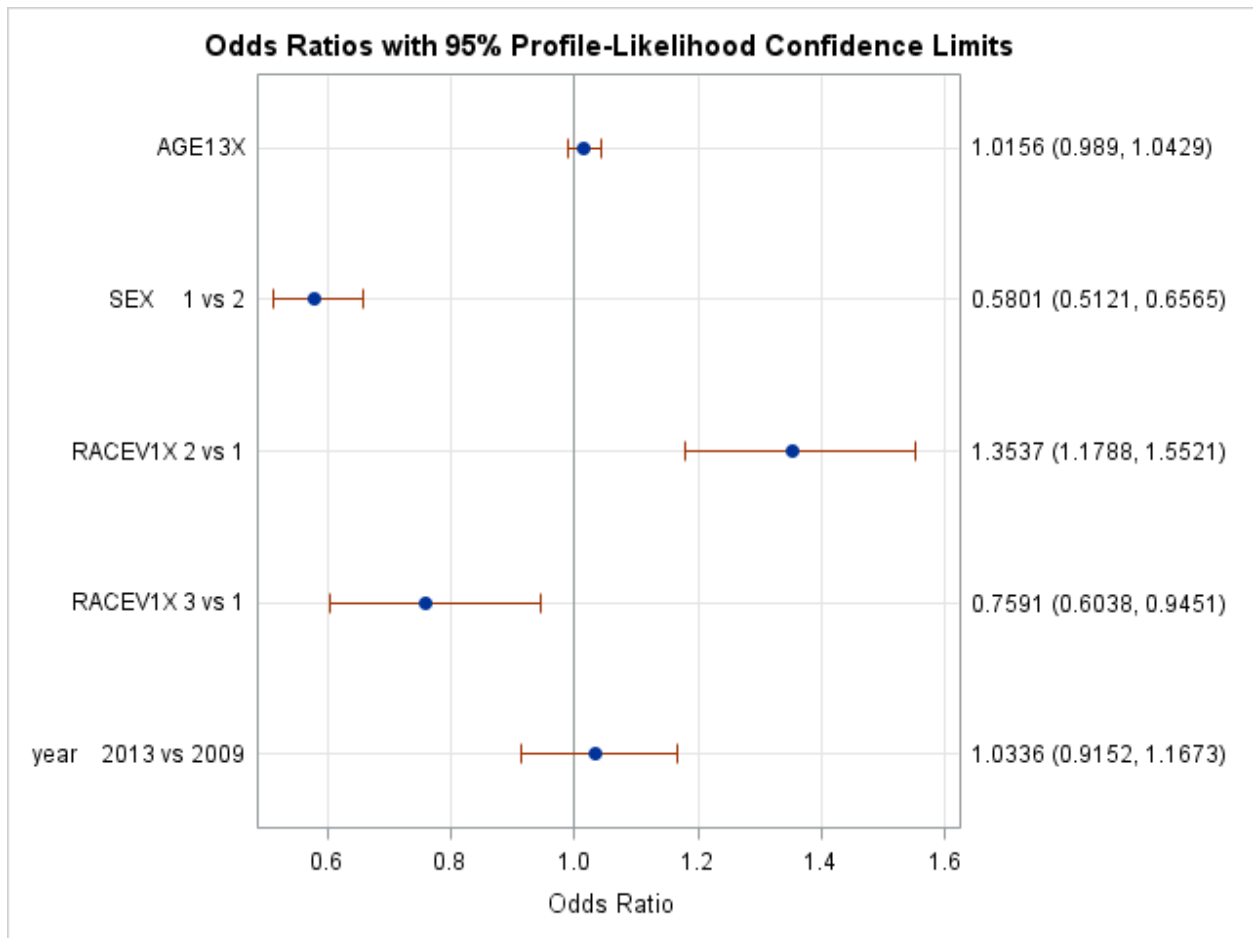
According to logistic regression, young adults in year 2013 were more slightly likely to visit ER, but it was not statistically significant ($p=0.595$), compared to young adults in year 2009. The older participants were more likely to visit ER, but it was not statistically significant ($p=0.253$). The male were 42% less likely to visit ER than female (OR=0.58, 95% CI: 0.51-0.66, $p<0.001$). Compared to whites, Africa-Americans were 1.4 times more likely to visit ER than female (OR=1.35, 95% CI: 1.18-1.55, $p<0.001$); other races were 24% less likely (OR=0.76, 95% CI: 0.61-0.95, $p<0.001$).

Table 4: Logistic regression results to predict the likelihood to have ER visits

DF	OR	Lower Limit of	Upper limit of	P-value
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		OR	OR	
Age	1.016	0.989	1.043	0.253
Sex (reference=female)				
Male	0.580	0.512	0.657	<.0001
Race (reference=white)				
Black	1.354	1.180	1.553	<.0001
Other race	0.759	0.607	0.950	<.0001
Cohort (reference=2009)				
Year 2013	1.034	0.915	1.167	0.595

Figure 4: Odds ratio and 95% confidence interval from Logistic regression to predict the likelihood to have ER visits



4. Discussions

Young adults who just graduated from high school or college usually had a job with low wages, which provided limited or no health benefits at all. Once they got removed from their parents plan, they became uninsured or underinsured. Disruption of health insurance coverage introduced barriers to health care and left young adults vulnerable to high out-of-pocket expenses. In a recent study, 28% of uninsured adults aged 19–25 delayed or did not get needed medical care due to cost compared with 7.6% of those with private health insurance and 10.1% of those with public coverage.

One of ACA's early provisions was the extension of dependent private health insurance coverage for young adults up to age 26. In this study, extended health insurance coverage under ACA lowered the likelihood to be hospitalized for young adults and lowered the total

healthcare cost among this population, especially the cost due to hospitalization. This study was the first one to examine the potential impact of this extended health insurance coverage for young adults aged 18-25 because of Affordable Care Act. In this study, we found that participants in 2013 were more likely to have health insurance coverage, less likely to use hospitalization and had less health care overall cost as well as cost due to hospitalization, when compared to young adults in year 2009. Previous study has found strong evidence that the dependent coverage expansion increased young adults' access to health care. In particular, the expansion reduced the likelihood that young adults had delayed or forgone care due to cost in the last 12 months, a finding illustrated by the sharp reduction in this measure for 18-25year olds relative to slightly older adults.

It is worthy to note that the health care expenditure per capita went down by 8%, the ER cost per capita down by 13%, and inpatient cost per capita down by 27%. It is huge savings especially considering the increasing trend in health care spending during 2001-2009, right before the policy was implemented in year 2010. Another study found that across the United States, per capita health expenditures rose from \$2,873 in 2001 to \$4,037 in 2009, an increase of 41 percent. The growth in per capita spending from 2001 to 2009 on hospital inpatient care was 37%².

However, the uninsured rate remained high in this study, as close to 30% of young adults had no insurance in year 2013. It is surprising to see the ER use was still quite often in year 2013, and almost remained unchanged when compared to year 2009. In this study, roughly one in six young adults used ER service in the survey year 2009 and 2013. It was comparable to the findings in previous study. In that study, about 19% male and 27% female in year 2011 used

² Fredric Blavin, Linda J. Blumberg, et al. Trends in US Health Care Spending in Leading to Health Reform. 09/2012

ER service in the past 12-month using National Health Interview Survey (NHIS)³. The extension of health insurance among young adults did not bring down the ER use immediately as hoped, maybe this is because the evaluation was done only a relatively short time after the policy was implemented. The long term effect of insurance coverage extension among young adults on ER use remains unanswered question; future research in this area will be helpful to better understand this issue.

There were limitations in this study. Because of data availabilities issue, we did not examine the long term impact of ACA on ER and hospitalization use in this study. Other variables which might have impact on ER and hospitalization use were not controlled for in this study, for example, chronic disease conditions.

This is the first evaluation among young adults in terms of health care utilization after ACA was implemented to extend the health insurance coverage using national MEPS data.

According to the findings in study, ACA helped to lower the hospitalization use significantly within a relatively short of time and reduce the overall health care spending per capita, especially the inpatient cost. However, the uninsured rate was still surprisingly high among young adults with close to 30% had no insurance at all in year 2013, meanwhile, ER use remained unchanged in the study time period. To help the uninsured to get the health insurance will promote the preventive care use and reduce the costly hospitalization use downstream, ultimately curb the fast increase in healthcare expenditure.

³ Whitney K. Kirzinger, M.P.H.; Robin A. Cohen, Ph.D.; and Renee M. Gindi, Ph.D., Health Care Access and Utilization Among Young Adults Aged 19–25: Early Release of Estimates From the National Health Interview Survey, January–September 2011.

Get Rid of Influenza: A qualitative study of determinants of influenza vaccination among healthcare professionals

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I. Introduction

It is not uncommon to hear the news of influenza in recent times. Influenza is a public health problem which was circulating in the community. As of 22nd April, 641 influenza cases associated with Intensive Care Unit admission or death in local hospitals were reported, in which 424 cases (aged 18 or above) were fatal cases.¹ Apart from individual threats such as absenteeism of students and workers, uncontrolled influenza brings public burden. Morbidity and mortality would highly increase if influenza is not well controlled and prevented. It has been estimated that \$30 billion dollars would be lost after a pandemic outbreak of influenza due to increasing healthcare cost and lower economic productivity.² Development and competitiveness of Hong Kong will be damaged in the long term.

It is consistently documented influenza vaccination among healthcare workers who are considered as a high risk group is of vital importance in the infection control.^{3,4} Since healthcare settings are a breeding ground of many pathogens including influenza virus, vaccination could prevent infection in healthcare professionals and transmission to patients in an effective way. However, there is always a gap between the ideal and the reality. The uptake among the healthcare professionals is relatively low in spite of the recommendations of health authorities.⁵

This study aimed to explore the view as well as the experience of the current healthcare professionals on the influenza vaccination behavior. Contextual reasons and barriers are involved in the decision making of healthcare professionals. It is important to identify the determinants affecting the willingness to be vaccinated which is appeared to be associated with knowledge, perceptions on influenza and the vaccines, social norms, trust on the source of information as well as the hospital policies.⁶ As a result, possible ways could be figured out in the future to improve the coverage in healthcare professionals based on the determinants addressed.

The research questions of this study were (1) What are the knowledge and attitude on influenza and the vaccine among healthcare workers, (2) What are the barriers inhibiting the uptake, and (3) How hospital policies affect the uptake.

Key words: determinants, influenza, flu, vaccination, healthcare professionals

II. Methods

i. Interview Design

6 mapping questions were designed to address 5 areas of research questions. 2 to 8 mining questions and probes were accompanied with each mapping question in order to explore the perspectives of the interviewee in detailed and to link the interviewee's experience to the questions. The interview questions were made in the order of knowledge on influenza illness and the vaccine, source of information, experience and intention of getting vaccinated and the personal opinion and attitudes on the influenza vaccination. Ice-breaking and background questions were set before the main interview questions so as to get the interview atmosphere warming up. The interview guide was then set up and sent to Professor Yi for comments. Mistakes were checked and the content was being improved.

ii. Sampling

The interviewee was recruited by purposive sampling, who has been working in nursing profession in Hong Kong public hospitals for around 20 years. The participant of this interview was the previous supervisor of the summer job of the interview, Miss Catherine Tam, who is currently a Nursing Officer in medical wards of the North District Hospital in Sheung Shui.

iii. Data Collection

The interview was conducted in the office of the Nursing Officer in the North District Hospital for about 1 hour. No third participation was allowed during the interview. A verbal informed consent was obtained from Miss Tam on the day of the interview. Her experience, opinions as well as other interview data were agreed to be used for academic purpose. The interview was started by greetings, followed by interview's descriptions and explanations on the study's objectives and ground rules. The requesting for recording was also confirmed.

The interview was tape-recorded in the whole process. It was conducted in Cantonese supplementary with English. To ensure the question accuracy, some wordings like "perceptions" were repeated in English directly when Miss Tam did not fully understand the interview questions.

iv. Data Management and Analysis

The whole process including the study design, data collection, management and analysis were done by the author. The tapes of the recording as well as the notes taken during the interview were transcribed into Chinese followed by English a day after the interview. Transcripts were sent to Miss Tam for review to look for any misunderstandings. During the stage of data analysis, line-by-line coding was adopted. Transcripts in English were read for about 3 times and were broken into sentences. Initial codes were being given to the sentences broken from the transcripts. Integration of the initial codes into the significant codes was done with the application of focused

coding. Hierarchies were then sorted from the significant codes until the main themes were coming up.

III. Results

3 main themes came up from in-vivo codes from the results of the interview. The themes included perceived attitudes on influenza illness and the vaccine, the barriers that may have lowered their intention to get vaccinated, and the hospital policies on the influenza infection control and the vaccination.

i. Healthcare workers' perceptions on influenza and the vaccine

a. Low perceived severity of influenza infection

Individual perception on the susceptibility and severity of influenza is one of the factors leading to low uptake of influenza vaccine. As pointed out by Miss Tam, influenza is not a serious disease as seen by healthcare workers- Influenza is similar to common cold which is not difficult to manage. The consequences of influenza infection are rarely serious and fatal. Recovery is also fast when appropriate treatment and short term lifestyle modification are available. Hence, it is not a necessity to get vaccinated to prevent influenza.

“Many think that it is just like common cold. You will have runny nose, sore throat, fever, muscle fatigue, getting tired...Just drink some water, take pills and sleep more when you are ill. Take a rest for a few days...Everyone knows such an easy job. It seldom kills people. There is no need to do too much to prevent influenza. ”

The public anxiety on the influenza illness is sometimes exaggerated by the mass media, as commented by Miss Tam. In order to maximize the profits, the media sometimes make the risks of influenza sound as dramatic as possible, for example, high incidence and mortality. Attention is then grabbed and the public is attracted buy their products. Healthcare workers, in general, do not consider certain mass media is a reliable source of information. Influenza is not as dreadful as described by such media so that healthcare professionals seldom choose to get vaccinated.

“We are in the time of unprecedented media availability. Information could be got immediately. But be cautious! Mass media often make the influenza risks as high as possible. So you are attracted to buy the newspapers and magazines. I don't think they are reporting all of the truth. You are sometimes over-estimating the influenza. It is actually not so dangerous.”

b. Perceived outcomes and effectiveness of influenza vaccine

On the other hand, influenza vaccination is considered as having side effects. Negative outcomes would possibly occur after getting vaccinated. Apart from immediate uncomfortable feelings such as pain and dizziness, there is a possibility of getting infected by the virus in the vaccine after vaccination. Similar to common cold, they would suffer from runny nose and fever. It is not possible for them to work and they need to go on sick leave. As a result, the workload of the medical wards would be increased highly due to their absence, which leads to disturbance on others like colleagues and patients in the wards.

“It is quite painful when you get vaccinated. You may feel dizzy, headache and have a feeling of getting ill. It is not comfortable!”

“I am not sure it will make me get infected. But it’s possible. I don’t want to be sick and absent for a few days. Then my colleagues will be very busy. There will be a disaster if one nurse or doctor is absent. Who will follow my duty? To be safe, it is better not to receive the influenza vaccination.”

Miss Tam also doubted the effectiveness of the influenza vaccination. It is not a perfect way to protect people from being infected with influenza. Alternatives with lower risk and fewer negative outcomes are available to prevent the infection of influenza. Maintaining hand hygiene with the use of alcohol-based hand rubs, keeping a healthy body by regular exercise and adequate diet, wearing masks and other personal protective equipment are better ways to get rid of influenza. Such methods are not invasive and will certainly not cause infection.

“We can do more exercise, eat better or change our lifestyle...Regular hand rubbing, wearing masks and PPE are surely the better options. I won’t be afraid of being infected by these methods.”

ii. Barriers of receiving influenza vaccine

Miss Tam expressed the barriers of getting vaccinated. The working nature and schedule as well as the culture in her workplace make healthcare professionals less intended to get the influenza vaccination even though some of them agree the importance of the vaccination.

“We nurses don’t have sufficient time to get the vaccination. We are very busy working in wards. For example, taking blood culture, examining the patients, writing case history, reporting to doctors...The situation goes worse in January, February, July...There’s no time for us to have lunch or dinner, not to say vaccination. We go back to home and sleep at 7 A.M. after working the night shift.”

Time constraint is one of the restrictions inhibiting the behavior of influenza vaccination of healthcare workers. As a healthcare professional in public hospitals, the workload in wards is very high, in particular at the peak period of certain infectious diseases. Time is filled with the duty of taking care of patients. What's more, nurses and other healthcare professionals are in shift work in general. The off-duty time is often not suitable for them to go to clinic and receive the influenza vaccination.

In the point of Miss Tam's view, hospital culture is also the determinant limiting them from getting influenza vaccination. Others' perspectives and thoughts towards vaccination make the behavior less favorable.

“Very few of my colleagues got vaccinated. It's very strange if I go to receive the vaccination.”

“For example, they may jeer at you when they know you get vaccinated and ask “aren't you afraid?””

Therefore, the culture of the workplace of healthcare professionals is not welcoming the influenza vaccination. Subjective norms play an important role in rejecting the uptake of influenza vaccination. Perceptions of social pressure from significant others, i.e. their colleagues would rather affect the decision making. The low frequency of vaccination among healthcare workers and the low degree of their support do not encourage the vaccination behavior. As a result, it is sometimes neglected due to the workplace atmosphere.

iii. Hospital policies

a. Non-mandatory vaccination

“Influenza vaccination is not compulsory in public hospitals although healthcare professionals are considered as the high risk group of being infected. We are free to choose whether we go to receive the influenza vaccination.”

As pointed out by Miss Tam, influenza vaccination is voluntary in healthcare professionals in public hospitals led by Hospital Authority. They are recommended, but not forced to receive the influenza vaccination. No consequences will be resulted if healthcare professionals reject the influenza vaccination. This further lowers the uptake of vaccination. In Miss Tam's view, it is not possible to greatly enhance or to maintain the uptake of influenza vaccine by focusing on traditional slogans and posters only. Without a regulation, healthcare professionals would reject the vaccination based on their existing perceptions towards influenza infection and the vaccination.

“Mandatory policy could be considered to ensure the uptake rate in healthcare professionals who are considered as high risk group. But the point is, something should be done before to reassure such a group of people in order to avoid strong objection and antipathy.”

b. Measures of hospital Infection Control Team

Hospital Infection Control Team (ICT) plays an important role in the control and prevention of infectious diseases including influenza in hospitals, while it depends on whether ICT conducts regular surveillance and effective campaigns. The practices of North District Hospital could be taken as a reference.

“Surveillance of influenza among healthcare professionals is good in the hospital. Monitoring is effective. However, there is no promotion campaign of the influenza vaccination for hospital workers, for example, free-of-charge vaccination in hospital activity room. ICT only relies on the posters and leaflets from the government. It seems to play a passive role.”

As stated by Miss Tam, effective campaigns and programs are important. Such things may not directly boost the uptake rate of the vaccine, but the awareness of influenza prevention and a nice atmosphere could be enhanced.

IV Discussion

All in all, enhancing the uptake of influenza vaccine in healthcare professionals is not an easy task. It may cover many determinants. Time and effort should be paid to analyze the factors behind and determine what strategies should be implemented in order to improve the coverage of influenza vaccination among healthcare professionals. At the end of the study, however, it is fortunate that the willingness to be vaccinated was found closely linked to the beliefs and attitudes on the influenza illness and the vaccination. Low perceived severity of influenza and perceived negative outcomes arisen from vaccination lower the intention to get vaccinated. In addition, the tight schedule and the culture in the workplace cause inconvenience and discouragement of influenza vaccination. Apart from individual determinants and social pressure, “macro” factors such as hospital policies also take place. Lacking mandatory policy and effective promotion campaigns worsens the coverage of vaccination and the awareness of the problem.

There were several limitations in the interview and study. Since the interview was conducted in Cantonese, the Chinese transcripts were needed to translate back into English for data analysis. However, after the translation, language gap had occurred. After translating into English, some

proverbs originally in Chinese were less lively, lowering some of the extent of impression about the expressions. Lastly, the interviewer recruited in this study was having nursing background in wards. However, other aspects like the frontline nurses in Accident and Emergency Department may have higher awareness of the problem. Medical officers and therapists may or may not have different insights and perspectives. A more complete picture could be explored if more participants are involved from different aspects.

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Health and quality of life of girls in adolescence. Poland

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Abstract

Introduction

Adolescent girls need social contact with their peers in order to build a pattern of relationships which they will use as adults. It is their peers they expect to receive acceptance and support from. This process is part of creating a social component forming the identity and should not be inhibited. The experience acquired in the school environment affects the development of adolescents in many areas. Peer environment fulfills the function of socialization.

Aim of the study

Examining the correlation relationship between the quality of life of girls with menstrual disorders in the light of the KIDSCREEN -52 questionnaire, and their age, physical health and socio-demographic indicators selected against healthy peers.

Materials and methods

122 girls with menstrual disorders from urban and rural areas, and 240 girls without any health or developmental problems from primary and lower secondary schools in urban and rural environment were examined. The study included girls attending primary and lower secondary schools at the age of 13 to 16. The studies used the standardized instrument - KIDSCREEN-52 Health Related Quality of Life Questionnaire for Children and Young People - Polish version of the questionnaire to test the quality of life related to health of children and adolescents. To obtain somatometric data anthropometric measurements techniques were used: height, weight, body slenderness, body mass index and Rohrer's index, the content of fat in the body, body density, active tissue and fat in kilograms and percentages.

Results

Based on the analysis of the obtained outcomes the largest number of dependencies was found between dimensions of quality of life related to health and age. Dissatisfaction with life and socio-economic status was found to be an equally important determinant of poor evaluation of life quality in health.

Conclusions

There exists a high correlation between the dimensions of life quality related to health according to the KIDSCREEN-52 questionnaire, and age and selected indicators of physical health as well as socio-demographic indicators in girls with different backgrounds, with menstrual disorders and those without any health and developmental disturbances.

Key words: life quality, socio-demographic indicators, physical health, maturation

Improvement of Cognizant Skills of Mentally Retarded Children

Qianyi Chen

Abstract

Mental retardation (MR) is a developmental disability that first appears in children under the age of 18. It is defined as a level of intellectual functioning (as measured by standard intelligence tests) that is well below average and results in significant limitations in the person's daily living skills (adaptive functioning). This study is to discover the relationship between retardation level and cognizant skills, and then build a statistical model to provide recommendations on how to improve the cognizant skills of retarded children. The purpose of this study to help set up goal-oriented training on retard children, and then improve their cognition behavior. This will improve the children's cognition, and to further improve their adaptive skills.

1. Introduction

Mental retardation begins in childhood or adolescence before the age of 18. In most cases, it persists throughout adult life. A diagnosis of mental retardation is made if an individual has an intellectual functioning level well below average, as well as significant limitations in two or more adaptive skill areas. Intellectual functioning level is defined by standardized tests that measure the ability to reason in terms of mental age (intelligence quotient or IQ). Mental retardation is defined as an IQ score below 70–75.

In general, mentally retarded children reach such developmental milestones as walking and talking much later than children in the general population. Symptoms of mental retardation may appear at birth or later in childhood. The child's age at onset depends on the suspected cause of the disability. Some cases of mild mental retardation are not diagnosed before the child enters preschool or kindergarten. These children typically have difficulties with social, communication, and functional academic skills. Children who have a neurological disorder or illness such as encephalitis or meningitis may suddenly show signs of cognitive impairment and adaptive difficulties.

To better understand the Level of Mental Retardation, here we cite public information and summarize as below table

Level of Mental Retardation	Range of IQ Test Scores and Levels of Necessary Support [Ref 2]
Mild mental retardation	IQ score: 50–55 to approximately 70–75 Intermittent supports are provided on an as-needed basis. Students do not necessarily require continuous or daily support.
Moderate mental retardation	IQ score: 35–40 to 50–55 Limited supports are provided over a prescribed period of time. Intermittent and extensive supports may be necessary for some students as well.
Severe mental retardation	IQ score: 20–25 to 35–40 Extensive supports are provided, usually involving assistance on a daily basis in a number of settings.
Profound mental retardation	IQ score: Below 20–25 Pervasive supports are provided usually involving constant assistance across all environments, often of high intensity and may include life-sustaining measures.

Mental retardation varies in severity. The Diagnostic and Statistical Manual of Mental Disorders, fourth edition, text revision (DSM-IV-TR), which is the diagnostic standard for mental health care professionals in the United States, classifies four different degrees of mental retardation: mild, moderate, severe, and profound. These categories are based on the person's level of functioning. [Ref 1]

Mentally retarded child needs management in multidisciplinary team approach. Adequate diagnostic facilities to detect associated problems and associated problems. Family members need counseling regarding various aspects of the conditions. Routine basic care, immunization, growth monitoring, nutritional requirement Psychological support and emotional support needed for parents and family members. Special educational arrangement and available facilities should be discussed with the parents.

Adaptive skills refer to skills needed for daily life. Such skills include the ability to produce and understand

language (communication); home-living skills; use of community resources; health, safety, leisure, self-care, and social skills; self-direction; functional academic skills (reading, writing, and arithmetic); and job-related skills.

2. Data

On the 272 subjects investigated, the retard level are classified as 1~4. But IQ score associated is not received. These outcomes are ordered on an ordinal scale. We can determine the disease status or the strength of response categories: 1= mild, 2=moderate, 3=severe or 4=profound, following American Psychiatric Association terminology. In schools, intermittent or limited supports are commonly provided for students with mild mental retardation. Among 272 subjects, 259 subjects are classified as below

Response Profile		
Ordered Value	Retard Level	Total Frequency
1	(1) Mild mental retardation	21
2	(2) Moderate mental retardation	112
3	(3) Severe mental retardation	83
4	(4) Profound mental retardation	34

For the rest of 22 subjects, the retard level is not classified yet.

Other information, including age, personality type, parents' marriage status, independency, Polygraph is also questioned. Besides, other 33 questions that may be used to evaluate retardation level and further improve subject's self-management ability are investigated.

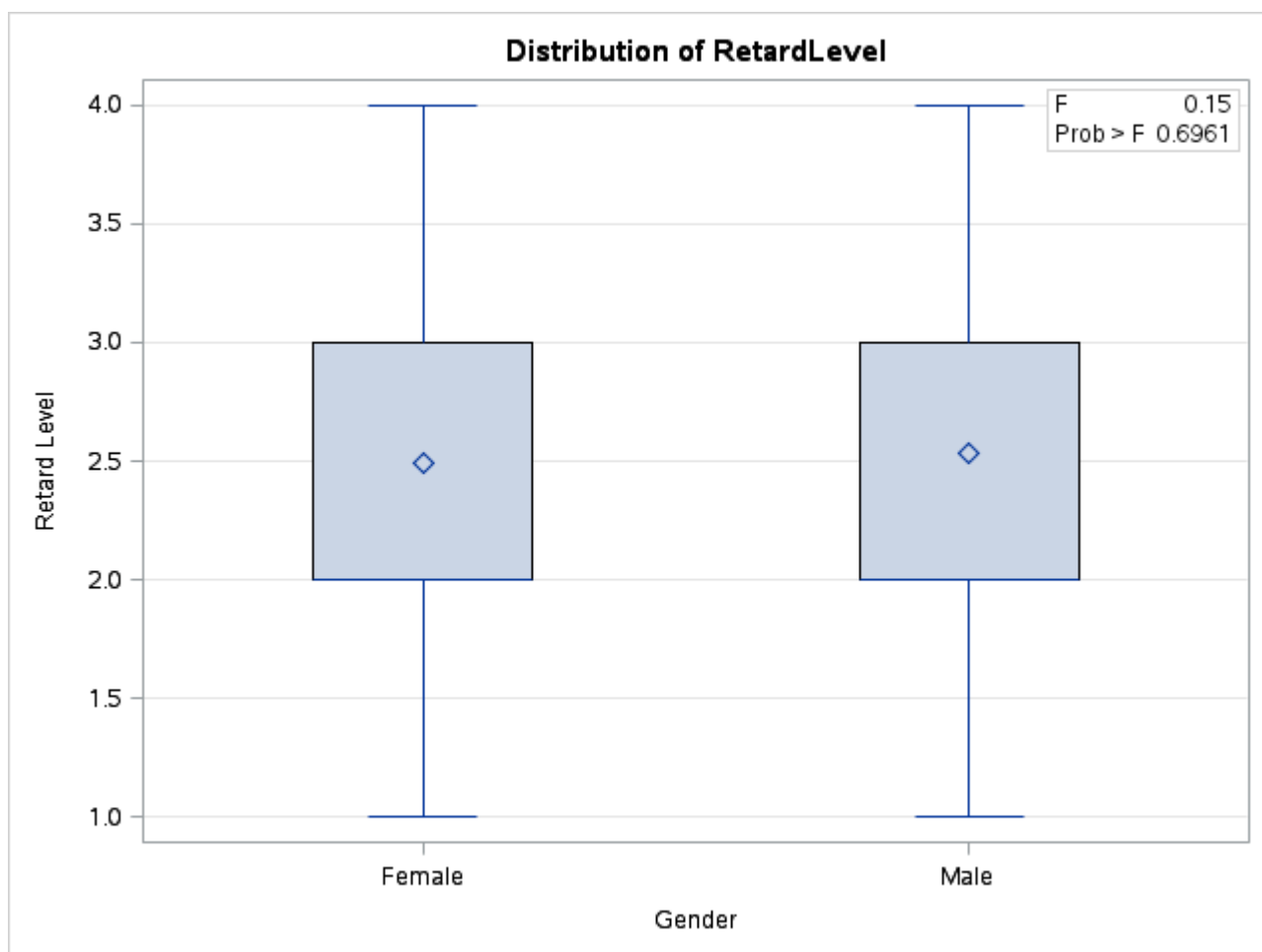
Question #	Question	1=Not Agree	2=Slightly Agree	3=Agree	4=Strongly Agree	5=Completely Agree
1	Inability to sense other's unhappiness	1	2	3	4	5
2	Difficult to calm down while in angry	1	2	3	4	5
3	To calm while others in fear	1	2	3	4	5
4	Try second time and strive to the best if first failure	1	2	3	4	5
5	Easy to be excited and hard to calm down	1	2	3	4	5
6	Know why in self angry	1	2	3	4	5
7	Don't know what to do while other in cry	1	2	3	4	5
8	Know to tell third party why other causes angry	1	2	3	4	5
9	Screaming continuously while in fear	1	2	3	4	5
10	Self-hurt while in bad mode	1	2	3	4	5
11	Ability to know other's good mode	1	2	3	4	5
12	Try to resolve while in difficulty	1	2	3	4	5
13	Know what cause self-fear	1	2	3	4	5
14	Sabotage while angry caused by others	1	2	3	4	5

15	Know the cause of self-happiness	1	2	3	4	5
16	Quick to find teacher is in angry	1	2	3	4	5
17	Try to reduce sadness	1	2	3	4	5
18	Know the cause of other's angry	1	2	3	4	5
19	Pacify dispute	1	2	3	4	5
20	Know the cause of other happiness	1	2	3	4	5
21	Clear know self-good mood	1	2	3	4	5
22	Learn to overcome fear from certain sources	1	2	3	4	5
23	Quick to calm down while excited	1	2	3	4	5
24	Try ways to soothe while in fear	1	2	3	4	5
25	Know to praise while others are in good behavior	1	2	3	4	5
26	Know in good mode or bad mode	1	2	3	4	5
27	Express happiness in most time	1	2	3	4	5
28	Ability to sense fear	1	2	3	4	5
29	Improper reaction mood (ea., smile while in sadness)	1	2	3	4	5
30	Try to calm while other is sad	1	2	3	4	5
31	Know why other cry	1	2	3	4	5
32	Unable to observe other's sadness	1	2	3	4	5
33	Ability to control angry quickly	1	2	3	4	5

3. Statistical Analysis

3.1 Descriptive Statistics

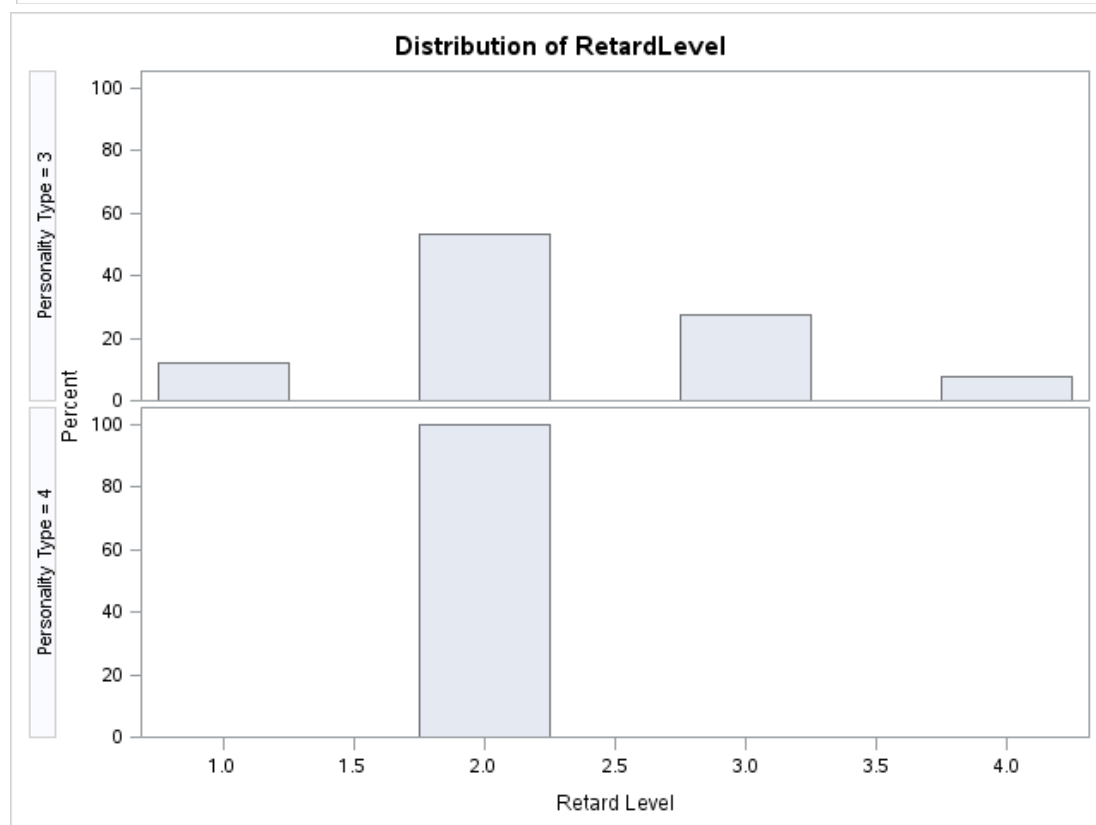
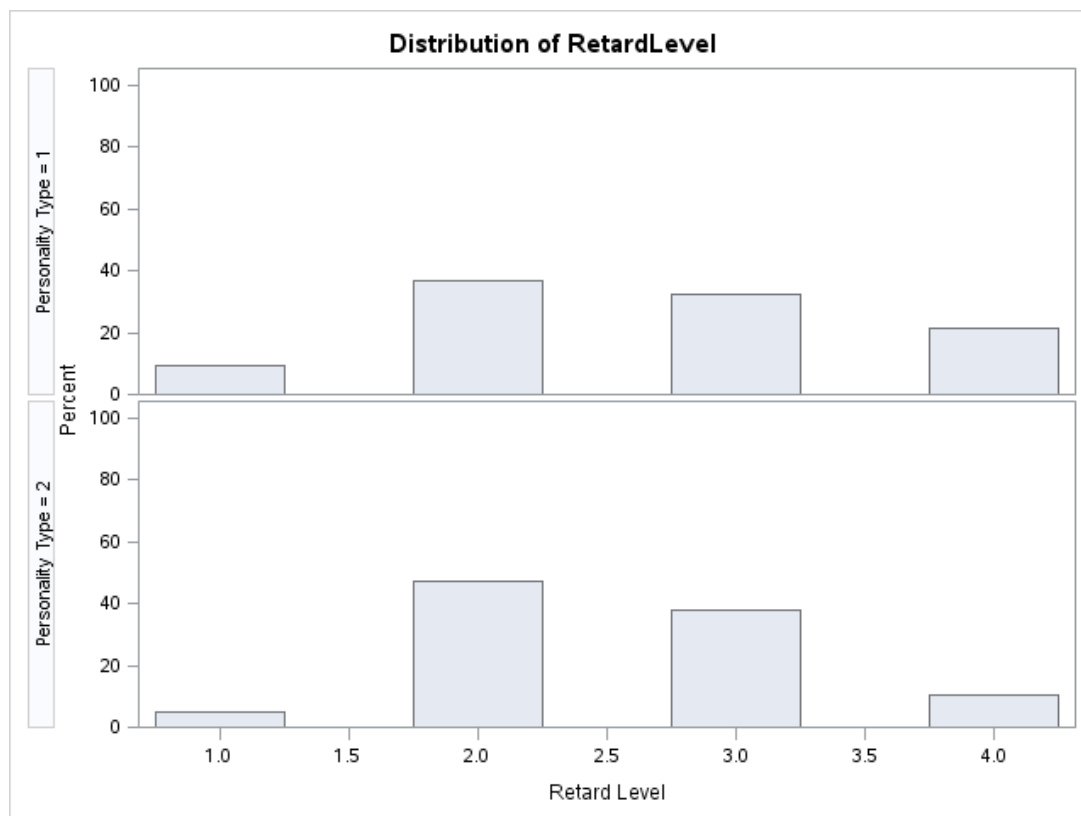
In the statistical study, we will first identify whether certain type of demographic classification can distinguish the Retardation Level by plotting the data using bar-chart and One-Way ANOVA. First we will test any gender difference on the Retardation Level



Source	DF	Sum of Squares	Mean Square	F Value	Pr > F*
Model	1	0.1054043	0.1054043	0.15	0.6961
Error	251	173.0250305	0.6893428		
Corrected Total	252	173.1304348			

The p-value 0.6961 shows no apparent difference of female from male on the Retardation Level.

Second we will test any Personality Type difference on the Retardation Level.

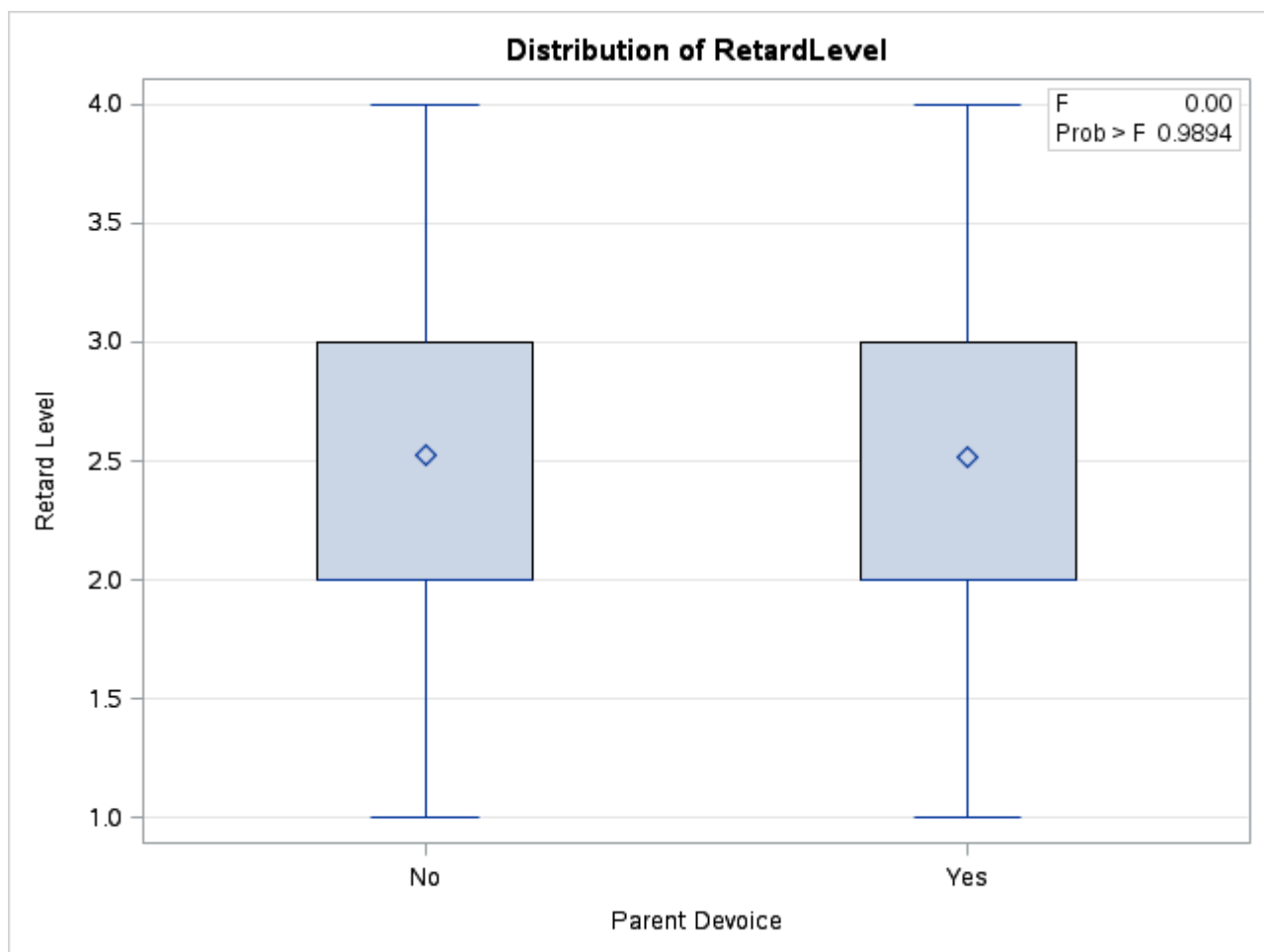


It is interesting to note that we only have one patient with Personality Type=4. Then this patient can be view as an outlier. We will identify whether Personality Type 1~3 can distinguish the Retardation Level by One-Way ANOVA.

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F*
Model	2	4.6609542	2.3304771	3.48	0.0322
Error	253	169.27655	0.6690773		
Corrected Total	255	173.9375			

The p-value 0.0322 shows significant difference of Personality Type on the Retardation Level.

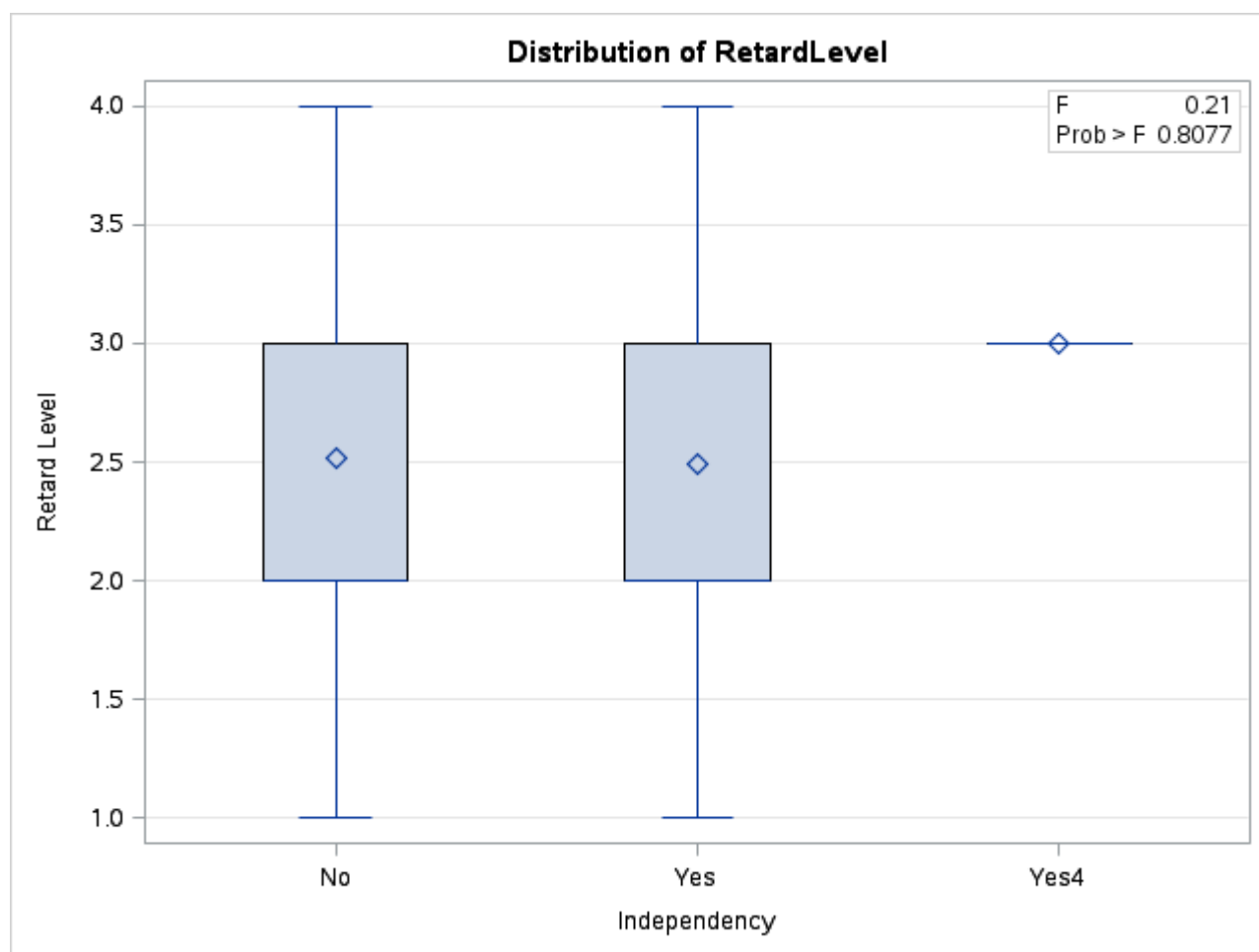
Third we will test any Parent Devoice difference on the Retardation Level.



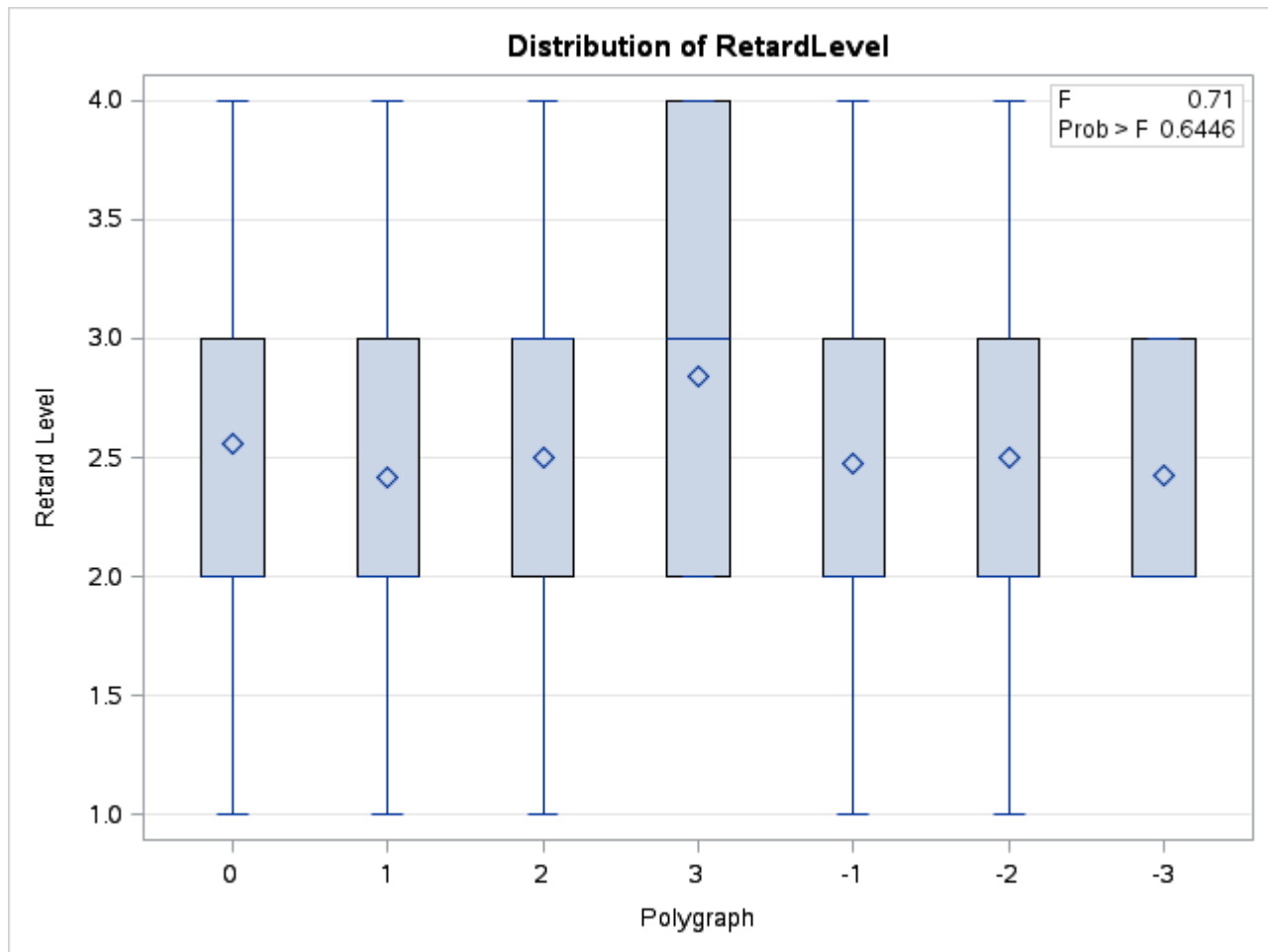
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F*
Model	1	0.0001225	0.0001225	0	0.9894
Error	245	169.6274079	0.6923568		
Corrected Total	246	169.6275304			

The p-value 0.9894 shows no apparent difference of parent Devoice on the Retardation Level.

Fourth, the independency is tested, the p-value 0.8077 on independency shows no apparent difference of independency on the Retardation Level as below



Last, the chart below shows the Age Differences on the retardation level. The p-value 0.6446 on Polygraph shows no apparent difference of Age Differences on the Retardation Level.



Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	2.889614	0.4816023	0.71	0.6446
Error	252	171.7822007	0.6816754		
Corrected Total	258	174.6718147			

3.2 Model Development

The Logistic procedure can be used to fit a model with an ordinal response variable. It fits a parallel lines regression model that is based on the cumulative distribution probability of the response category.

Here we denote

$$p_1 = \text{Prob}(Y = 1 | X)$$

$$p_2 = \text{Prob}(Y = 2 | X)$$

$$p_3 = \text{Prob}(Y = 3 | X)$$

$$p_4 = \text{Prob}(Y = 4 | X)$$

Where Y is the response variable and X are the continuous predictor variables
PROC LOGISTIC fits the model

$$\log it(p_1) = \log\left(\frac{p_1}{1-p_1}\right) = \alpha_1 + \beta x$$

$$\log it(p_1 + p_2) = \log\left(\frac{p_1 + p_2}{1-p_1-p_2}\right) = \alpha_2 + \beta x$$

$$\log it(p_1 + p_2 + p_3) = \log\left(\frac{p_1 + p_2 + p_3}{1-p_1-p_2-p_3}\right) = \alpha_3 + \beta x$$

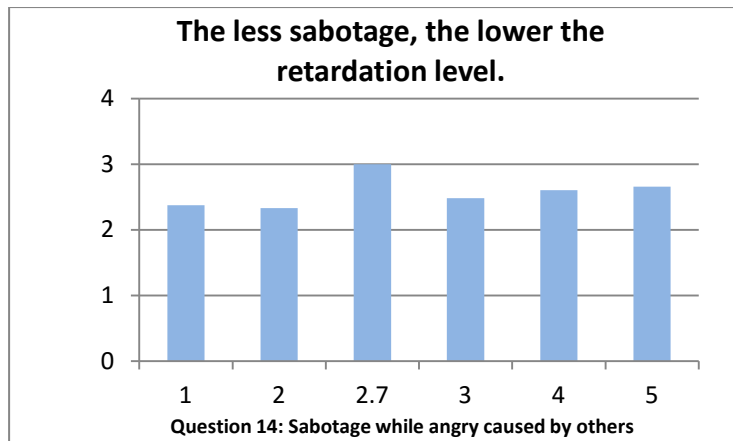
Notice that LOGISTIC models the cumulative probabilities and that this model assumes a common slope parameter associated with the predictor variable. This model is known as the proportional-odds model because the ratio of the odds of the event $Y \leq j$ is independent of the category, j . In other words, the odds are constant for all categories.

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard	Wald	Pr > ChiSq
				Error	Chi-Square	
Intercept	(1) Mild mental retardation	1	-1.3076	0.6948	3.5415	0.0598
Intercept	(2) Moderate mental retardation	1	1.4359	0.6873	4.3646	0.0367
Intercept	(3) Severe mental retardation	1	3.3458	0.7157	21.8513	<.0001
PersonalityType	1	1	-0.3212	0.1756	3.3435	0.0675
PersonalityType	2	1	-0.1364	0.1631	0.6992	0.4031
Question14		1	-0.2282	0.1035	4.8577	0.0275
Question18		1	0.4118	0.1511	7.422	0.0064
Question19		1	-0.3232	0.1348	5.7441	0.0165
Question21		1	-0.321	0.1518	4.4749	0.0344
Question27		1	-0.2402	0.1448	2.7517	0.0971
Question32		1	0.2454	0.1169	4.4017	0.0359

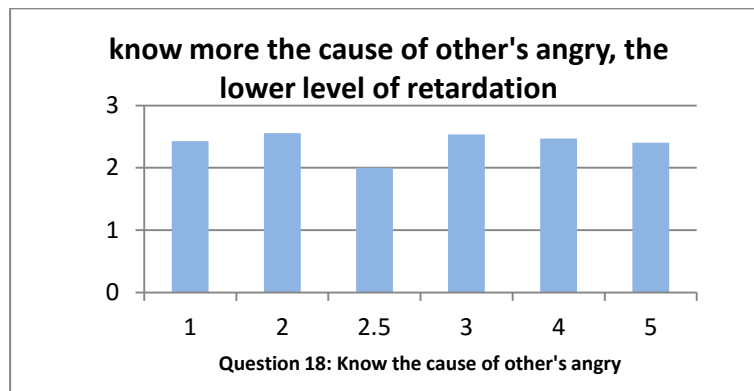
From the model, the below observations can be found:

(1) The personality type is negatively correlated to βx . The personality type carries value 1: Extrovert; 2: Middle; 3: Introvert. It means the less introvert the subject, the less the retardation level.

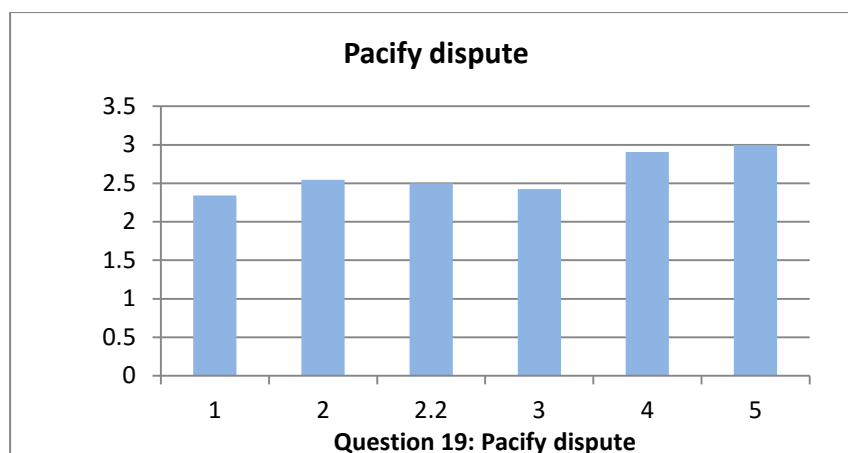
(2) The question 14 is negatively correlated to βx . The question 14 has 5 levels on "Sabotage while angry caused by others". It means the less sabotage, the lower the retardation level.



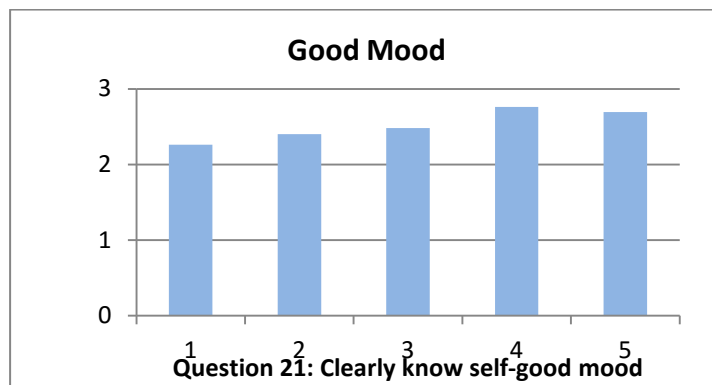
(3) The question 18 is positively correlated to βx . The question 18 has 5 levels on “Know the cause of other's angry”. It means know more the cause of other's angry, the lower level of retardation.



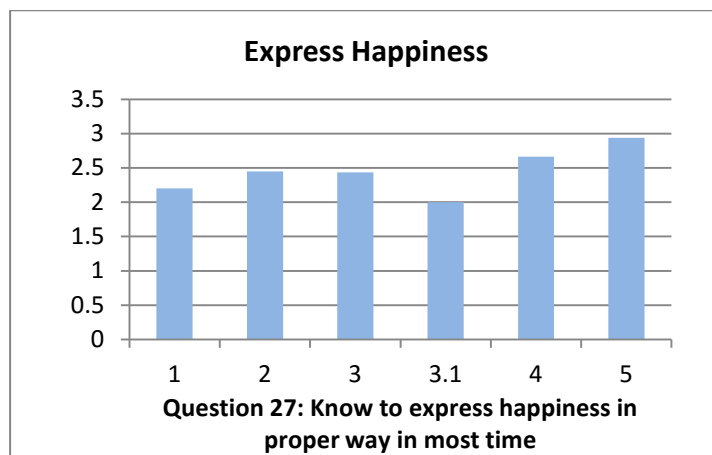
(4) The question 19 is negatively correlated to βx . The question 19 has 5 levels on “Pacify dispute”. It is interested to note that subjects in severe and profound mental retardations more like to pacify dispute.



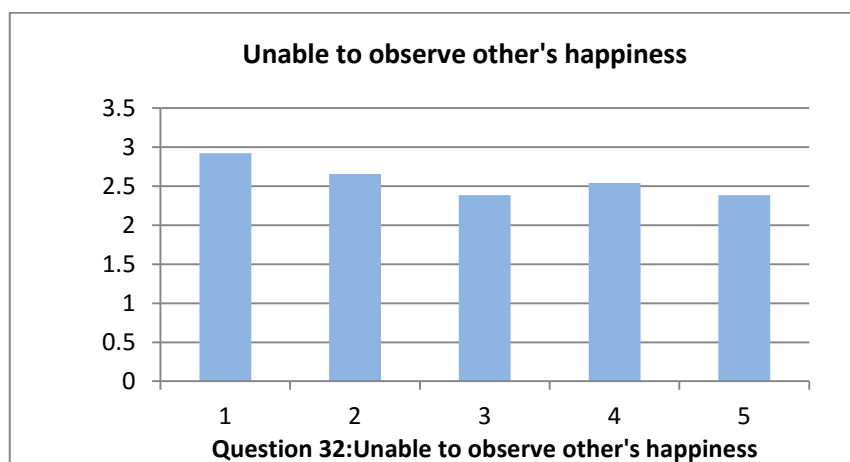
(5) The question 21 is negatively correlated to βx . The question 21 has 5 levels on “Clearly know self-good mood”. It means the less in good mood, the less the retardation level.



(6) The question 27 is negatively correlated to βx . The question 27 has 5 levels on 'Express happiness in most time'. It is interested to note that subjects in severe and profound mental retardations more like to express happiness.



(7) The question 32 is positively correlated to βx . The question 32 has 5 levels on "Unable to observe other's happiness". It means know more other's happiness, the lower the retardation level.



4. Conclusion

The statistical model established indicates that for subjects with less retardation level, they show less introvert, less sabotage, to understand more the cause of other's angry, and know more other's happiness. The subjects in severe and profound mental retardations also show to pacify dispute without knowing the cause, more like to express happiness, and easy in good mood.

Then the cognizant training goal can be set up on how to make children to learn to be more extrovert, less sabotage, understand more about others happiness and angry. For subjects in severe and profound mental retardations, the training needs to set up more understand the cause of dispute before to pacify, express bad mood and unhappiness if overwhelm by good mood expression only.

This important cognition improvement will eventually help to improve adaptive skills.

Reference:

[1] <http://www.minddisorders.com/Kau-Nu/Mental-retardation.html#ixzz43OSYNeTH>

[2] *Excerpt from Early Childhood Special Education - 0 to 8 Years: Strategies for Positive Outcomes*, by S.A. Raver, 2009 edition, p. 228.

Low-cost flood defences for the management of flood waters and the sanitation-related flooding

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Abstract

A novel and low-cost flood defence tool is tested here for the management of flood waters and the sanitation-related contamination of flood zones. The novel tool FloodSax[®] was tested for its ability to manage flood water levels, as well as bacterial and fungal contamination of the flood waters. The tests were performed in batch reactors on microbial strains isolated from a flood zone on South Africa. This was a preliminary study on a laboratory scale. One complete Flood Sax[®] can retain 28.1 L of fresh flood water, 22.1 L of the brackish flood water and 19.0 L of sea flood water. Concentrations of the bacteria in all simulated flood waters which underwent contact with the mini-Flood Sax[®] for 24 hours ranged from below 1000 CFUs/100 mL (detection limit of the spread-plating technique used) and to 76000 CFUs/100 mL. For fungi in the same context, the concentrations after exposure ranged from below 1000 CFUs/100 mL (detection limit of the spread-plating technique used) and to 97000 CFUs/100 mL. The initial bacterial and fungal concentrations in all simulated flood waters were higher than 300000 CFUs/100 mL. These results indicate that the Flood Sax[®] have limited efficiency in the removal of bacteria and fungi from flood waters, regardless of the flood water salinity. The used Flood Sax[®] should be treated as hazardous biological waste and they can't be reused. The Flood Sax[®] can be used as an initial flood defence mechanism and their main function will be in the management of the flood water levels in flood zones. The application range will depend on pricing considerations and product availability in a given (developing) country. Alternate methods will have to be found to manage microbial contamination during flood disasters.

Keywords - *bacteria, fungi, Flood Sax[®], mitigation methods.*

INTRODUCTION

Local floods often occur in cash-strapped municipalities in developing countries. Under these conditions, low-cost tools must be available during the response phase of the disaster management cycle. One such low-cost tool is a sandbag which is normally a polypropylene bag filled with approximately 17 kg of sand (Hellevang, 2016). The width and length of the bag are normally in the range of 35.5 × 65.5 cm (Hellevang, 2016). This low-cost solution to control flood waters is popular because sandbags are easy to prepare and use, the average person can easily make one without difficulty. Sandbags are efficient method of flood water management and belong into the flood proofing methods of disaster management (Plate, 2002). It has been used in different countries with varying degrees of success (Schelfaut et al., 2011). If sand is not available, alternative tools resembling sandbags can be devised. These include filling up domestic rubbish bags with material such as soil and using them for flood protection at the household level (UK Environment Agency, 2016). Problems in using sandbags and similar flood protection tools arise from the fact that they only provide a temporary management of the flood waters (UK Environment Agency, 2016). At the same time, they are tedious to make as one volunteer can prepare about 12 sandbags per hour (UK Environment Agency, 2016). Thus the efficient response might require large numbers of volunteers and this may not be feasible on all (local) flood zones. In recent years new and modern low-cost flood protection tools have become available. One such tool is Flood Sax[®] (Flood Sax[®], 2016). Focus of this article is to test the ability of Flood Sax[®] to remove and retain microbial contaminants which have been isolated from the flood zones after the 2012 Port Alfred Flood. The authors also studied the water-retention characteristics of the Flood Sax.

METHODOLOGY

For the actual experiments, individual Flood Sax[®] of approximately 48 x 55 x 3.5 cm in size (total volume of 9240 cm³) were divided into smaller bags of 3.5 x 7 x 1 cm (total volume of 24.5 cm³). Individual mini-Flood Sax were prepared to study their water absorption properties and microbial removal under laboratory conditions. First, the air-dry moisture content of the mini-Flood Sax was determined. Three mini-Flood Sax were weighed using the PA1214 analytical balance (Pioneer[™], Ohaus Corporation, Johannesburg, South Africa). The mini-Flood Sax were then placed into the UFE 700 oven (Memmert, Schwabach, Germany) and dried at 40 °C for 24 hours. The low drying temperature was chosen to minimise the potential damage to the active ingredient of the mini-Flood Sax, but also to guarantee evaporation of the air-retained moisture.

After the drying, the mini-Flood Sax were placed into a dessicator to cool down and weighed again as stated above. Retention of water by the mini-Flood Sax was tested with simulated fresh water (MilliQ water; Millipore, Port Elizabeth, South Africa), simulated brackish water and simulated sea water. The simulated brackish water was prepared by dissolving 87.5 g NaCl and 25 g KCl (both purchased from Sigma-Aldrich, Johannesburg, South Africa) in 5 litres of MilliQ water. The simulated sea water was prepared by dissolving 175 g NaCl and 55 g KCl in 5 litres of MilliQ water (Millipore, Port Elizabeth, South Africa). To test the ability of the mini-Flood Sax to absorb flood waters, one mini-Flood Sax was placed inside a 1 litre Schott Bottle (Merck Pty. Ltd., Cape Town/Johannesburg, South Africa). Then 250 mL of either simulated brackish, sea and fresh flood water was poured into each bottle which was placed in a low temperature incubator set at 25 °C in the Labcon low temperature incubator LTIE 10 (Labmark, Johannesburg, South Africa) for 24 hours. After 24 hours, the liquid was drained out each of the Schott bottles and the mini-Flood Sax were removed. These were then blotted with paper towel and weighed as stated above. Then the bags were dried at 65 °C for 72 hours. The retained moisture was calculated using the definition of the moisture content of soil, but the weights were those of the mini-Flood Sax (Moisture content, 2016). In all drying experiment an estimate was made to correct for the salts adsorbed on the mini-Flood Sax[®]. The drying temperature was raised to evaporate all the water and this could be done destructively here as the mini-Flood Sax[®] were not reused between individual experiments unless stated otherwise.

Bacteria and fungi were isolated from flood waters from the Port Alfred and purified by double streaking on nutrient agar and potato-dextrose agar (Merck Pty. Ltd, Cape Town/Johannesburg, South Africa). The cultures were then maintained on slants from the respective agars at 4 °C until use. All incubations for bacteria were done at 35-37 °C for 24 hours, while the fungal cultures were incubated in constant moisture atmosphere at 28 °C for 5-7 days. All incubations were conducted in the Labcon LTIE 10 low temperature incubators. Before each removal experiment, bacteria and fungi were grown in tryptic soy broth or the Sabouraud medium (Sigma-Aldrich, Johannesburg, South Africa). All sterilisations were conducted using the Model RAU-53Bd REX MED autoclave (Hirayama Manufacturing, Tokyo, Japan).

Preliminary experiments indicated that the experimental volume ratio of simulated flood water and the Flood Sax needed to be between 1.63 and 2.55 (volume of simulated flood water divided by the volume of mini-Flood Sax). Therefore, four mini-Flood Sax were placed into a 1 litres Schott bottle and 250 mL bacterial or fungal suspension in simulated water in question as added. Suspensions of bacteria and fungi were prepared separately and the relevant experiments were also run separately. In all experiments, the initial microbial concentrations were higher than 300000 colony-forming units per 100 mL of simulated water (designated as CFUs/100mL in further text). The initial microbial concentrations were confirmed using the spread-plating with decimal dilutions in sterile saline (0.9 % solution of NaCl in MilliQ water, Sigma-Aldrich, Johannesburg and Millipore Port Elizabeth, South Africa). Spread-plating was done on nutrient agar for bacteria and potato-dextrose agar for fungi. Inoculations were done aseptically as described by Tandlich et al. (Tandlich et al., 2012).

The mini-Flood Sax[®] were exposed to the bacterial and fungal suspension in the simulated flood waters for 24 hours. The liquid phase was then drained from each Schott bottles and the outside of the mini-Flood Sax[®] were swabbed with sterile throat swabs (Spellbound Lab, Port Elizabeth, South Africa). This was done to see if any bacteria and fungi will be released upon human contact with the mini-Flood Sax[®], which have been exposed to contaminated flood waters. The swabs streaked onto nutrient and potato-dextrose agar plates which were then incubated as stated above. After the swabs, 160ml of sterile particular simulated water was then poured in each bottle containing the mini-Flood Sax[®] with retained bacteria or fungi. The Schott bottles were placed into the low-temperature LTIE 10 incubator and incubated at 25 °C for 120 hours. Samples from each Schott bottle were spread-plated onto the nutrient and potato-dextrose agar every 24 hours. Incubation and inoculations were done as stated above. Unless stated otherwise in this article, all experiments were performed in duplicate. No statistical testing was done on the initial and final microbial concentrations. This was due to the limited budget and preliminary nature of the study. All spread-plating was done onto 90 mm sterile Petri dishes (Spellbound Labs, Port Elizabeth, South Africa). No ethical approval was needed for the study as no human subjects or interviews were involved in this research. The project was conducted as the final year project in the Bachelor of Pharmacy degree of the first author. All precautions and containment measures necessary were taken.

RESULTS

The mass-based air moisture content of the mini-Flood Sax[®] was equal to 3.94 ± 0.02 % or 0.2268 ± 0.0854 g of water per mini-Flood Sax[®] (designated as X in further text). Taking the volume of the mini-Flood Sax[®] (i.e. 24.5 cm^3 and designated as Y in further text) and the density of water at 25 °C (i.e. 0.997 g/cm^3 and designated as ρ in further text; Density of water calculator, 2016) into account, one can derive equation (1).

$$V_{\text{mini}} = \frac{X}{Y \times \rho} \quad (1)$$

In equation (1), V_{mini} is the air moisture content of the mini-Flood Sax[®] in volumetric fractions. Taking the numbers above into account, this value is equal to (0.9 ± 0.3) % of mini-Flood Sax[®] volume. Therefore 99.1 % of the total volume of the complete Flood Sax[®] will be available for water uptake during flood disasters. Experimental data indicate that one mini-Flood Sax[®] was able to retain 75 mL of simulated fresh flood water, 59 mL of simulated brackish flood water and 50 mL of simulated sea flood water. These three values are designated as $V_{\text{Mini}}^{\text{Absorbed}}$ in further text. Taking these volumes in account, along with the complete Flood Sax[®] (9240 mL and designated as Z in further text) and the values of X and Y , the volume of water absorbed by one complete Flood Sax[®] can be estimated using equation (2).

$$V_{\text{absorbed}} = \frac{Z \times 0.991 \times V_{\text{Mini}}^{\text{Absorbed}}}{Y} \quad (2)$$

Now we can estimate the volumes of flood water each complete Flood Sax[®] can absorb. Such calculation can be accomplished by taking the following factors into account: the volume of the mini-Flood Sax[®] and its air-moisture content, as well as the complete Flood Sax[®] volume. Therefore one complete Flood Sax[®] should be able to retain 28.1 L of fresh flood water, 22.1 L of the brackish flood water and 19.0 L of sea flood water. These values are well within the parameters listed on the Flood Sax[®] manufacturer website.³ The differences in the effective volumes of fresh, brackish and sea flood waters absorbed by the mini-Flood Sax[®] could be due to the competition of the sodium, potassium and chlorides ions; and water for the uptake by the effective polymer inside the Flood Sax[®]. The intrusion of salt from the brackish and sea simulated flood water into the structure of the active polymer inside the flood sack could also provide an explanation. Further research will need to be conducted to ascertain the exact mechanism, as it might have serious implications on the stability of the Flood Sax[®] in the flood zones. The hydrological modelling and flood prediction are standard tools in disaster management around the world. This information and the calculated values of the water retained by Flood Sax[®] can be used to estimate the requirements for actual flood disaster response in a given/local municipal area.

The swab streaks from the mini-Flood Sax[®] were positive for bacteria and fungi. This was indicated by the growth on the nutrient and potato-dextrose agars which were streaked with the swabs. Thus the microorganisms which were taken up by the mini-Flood Sax[®] were readily available for transfer from the sax into onto the hands of the relief workers during recovery phase of the flood disaster management cycle. Around 16.7 % of all inoculated plates which contained nutrient agar were overgrown, i.e. the concentrations of bacteria after contact with the mini-Flood Sax[®] not different from the initial bacteria concentration in the simulated flood waters. This was observed regardless of the type of simulated flood water used. In the remaining Petri dishes, 83.3 % of the inoculated nutrient agar plates from all types of simulated flood waters contained much lower number of bacterial colonies. This indicated that the concentrations of the bacteria in all simulated flood waters which underwent contact with the mini-Flood Sax[®] for 24 hours ranged from below 1000 CFUs/100 mL (detection limit of the spread-plating technique used) and to 76000 CFUs/100 mL. These results indicate that the Flood Sax[®] have limited efficiency in the removal of bacteria from flood waters, regardless of the flood water salinity.

With the potato-dextrose agar plates, 100 % of the inoculated fungal samples were not overgrown. This indicated that the concentrations of fungi in all simulated flood waters which underwent contact with the mini-Flood Sax[®] for 24 hours ranged from below 1000 CFUs/100 mL (detection limit of the spread-plating technique used) and to 97000 CFUs/100 mL. These results indicate that the Flood Sax[®] have limited efficiency in the removal of fungi from flood waters, regardless of the flood water salinity. However, the removal of the fungi is more effective than the removal of bacteria. The used Flood Sax[®] should be treated as hazardous biological waste and they can't be reused. This is indicated by the release profiles of bacteria and fungi from their retention on Flood Sax[®]. This is

based on the observation that there was no difference between the initial bacterial and fungal concentrations in the flood waters; and the final concentrations in release experiments with Flood Sax[®] exposure to all types of contaminated and simulated floods waters.

DISCUSSION

Changes to the scope of flood disaster management in developing countries can be implemented based on the results of this study (Zuma et al., 2012). These should take into account the pricing of Flood Sax[®] and the availability of local suppliers (Flood Sax 2106, b,c). When using Flood Sax[®] focus should be placed on the prevention phase of the disaster management cycle, i.e. Flood Sax[®] should be acquired as a routine flood prevention tool at the local government level. They have several advantages over sandbags. Firstly, if available in the flood disaster zone or geographical zones at risk from flooding, they can be deployed on a moment notice. This eliminates the time-consuming and labour-intensive need for filling of sandbags. Based on the results of this study, application of Flood Sax[®] in the current form should be focused on the management flood water levels, once the flood has hit. If the disaster management profile of a local municipality is known, e.g. as part on an integrated development plan, then areas most risk from flooding can be identified and Flood Sax[®] distributed in “frontline depots” or among the population. After a short training session, the devices can then be used immediately once a flood occurs. A major problem at the moment is the lack of any ability of the Flood Sax[®] to eliminate microbial pollution which a serious problem during floods (Zuma et al., 2012). This could be solved by impregnating the devices with silver nano-particles or similar antiseptic agents.

CONCLUSION

The Flood Sax[®] can be used as an initial flood defence mechanism and their main function will be in the management of the flood water levels in flood zones. Taking the cost implications into account Flood Sax[®] could be distributed among the population in high risk areas during the preparedness phase of disaster management. Alternate methods will have to be found to manage microbial contamination during flood disasters.

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Medication Use and Its Association with Self-Reported General Health

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Abstracts:

Medication use gives us hints about the health status ranges from an individual to community or country and it depends on many crucial and interlinked factors. The basic purpose of this study is to reveal the influence of self-reported general health (Individual's perception of his/her own health condition as good, average or bad) on medication use among adults in Bangladesh considering symptom based health conditions as acute and chronic morbidity along with other relevant socio-demographic factors such as age, sex, income, education, residence, marital status, employment status etc.

Health and Socio Economic Survey-2013 conducted by Independent University Bangladesh was used for this purpose. The sample size for this study was 3085 adults, 51% men and 49% were women, randomly selected from four districts of the country. Both descriptive statistics and Step wise logistic regression analysis was applied to configure our study findings.

Among the study population, 48% took at least one medicine one month prior to the survey. Regarding self-rating of health status, 62.4% were reported as self-rated good health, though within this group 60.6% had at least one or more acute or chronic morbidity but only 39.7% used medicines. On the other hand 32.1% were reported as self-rated average health and among them 78.4% had symptom based morbidities but only 60% took medicines. Only 5.5% rated them as bad health although 10.7% of them had no symptom based morbidities and 72.8% used to take medicines. These simple figures allow us to consider that self-reported general health is more practical and realistic predictor for medication use. Final logistic regression model shows that self-rated bad health and average health group consumed 2.3 and 1.54 times more medicine than self-rated good health group ($P=0.003$ and $P=0.000$ respectively) after controlling all other potential factors particularly symptom based health conditions like acute and chronic morbidities.

Self-reported general health is a practical as well as vital predictor of medicine use, especially for developing countries like Bangladesh. This result certainly should have important impact on health policy implication and treatment approach at community level in Bangladesh.

Opinion of healthcare professionals in the usage of social media for patient care in Majmaah, Saudi Arabia

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Abstract:

Introduction: Use of social media for patient care is the new frontier in the healthcare industry. Sharing of information between the clinicians and their patients is now so much easier. In slowly gaining a foothold worldwide it needs a healthy push to make it universally acceptable.

Aim: Study the knowledge, attitude and practices of healthcare providers on the usage of social media in their clinical practice.

Methodology: A baseline cross – sectional study was conducted among 200 healthcare professionals from March 2015 to September 2015 on their knowledge, attitude and practices in the use of social media for patient care in Majmaah, Saudi Arabia. A close ended self – administered validated questionnaire was used to gather data which was analyzed by using the SPSS ver. 21.0 software.

Results: 55.3% participants used social media for both professional and personal reasons. Some (25.3%) specified using it for patient care while a significant majority (52.9%) opined that it can be successfully used for patient interaction. Nearly 55% agreed that social media should not be banned due to its benefits as an efficient tool for patient communication.

Conclusion: Social media use for patient doctor interaction should be encouraged to improve patient care through effective communication.

Keywords:

Social media, healthcare, patient care, Majmaah, Saudi Arabia, clinicians

Perceptions of Nursing Students to Unsafe Clinical Practices

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Objectives: Nursing students who are in clinical practices under the complicated medical environment to become competent practitioners can be exposed to a variety of dangerous situations. In particular, nursing students can experience stress and compromised safety because they have difficulty in prioritizing their tasks and lack confidence in clinical and interpersonal skills. The purpose of this study is to investigate the types and characteristics of nursing students' attitudes toward the safety of clinical practices, and improve their safety related to clinical practices.

Methods: A total of 40 statements about the safety of clinical practices were applied to 37 nursing students. Collected data were analyzed with the PC QUANL program.

Results: The Perception of nursing students to the safety of clinical practices was categorized into three types: 'Inappropriate clinical practices-perfectionism type,' 'Patience-rule compliance type' and 'Active participation-meeting expectation type.'

Conclusion: The subjects related to the safety of clinical practices need to be developed within the curriculum of nursing departments by examining the Perception of nursing students to the safety of clinical practices. In addition, a sense of responsibility shared by nursing students, educators and practitioners needs to be enhanced to improve the safety of clinical practices.

Keywords: Unsafe clinical practices, Nursing students, Perception, Q Methodology

Predictors of Post-Traumatic stress in adults and trauma in children among Arab Population who have fled their “war zone” homelands and settled in Malaysia

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Background: Scientific evidence indicating that Post traumatic stress is most likely to occur when the objective severity of exposure to traumatic danger or harm is more extreme. Predictors of Post-traumatic stress in adults and child trauma in were assessed in this study.

Methods: A cross sectional study was conducted in Klang Valley Malaysia among Arab population who have come from war zone countries. A convenience sample of 261 Arab adults and 261 Arab children was chosen. A self- administered questionnaire printed in Arabic was distributed to all participants.

Results and discussion The participants were 116 (44.4%) Iraqis and 145 (55.6%) Syrians. Children followed the same percentages respectively. Post-traumatic stress was present in 91 (34.9%) of all adult participants whereas child trauma was seen in 171 (65.5%) children. A bivariate analyses was used in this study. Severe trauma events during war were found to be strong predictors of both post-traumatic stress among adults and trauma in children. (OR 1112.58, 95%CI 142.17-8706.71, P value <0.001 and 1271.32, 95%CI 178.73-9407.52, P value <0.001 respectively). This study is the first of its kind in Malaysia which we hope could add to the knowledge of this disorder and opens a window to look at this group of population to see how they are settling in their new environment. Furthermore, it is a good tool to help countries like Malaysia to be more prepared in terms of medical health services, mental health services in particular and reduce the economic impacts, those migrants, might add to the national health system.

PREVALENCE AND RISK FACTORS OF BEING OVERWEIGHT OR OBESE AMONG ENGLISH MEDIUM SCHOOLS STUDENTS OF DHANMONDI, DHAKA: A POPULATION-BASED CROSS-SECTIONAL STUDY

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Abstract:

Purpose: The aim of the study is to determine the prevalence and risk factors associated with overweight or obesity among English medium school students (standard 6-10) of Dhanmondi area, Dhaka Bangladesh.

Methods: A population based cross-sectional study was conducted among 129 students from two different English medium schools in Dhanmondi area to assess the prevalence and risk factors of being overweight or obese. In this study the data of weight and height of all students collected from school's health management data book. For the data collection, a semi-structured English questionnaire was used. The students were filled out the questionnaires by themselves.

Results: Among the respondents 63% were female whereas 66% of the respondents were male. The overall prevalence of overweight or obesity was found to be 19.38% among the 129 English medium school students. Mother's education has a significant correlation for being overweight or obese. Moreover watching TV more than 2 hours have significant association of being obese or overweight among school children (odds ratio (OR) 0.376, confidence interval (CI) 0.122-1.075.

Conclusion: However these data shows that a high prevalence and risk factors of being overweight or obesity in English medium school children in Dhanmondi area of Dhaka city, Bangladesh. Mother's education, take lunch everyday with higher fat, and watch Tv more than 2 hours seem to be among the major underlying factors for increasing prevalence and risk factors of childhood overweight or obesity among English medium school children.

CHAPTER I

INTRODUCTION

1.1 Introduction

Introduction

Obesity is now a serious health problem and its prevalence has increased in an unexpected number over the last 20 years. Over 250 million people in low and middle income countries suffer from obesity. But globally more than one billion are overweight and of these 300 million are obese.¹ Obesity is often simply defined as a condition of abnormal or excessive fat accumulation in adipose tissue, to the extent that health may be impaired.² It is still a matter of debate as to how to define obesity in young people³. Almost all the developing and developed countries are experiencing an epidemic of obesity but great variation is found between and within countries.⁴

Childhood obesity has been called “one of the most serious public health challenges of the 21st century,” and with good reason.⁵ Obesity can harm nearly every system in a child’s body—heart and lungs, muscles and bones, kidneys and digestive tract, as well as the hormones that control blood sugar and puberty—and can also take a heavy social and emotional toll.⁶ What’s worse, youth who are overweight or obese have substantially higher odds of remaining overweight or obese into adulthood,⁷ increasing their risk of disease and disability later in life.

The mechanism of obesity development is not fully understood and it is believed to be a disorder with multiple causes. Environmental factors, lifestyle preferences, and the cultural environment play pivotal roles in the rising prevalence of obesity worldwide. In general, obesity is assumed to be the results of an increase in caloric and fat intake and have significant impact on both physical and psychological health.⁸

Studies of obesity were often used weight for height measures as indicators of obesity. These had many problems and must be regarded as only approximating to the degree of fatness.⁹ In adults BMI (body mass index) $BMI (kg/m^2) = \text{weight in kilograms} / \text{height in meters}^2$ has commonly used. But, in childhood the index has been limited use as it vary with age.

Adolescence refers to the long transitional, developmental period between childhood and adulthood, and to a maturational process involving major physical, psychological, cognitive and social transformation.¹⁰ It is defined by the WHO as a person between 10 and 19 years of age.¹¹ The onset of it is marked by puberty, which is primarily a physical , maturational , hormonal and growth process.¹⁰ One in every 5 people in the world is an adolescent, and out of 1.2 billion adolescents worldwide about 85% live in developing countries and the remainder in the industrialized world.¹¹

In general, overweight and obesity are assumed to be the results of an increase in caloric and fat intake and the overweight and obesity in childhood are known to have significant impact on both physical and psychological health. Obesity may be caused by number of social, cultural, behavior, physiological metabolic and genetic factors that are beyond the person’s control. Symptoms of obesity are breathing trouble, excess accumulation of fat, insulin resistance increase in size or number of fat cells that rise in blood pressure, high

cholesterol levels etc.¹² Illnesses can hinder adolescent ability to grow and develop to their full potential. Alcohol or tobacco use, lack of physical activity, unprotected sex and/or exposure to violence can jeopardize not only their current health, but often their health for years to come.¹³

Obesity has reached epidemic proportions in the developed part of the world with as many as 30-40% of adults being already obese and the incidence in children and adolescent is rising.¹⁴ World health organization has declared obesity as one of the most neglected diseases of significant public health importance. The 2002 World Health Report lists overweight as the fifth most serious risk factor for both developed countries and low mortality developing countries.¹⁵ According to the report of International Obesity Task Force (IOTF), in the year 2000 about 10% (a total of 155 million) of the young people aged 5-17 years globally were overweight; among whom 2-3% (30-45 million) were obese, a further 22 million younger children are also affected according to previous IOTF global estimates based on WHO data for under fives.^{15,16}

A consistent increase in the prevalence of childhood obesity has been observed since 1971 in developed countries; however, its prevalence is increasing in developing countries as well. In Scandinavian countries the prevalence of childhood obesity is lower as compared with Mediterranean countries, nonetheless, the proportion of obese children is rising in both regions.¹⁷ The prevalence of childhood obesity is high in the Middle East, Central and Eastern Europe.¹⁸ Iran has been reported as one of the seven countries with the highest prevalence of childhood obesity.¹⁹ In a recent review from developed countries, prevalence of overweight youth (10-16 years) was > 15% in North America (Canada, USA), Great Britain and some South Western European Countries (Greece, Italy, Malta, Portugal, Spain), and between 10-15 % in Nordic (Denmark, Finland, Norway, Sweden) and other European countries. The 2011-12 Australian Health Survey reported that from 47,000 Australians 63 percent of the population are either overweight or obese. This is an increase from 56 percent in 1995 and 60 percent in 2007-08. Around one-quarter of children aged 5-17 years are overweight or obese. Data from developing countries is limited especially for older children (> 5 years old) and adolescents. In Egypt 14% of adolescents and in Cyprus 25% of 6-11 year old children were reported to be overweight or obese. Obesity is increasingly being reported from countries that have acquired affluence in the recent times such as Taiwan and Saudi Arabia. In Saudi Arabia, one in every six children aged 6 to 18 years old is obese.²⁰ The incidence of obesity at all ages is on the rise in the developing countries including India. According to a report from urban South India, 21.4 % of boys and 18.5% of girls aged 13-18 years were overweight or obese.²¹ The prevalence of obesity among School children in India has been reported between 5.74% and 8.82%.^{22,23}

During last two decades, the prevalence of overweight in older children and adolescents almost doubled in USA (from 15.4 % to 25.6%)²⁴ but tripled in Canada (from 11% of boys and 13% of girls in 1981 to 33% and 27% respectively in 1996). Between 1974 and 1997, the prevalence of overweight and obesity in 6-17 year age group more than tripled (from 4.1% to 13.9%) in Brazil, a fast growing developing country. Among urban Chinese children within a 6-year period (1991 and 1997) the prevalence of overweight and obesity increased from 7.7 to 12.4 % though such a trend was not observed among rural children.²⁵

Bangladesh, a country with a large economic burden due to under nutrition, now has to deal with over nutrition as well. In Bangladesh, nearly 40% of children <5 years are suffering from malnutrition.²⁶ However, in recent years, multiple factors such as rapid urbanization, continually decreasing number of playgrounds, increasing purchasing power, and easy access

to new technological devices such as hand-held computer toys probably have led to less physical activity and more sedentary activity, and thereby have attributed to an emerging overweight and obesity problem among young children in urban settings, especially among affluent facilities in Dhaka.²⁷

Some findings were revealed in a study entitled, Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013, conducted by an international consortium of researchers led by the Institute for Health Metrics and Evaluation (IHME) at the University of Washington was recently published in *The Lancet* where it stated that Over the last 33 years, rates of either being overweight or obese doubled among Bangladeshi adults but remained low among children, according to a new, first-of-its-kind analysis of trend data from 188 countries. In 1980, 7% of adults and 3% of children were overweight or obese. In 2013, those rates had climbed to 17% for adults but only 4.5% for children.²⁸

Health is a fundamental human right that underpins survival of citizens, the worth and value of human capital and the overall well-being of the economy.²⁹ regarded health as one of the basic capabilities that gives value to human life and augments human capital which is the engine of economic growth and sustainable development. Healthier workers are more productive, and earn higher wages; they also help attract foreign direct investment.³⁰ The level of ill health reduces the amount and productivity of labor supplied to an economy.³¹

Over the years, Bangladesh has achieved considerable progress in child health. The fourth goal of the Millennium Development Goals (MDGs) is directly linked with children's health outcome. For instance Under-Five Mortality Rate (U5MR) has significantly declined since 1990. Bangladesh Demographic and Health Survey (BDHS) 2011 data shows that U5MR has declined to 53 per 1,000 live births in 2011 from 65 as at 2007; Infant Mortality Rate (IMR) is 43 deaths per 1,000 live births and the child mortality rate is 11 per 1,000 children. Regionally, Bangladesh clearly stands out with the highest annual rate of reduction of U5MR (on average a 5.3 per cent annual rate of reduction between 1990 and 2011). Thus, Bangladesh is on track towards achieving the MDG 4 target for U5MR target of 48 per 1,000 live-births by 2015.³²

But behind lot of success stories still a number of challenges remain in child health, which demands extra ordinary effort to close the equity gaps. One of them is over-nutrition. The government has delineated an effective policy response to the high prevalence of under-nutrition but over-nutrition is on rise. Bangladesh has a wide range of policies encouraging appropriate infant and young child feeding practices, 6 months of paid maternity leave in the public sector, school meals for vulnerable communities, micronutrient supplementation interventions and more. However, almost all of these efforts address the under-nutrition aspect of malnutrition, neglecting the other form of malnutrition – over-nutrition.³³

Recent icddr,b study, which looked at the urban-rural divide in childhood nutrition, found that almost 20% of rural children are still underweight, and therefore at a higher risk for diarrhoeal diseases and infection, while 5.6% of urban children are now obese, and therefore susceptible to diabetes, metabolic disorders and heart problems in later life. Under-nutrition has been decreased in a dramatic way whereas childhood obesity has been increasing in Bangladesh.³⁴

The most recent Sector-Wide Approach (SWAp) in Bangladesh, the Health Population Nutrition Sector Development Program (HPNSDP), draws on the original SWAp, the Health Population Sector Programme.³⁵ The second SWAp, the Health, Nutrition and Population

Sector Programme (HNPS), was implemented from 2003 to 2011. The HNPSDP began in July 2011 and will continue through June 2016. This programme's strategic implementation document is the centerpiece of all health-related activities in the country, and fortunately it recognizes overnutrition and obesity as development challenges. The programme trains front line fieldworkers on NCD prevention aimed at early intervention to address obesity and its risk factors. However, this training programme amalgamates all NCD-related risk factors, including tobacco use, diabetes, heart disease, hypertension, cancer screening and others, with funding allocated at 499 million Bangladeshi takas (BDTs) over 5 years.³⁶

The HPNSDP is being implemented under the NCD Operational Plan (OP),³⁷ which also directs the Project Implementation Plan and the amalgamated training in prevention of NCD risk factors. The eight components of the OP, for which 380 million BDTs have been allocated, cover all conventional and nonconventional NCDs. However, we found no specific activities for obesity prevention. Nevertheless, the OP of the National Nutrition Services (NNS)³⁸ has identified obesity as an emerging problem in Bangladesh. That organization plans to publish diets that, with exercise, can keep a person's weight under control while enjoying a healthy and active lifestyle. This OP has allocated 273 million BDTs for NCDs and emergency nutrition programmes together. However, neither the NNS nor the NCDC has implemented any of the planned activities³⁹. Although this nutrition transition is happening among women of reproductive age and among children, none of the other relevant OPs – Health Education and Promotion⁴⁰; Information, Education, and Communication⁴¹; Maternal Neonatal Child and Adolescent Health⁴² – addresses obesity or over-nutrition. Many national and international NGOs implement nutrition-related activities through their nationwide networks, but in almost all cases they only cover the under-nutrition issues of mothers and children^{43, 44}

So a driving force behind the shift from under-nutrition in childhood to over-nutrition in adulthood in Bangladesh could be due to rapid increase in economic development, globalization, leading to tremendous changes in sedentary lifestyles, lack of physical activity and increased consumption of foods with high amounts of fat, sugar and salt. Increasingly, the diets of people in Bangladesh consists of food with a high energy density but low micronutrient content. Those are not just the primary causes of over-nutrition in children. But still some of the most important questions regarding the increase of over-nutrition or obesity in Bangladesh remained unanswered. Since Bangladesh ranks in the bottom quartile of healthcare spending in the region; the percentage of GDP allocation for health is 3.3% which is far below the level needed to scale up essential health interventions. For universal coverage of health care, public investment in health should be at least 5% of GDP and WHO suggested minimum 4% as the appropriate percentages for countries of Asia-Pacific region.⁴⁵

Recently in Bangladesh, malnutrition in the form of under-nutrition has been one of the most talked about issues, marked by the presence of the global Scaling Up Nutrition initiative.⁴⁶ Yet the issue of over-nutrition remains a relatively low priority. Have we even thought why is this happening? Why under-nutrition is one of most talked issues and over-nutrition is one of the most visible yet neglected public health issues in Bangladesh? Is there any budget constraints for health? If not they why government wouldn't take any further initiatives to stop arising over-nutrition in Bangladesh? If not now then when?

Considering such thoughts few nationally representative surveys provide data about nutrition transition among Bangladeshi children. Currently around 40% of children younger than 5 years of age suffer from stunting, or chronic under-nutrition.⁴⁷ However, especially in urban areas, an increase in overweight among children is being observed.⁴⁸ Unpublished data

from a recent nationally representative survey⁴⁹ revealed that, of the children in urban areas of Bangladesh, 1 in 10 is overweight. This study also reports that among children aged 5–18 years there is a double burden of under-nutrition and over-nutrition. The findings show that the children are not involved in rigorous physical activities. Because this study focused on urban children, at this stage it is not possible to evaluate the rates among rural children. However, the urban data alone substantiate that over-nutrition is a particular public health concern for the nation, as overweight or obese children have a high risk of becoming overweight or obese adults.^{50, 51}

The National Strategy for Accelerated Poverty Reduction II⁵² directs all Bangladesh policies focused on poverty reduction, including the issues of nutrition and under-nutrition. It outlines programmes to address both of these issues; however, over-nutrition is not mentioned in this vital policy document. A similar situation is observed in the country's 65-year plan.⁵³ The National Health Policy⁵⁴ identifies under-nutrition as an issue and includes programme planning, but no programmes are identified to address over-nutrition. The present National Plan of Action for Nutrition⁵⁵, formulated in 1997, also focuses on under-nutrition, but this document is under revision, and the updated version does address over-nutrition (Director of the National Nutrition Services, Unpublished). One of the most important documents for multi-sectoral involvement in nutrition actions, the Country Investment Plan: A Road Map Towards Investment in Agriculture, Food Security, and Nutrition, includes plans to address both under- and over-nutrition, thereby providing the missing investment⁵⁶. The Bangladesh National Strategy for Maternal Health⁵⁷, the National Child Policy⁵⁸, the National Health Research Strategy⁵⁹, and the draft National Urban Sector Policy⁶⁰, however, do not mention actions on over-nutrition. The Drug Policy⁶¹, the Land Transport Policy⁶², and the Population Policy⁶³ have indirect effects on health and nutrition, yet nothing concerning these issues is present in those documents.

Appropriate infant and young child feeding (IYCF) practices⁶⁴ can reduce the risk of developing obesity in later life, so I studied the existing IYCF trends⁶⁵, policies and strategies. Three different action plans focus on IYCF issues in the country⁶⁶, which saw an increase of almost 20%⁶⁵ in the rate of exclusive breastfeeding between 2007 and 2011.

The only strategies that significantly discuss over-nutrition as a development challenge are the National Urban Health Strategy 2011⁶⁷ and the Strategic Plan for Surveillance and Prevention of NCDs in Bangladesh⁶⁸. The former document identifies the issue in urban areas and outlines programme initiatives. The latter, the only national strategy that focuses entirely on NCDs and their risk factors, outlines the problem clearly, but is lacking in many other aspects.

The health, nutrition and population sectors of Bangladesh receive substantial support from major donors, development partners and UN organizations. Therefore I studied the responses of these entities and found that, except for the World Health Organization (WHO)⁶⁹, none focuses on over-nutrition. The WHO pays specific attention to chronic NCDs and thus includes obesity and over-nutrition as risk factors for developing NCDs.

Regrettably, the current Bangladeshi public health response to malnutrition is still primarily restricted to under-nutrition. It is urgent that the public health policies begin to concurrently deal with both sides of malnutrition. This paper has identified a few responses to over-nutrition among the schools going adolescents. However, such isolated efforts might provide only sporadic successes. All stakeholders must recognize that the country is facing a double burden and not only among adults but also adolescents.

Effective prevention strategies are available for reversing this trend and Bangladesh should initiate appropriate steps in this regard to put an early stop to the eventual consequences of childhood obesity. Public health interventions that can force implementation of strong policies especially targeting the built environment need to be instigated at the earliest, to effectively tackle this problem in the country.

So, based on the findings through the study intensive school based public health intervention programmes can be created in different English medium schools which will help to increase awareness among governments, health care professionals, teachers, parents and the community. It will also help to provide evidence and guidance for the development of better prevention and management strategies in future. It is also anticipated that this study may increase awareness among English medium school students regarding prevalence of overweight and obesity and associated risk factors. Childhood obesity and overweight is indeed a reality among English medium school students and the time for action is now!⁷⁰

1.2 Justification of the Study

Childhood overweight and obesity are the emerging child health challenges demanding global attention.⁷¹ It is among the easiest medical conditions to recognize but the most difficult to treat.⁷² Childhood obesity due to poor nutrition and lack of exercises causes a big threat to the life expectancy levels. It is associated with higher chance of premature death and disability in adulthood.⁷³ It also leads to adult obesity along with chronic health problems such as diabetes, asthma, sleep apnoea, gallbladder disease, elevated blood pressures and elevated total cholesterol.

In Bangladesh, students of English medium schools are more vulnerable than normal schooling system. These students hail from affluent societies, they use personal transport, eat fast foods, have less play time with no play ground at school and pass more time at computer than mobility. In these societies childhood obesity is still considered a sign of healthiness and affluency.⁷⁴ In Bangladesh, obesity or overweight is a new concern, but a grave concern nonetheless.⁷⁵ But very limited information on the prevalence and associated risk factors regarding childhood obesity and overweight among the English medium schools students of Dhaka city has been found in the published literature as we can create awareness to reduce this problem. In this circumstance, the present epidemiological study has been undertaken to determine the prevalence and risk factors associated with childhood obesity and overweight among the secondary English medium school students in Dhaka city.

My study will demonstrate prevalence and several risk factors of childhood overweight and obesity among English medium school students in Dhaka. As a result teachers, parents, school students could be able to understand the causes of obesity and students would choose their food item that will not be the factors of developing overweight. This study also would be a source for designing intensive Public health programs to increase awareness on these risk factors among children and adolescents in order to reduce the future burden of obesity associated with chronic diseases. This study would be able to generate a message towards parents, teachers that life style modification with a variety of physically activities, recreational activities and healthy dietary practices of the school students should be encouraged through School Health Service Programme.

1.3 Operational Definitions

1.31 Overweight and Obesity: Overweight and obesity is defined as abnormal or excessive fat accumulation that may impair health. A BMI greater than or equal to 25 is overweight and a BMI greater than or equal to 30 is obesity.⁷⁶

1.32 BMI: Body mass index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of his height in meters (kg/m^2).⁷⁶

1.33 Sedentary Lifestyles: A sedentary lifestyle is a type of lifestyle with no or irregular physical activity.⁷⁷

1.34 BMI for age: BMI is used differently for children. It is calculated the same way as for adults, but then compared to typical values for other children of the same age. Instead of set thresholds for underweight and overweight, then, the BMI percentile allows comparison with children of the same sex and age. A BMI that is less than the 5th percentile is considered underweight and above the 95th percentile is considered obesity. Children with a BMI between the 85th and 95th percentile are considered overweight.

1.35 Eating habit: The practices related to food intake, include kinds of foods, how to eat. Eating habit were based on the questionnaire-

Everyday: seven days per week

Often : four to six days per week

Sometime : one to three days per week

Never: never eat that kind of food

1.36 Meal: Time for eating foods that bought from food store or prepared by family. Other factors concerned to a meal are number of meals, time for a meal, latest meal in a day,

1.37 Fast food: Foods designed for ready availability, use or consumption and sold at eating establishments for quick availability or take-out. In this research fast food are all kinds of food which are sold in fast food store system like KFC, Burger King, Pizza Hut and so on. Otherwise times of having fast food is important in eating habit.

1.38 Physical activities: Physical activities is generally defined as any bodily movement produced by skeletal muscles that result in energy expenditure above resting level.

1.4 Research Question (s)

What is the prevalence and risk factors of being overweight or obese among English medium school students of Dhanmondi, Dhaka?

CHAPTER II LITERATURE REVIEW

According to Obesity Prevention Source of Harvard School of Public Health, South Asian countries like Bangladesh, India and Pakistan have low child obesity rates compared to other countries. But the large populations of these countries add up to large numbers of children who are overweight or obese.⁷⁸ In developed countries, increases in obesity that began in the 1980s and accelerated from 1992 to 2002 have slowed since 2006. Conversely, in developing countries, where almost two-thirds of the world's obese people currently live, increases are likely to continue.⁷⁹

The annual rate of increase in the prevalence of childhood obesity has been growing steadily; the current rate is ten times higher than it was in the 1970's.⁸⁰ More than 60% of children who are overweight before puberty are likely to be obese by early adulthood. The highest rate of childhood obesity has been observed in developed countries such as the UK and USA. However, the problem is steadily affecting many low-income and middle-income countries particularly in urban settings. Thus in such settings the prevalence of obesity may be as high as in industrialized countries.⁸¹

The WHO predicts that by 2015 approximately 2.3 billion adults will be obese.⁸² Globally it is estimated that 155 million children are obese. The prevalence rate worldwide ranges at 25%, America is 37%, Europe 35%, Middle East 25%, and Asia 15% and in Africa it is estimated to be 8.4%. Studies conducted among the pre-school children from several African countries indicate that South Africa had a prevalence rate of 31.9%, Algeria 21.6%, Seychelles 25%, Malawi 8.4% and Mauritius 5.6%, Kenya 4.6%.⁸¹ However, there are limited representative data available from African countries for studying the trends on childhood obesity.⁸³

In both developed and developing countries there are proportionately more girls overweight than boys, particularly among adolescent age.⁸⁴ Obesity prevention is an important contemporary public health priority. Prevention involves addressing the principle risk factors of diet and less physical activity and also involves a wide range of environmental factors including access to sport and leisure, family life, diet, education and information.

Obesity in children and adolescents is rising alarmingly and approaching epidemic proportion in many economically developed countries, particularly in USA, Canada, Australia and several European countries.⁸⁵ Likewise in developing countries this issue is emerging as a public health crisis. According to a recent report, out of an estimated 43 million obese children worldwide in 2010, approximately 81% were from developing countries, half of which (18 million) were reported to be living in Asia despite of huge burden of under-nutrition. By 2020, it is estimated that the global prevalence of childhood obesity will reach approximately 60 million.⁸⁶

WHO (2013) considers childhood obesity as “one of the most serious public health challenges of 21st century”.⁸⁷ It accounts for a wide range of psychosocial and medical consequences.⁸⁸ Lower self-esteem, social isolation, poor academic achievement and peer problems are the most apparent immediate consequences in obese children.⁸⁹ Obesity in

children and adolescents predisposes them to and is causally linked with cardio-metabolic disorders such as hypertension, dyslipidaemia and insulin resistance which are well-established illnesses.⁹⁰ As overweight and obesity is likely to follow through into adulthood, in the longer term, there is a greater risk of developing cardiovascular diseases.^{91,92} Obesity at a young age seems to have substantial impact on reducing life expectancy.⁹³ Evidence also suggests a link between obesity in young girls with potential menstrual disorders, hypertension in pregnancy and sub-fertility.⁹⁴

Health risks such as cardiovascular disease, cancer, diabetes, osteoarthritis, and chronic kidney disease increase when a person's BMI exceeds 23. In 2010, obesity and overweight were estimated to have caused 3.4 million deaths globally, most of which were from cardiovascular causes. Research indicates that if left unchecked, the rise in obesity could lead to future declines in life expectancy.⁹⁵

“Being overweight carries significant health risks, and those risks are greatly increased for obese individuals,” said Alan Lopez, Laureate Professor at the University of Melbourne and a co-founder of the Global Burden of Disease (GBD) study. “Unlike tobacco control, there is very little evidence that public health campaigns or industry regulatory mechanisms are yet having an impact. Health authorities across Asia need to take the population health consequences of weight gain much more seriously.”⁹⁵

A study conducted titled “Prevalence of Overweight and Obesity among Students in the Kumasi Metropolis”. The aim of the study was to determine the prevalence of obesity and overweight among students in the Kumasi metropolis. It was a descriptive cross-sectional study, where 500 students aged 10 to 20 years were examined from two junior high schools selected by multistage sampling technique and three randomly selected senior high schools. Height and weight were measured in all participants and the body mass index (BMI) of each individual was calculated. Body mass index classes were calculated according to the International Obesity Task Force standards. Out of the 500 students, 290 (58.00%) were males and 210 (42.00%) were females. The prevalence of underweight, normal weight, overweight, and obesity was 7.40%, 79.60%, 12.20%, and 0.80%, respectively. Overweight was more prevalent among students than obesity. There is therefore the need to establish effective public health promotion campaigns among students in order to curtail future implications on health.⁹⁶

Another study conducted titled “The prevalence of underweight, overweight, obesity and associated risk factors among school-going adolescents in seven African countries” where it stated that the burden caused by the coexistence of obesity and underweight in Low and Middle Income Countries is a challenge to public health. While prevalence of underweight among youth has been well documented in these countries, overweight, obesity and their associated risk factors are not well understood unlike in high income countries. Cross-sectional data from the Global School-based Student Health Survey (GSHS) conducted in seven African countries were used for this study. The survey used a clustered design to obtain a representative sample (n = 23496) from randomly selected schools. 53.6% of the sample was male, and participants ranged in age from 11-17 years old. Body Mass Index (BMI) was calculated using age and sex adjusted self-reported heights and weights. Classification of weight status was based on the 2007 World Health Organization growth charts (BMI-for-age and sex). Multivariable Logistic Regression reporting Odds Ratios was used to assess potential risk factors on BMI, adjusting for age, sex, and country. Statistical analyses were performed with Stata with an alpha of 0.05 and reporting 95% confidence intervals.

Unadjusted rates of being underweight varied from 12.6% (Egypt) to 31.9% (Djibouti), while being overweight ranged from 8.7% (Ghana) to 31.4% (Egypt). Obesity rates ranged from 0.6% (Benin) to 9.3% (Egypt). Females had a higher overweight prevalence for every age group in five of the countries, exceptions being Egypt and Malawi. Overall, being overweight was more prevalent among younger (≤ 12) adolescents and decreased with age. Males had a higher prevalence of being underweight than females for every country. There was a tendency for the prevalence of being underweight to increase starting in the early teens and decrease between ages 15 and 16. Most of the potential risk factors captured by the GSHS were not significantly associated with weight status. The prevalence of both overweight and underweight was relatively high, demonstrating the existence of the double burden of malnutrition among adolescents in developing countries. Several factors were not associated with weight status suggesting the need to explore other potential risk factors for overweight and underweight, including genetic factors and socioeconomic status.⁹⁷

The National Secondary Students' Diet and Activity (NaSSDA) survey 2009-10 is jointly funded by the state Cancer Councils, Cancer Council Australia and the National Heart Foundation of Australia. The study fills a significant gap in existing data in Australia by establishing an ongoing commitment to the standardized monitoring of adolescents' body weight, and dietary and physical activity behaviour at both a state and national level. A nationally representative sample of 12,188 secondary school students from year levels 8 to 11, from 237 schools was surveyed. Data on students' dietary, physical activity and sedentary behaviour were collected via a web-based questionnaire, and anthropometric measurements of students' height, weight and waist circumference were taken by trained researchers in a confidential setting. Active parental consent was required for students to participate in each component of the study. An audit of the school food and activity environment was also conducted. This research memo reports on the prevalence of overweight and obesity among Australian secondary school students. Measures of height and weight were used to compute Body Mass Index (BMI), which was classified into weight categories according to international standard cut-offs developed for children and adolescents. Data were weighted by state, year level, sex and education sector to the population of students enrolled in Australia and the reported prevalence estimates are based on these weighted data. Analyses adjusted for school level clustering using Stata SE 11.1. Logistic regression analysis was used to test for significant differences ($p < 0.01$) in overweight/obesity prevalence by sex, socio-economic status (SES) and home location. Overweight and obesity prevalence: Overall, 72% of all students were classified as a healthy weight (71.8%; 95% CI: 70.4% - 73.2%). Just under one in four students were categorized as overweight (18.4%; 95% CI: 17.3% - 19.5%) or obese (5.0%; 95% CI: 4.3% - 5.8%). Five percent of all students were underweight (4.8%; 95% CI: 4.2% - 5.5%).⁹⁸

Another study was conducted in Turkey titled "Prevalence of Obesity and Associated Risk Factors among Adolescents in Ankara, Turkey" where the purpose of this study was to investigate the prevalence of and the risk factors associated with obesity among adolescents in Ankara, Turkey. The study was conducted in 26 schools in Ankara during the time period from September 2010 to March 2011. A total of 8848 adolescents aged 11-18 years were chosen using a population-based stratified cluster sampling method. Body mass index (BMI) of the participants was compared with the BMI references for Turkish children and adolescents to estimate the prevalence of overweight and obesity. A standardized questionnaire aiming to determine the socio-demographic characteristics, computer use, television (TV) watching, physical activity, and presence of obesity in the family was applied to the study group.

The results showed that the overall prevalence of obesity among adolescents was 7.7% (8.4 % for females and 7.0% for males). It was observed that BMI increased as computer use increased. A greater proportion of the overweight and obese adolescents watched TV and use computer for more than 2 hours/day as compared to their normal-weight counterparts. The normal-weight subjects were found to show a higher participation in regular physical activity. Obesity prevalence among the families of obese adolescents was 56.5%. The prevalence of adolescent obesity in Ankara, Turkey is lower as compared to many European countries and to the United States. Computer use, watching TV, physical activity and family factors are important risk factors for obesity.⁹⁹

Overweight and obesity is an emerging public health problem among school-aged children in Bac Giang city in the Northern part of Vietnam recently. This study aims to identify overweight-obesity prevalence of secondary school children in this city and its associated factors. The study was a nested case control in a cross-sectional study design in 1528 secondary students selected from 4 secondary schools in 2 inner communes and 2 suburban communes of Bac Giang city, Vietnam. *Result:* Overweight prevalence among secondary school students in Bac Giang was 6.7%, the prevalence of obesity was 2.0%. Overweight and obesity is more prevalence in male students, inner communes and students from family have higher income and higher food expense. Overweight and obesity was associated with higher energy intake, more fat consumption, having supplement meals and bed time meal, increased physical activities and increased sleep duration. Education campaign targeting reducing overweight and obesity should target both parents about dietary adequacy and balance and children about more physical activities.¹⁰⁰

To study the prevalence of obesity and overweight among school children in Puducherry. To identify any variation as per age, gender, place of residence and type of school. Secondary data analysis of a school-based cross sectional study in all the four regions of Puducherry. Children between 6 and 12 yrs were sampled using multistage random sampling with population proportionate to size from 30 clusters. Anthropometric data (BMI) was analyzed using CDC growth charts. Data was analyzed using SPSS, BMI (CDC) calculator, CI calculator and OR calculator. The prevalence of overweight ($\geq 85^{\text{th}}$ percentile) among children was 4.41% and prevalence of obesity ($>95^{\text{th}}$ percentile) was 2.12%. Mahe region had the highest prevalence of overweight (8.66%) and obesity (4.69%). Female children from private schools and urban areas were at greater risk of being overweight and obese. Childhood obesity is a problem in Puducherry and requires timely intervention for its control.¹⁰¹

We determined the prevalence and risk profiles of being overweight or obese among children and adolescents in rural northeast China. We conducted a cross-sectional study consisting of 4,094 children and adolescents aged 5–18 y. Anthropometric measurements and information on health-related variables were collected by well-trained personnel. Odds ratios (ORs) are presented with 95% confidence intervals (CIs). The overall prevalence of subjects who were overweight or obese was 21.8% (15.4% overweight and 6.4% obese). Among boys, getting more sleep was found to be a protective factor against being overweight or obese, and a higher monthly family income (2,000–5,000 Chinese yuan (CNY); 1 CNY = 0.163 US dollar) was associated with an increased risk as compared with lower incomes. For girls, not having breakfast every day conferred higher odds of being overweight or obese (OR, 1.45 (95% confidence interval (CI), 1.11–1.91)). When both parents were overweight, this increased the risk of a child being overweight or obese in both boy (overweight father: OR, 1.54 (95% CI, 1.26–1.89); overweight mother: OR, 1.73 (95% CI, 1.35–2.22)) and girl participants (overweight father: OR, 2.01 (95% CI, 1.57–2.57); overweight mother: OR, 1.45 (95% CI, 1.07–1.96)). The prevalence of pediatric obesity in rural China was relatively high.

Risk profiles should be fully considered when planning prevention and treatment programs for pediatric obesity.¹⁰²

Childhood obesity is one of the most serious health challenges of the 21st century. The problem is global and the prevalence is increasing at an alarming rate. To determine the prevalence and risk factors of overweight and obesity among Saudi primary school students in AlAbnaa primary schools in Tabuk. A cross-sectional study was conducted among primary schools students in AlAbnaa Schools in Tabuk, Saudi Arabia. Sampling frame included all genders. In the first stage, a sample of four primary schools had been selected using simple random technique-two primary school for boys and two for girls. In the second stage, stratified sampling technique had been used. The data was collected through a self-administered validated questionnaire. Height and weight of the subjects were measured and body mass index (BMI) was calculated. Recently published 2007 World Health Organization (WHO) growth charts which depended on data from widely different ethnic backgrounds and cultural settings were used for defining overweight and obesity among students. A total of 331 out of the target study subjects of 350 responded to the survey giving a response rate of 94.6%. Age of the respondents ranged from 6-13 years old and the mean age was 9.7 ± 2.1 years. The prevalence of overweight and obesity among male primary school students were 7.3% and 17.4%, respectively while the prevalence among female students were 12.4% and 20.9%, respectively. Overweight and obesity were more prevalent among student living with both parents ($P = 0.031$), with highly educated parents ($P = 0.008$), with history of maternal obesity ($P = 0.001$), with working mothers ($P = 0.024$), and with smaller family size ($P = 0.004$). The results of the current study provide alarming evidence-based data on the considerable prevalence of childhood overweight and obesity among Saudi primary school children in Tabuk, Saudi Arabia.¹⁰³

Obesity is an emerging problem in Pakistan. The authors sought to determine prevalence of obesity and malnutrition in school-going children, from grades 6th to 8th of different schools of Karachi and assess associations that affect the weight of the children. A cross sectional study design with children studying in grades 6th to 8th grade, in different schools of Karachi. We visited 10 schools of which 4 consented; two subsidized government schools and two private schools. A questionnaire was developed in consultation with a qualified nutritionist. Height and weight were measured on calibrated scales. A modified BMI criterion for Asian populations was used. Data was collected from 284 students. Of our sample, 52% were found to be underweight whereas 34% of all the children were normal. Of the population, 6% was obese and 8% overweight. Of all obese children, 70% belonged to the higher socio-economic status (SES) group, while of the underweight children, 63.3% were in the lower SES. Amongst obese children in our study, 65% ate meat every day, compared to 33% of normal kids. Obesity and undernutrition co-exist in Pakistani school-children. Our study shows that socio-economic factors are important since obesity and overweight increase with SES. Higher SES groups should be targeted for overweight while underweight is a problem of lower SES. Meat intake and lack of physical activity are some of the other factors that have been highlighted in our study.¹⁰⁴

The prevalence of child obesity is increasing rapidly worldwide. In developing countries such as India, especially in urban populations, childhood obesity is emerging as a major health problem. In view of these contexts, the present study was undertaken to estimate the prevalence of overweight and obesity in an urban population of girl adolescent students attending the English Medium School in kolkata, India. A total of 571 girl students, aged 12-18 years, were evaluated. cole et al. (2000) recommended cut-off points were utilized to assess overweight and obesity. The overall prevalence rates of overweight and obesity were

28.5% and 4.2% respectively. The rate of overweight was the highest when compared with that of different parts of India, including kolkata, and also when compared to rates from the USA and great Britain. In the context of the present study, it can be presumed that, the higher prevalence of overweight in these school children may be due to their eating habits, as well as to their lack of awareness on proper eating habits. In addition, low involvement in physical activities may also have influenced the rate of overweight and obesity. Thus, it can be concluded that the study definitely highlighted the existence of an obesity threat, which is likely to persist among Bengalee school children of wealthier families.¹⁰⁵

Obesity is a worldwide epidemic. In Thailand, with a rapidly changing society, obesity prevalence is increasing dramatically both in adult and children. A cross-sectional study was conducted in Phutha Monthon district, Nakhon Pathom province, Thailand in 2008. The objective was to determine the prevalence of obesity and its related factors among students grade 7-12. Two hundred and thirty students were selected by multi-stage cluster sampling with proportional size. Student anthropometry was measured by the researcher and a questionnaire was used to assess factors related to obesity.

The study revealed that the prevalence of obesity among the sample was 8.7 %, fat was 6.04 % and slightly fat was 5.65%. Paternal occupation had a significant relationship to obesity status. This revealed indirectly that family income had an association with obesity. There was no significant association between gender, parental marital status, parental education level, birth order and obesity. The result showed that students who ate fruits more than three times per week were 3.69 times more at risk of obesity than those who ate fruits less than or equal to 3 times per week (adjusted odds ratio: 3.69, 95% CI 1.04-13.13). Other food consumption such as fast food, fatty food, was not significant association with obesity. Physical activities and nutritional knowledge were also found to be not significant factors in this study. There was no significant difference of time spent in watching TV, passive entertainment activities between the obese and non obese group.

The large potential for obesity to develop is alarming. Obese and fatty students needs to be monitored closely. This study has produced result that contradict many previous studies so the results need to be treated with great care and unless further research confirm them. The common method of avoiding obesity such as promoting healthy food and physical activities should be continued.¹⁰⁶

A newspaper article regarding overweight and obesity titled “Overweight and obesity soaring among Bangladeshi adult” where its written that Over the last 33 years, rates of either being overweight or obese doubled among Bangladeshi adults but remained low among children, according to a new, first-of-its-kind analysis of trend data from 188 countries. In 1980, 7% of adults and 3% of children were overweight or obese. In 2013, those rates had climbed to 17% for adults but only 4.5% for children. These findings were revealed in a study entitled, “Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013,” conducted by an international consortium of researchers led by the Institute for Health Metrics and Evaluation (IHME) at the University of Washington was recently published in The Lancet.

“Bangladesh has lowered the rates of death from infectious diseases, childhood causes of death and complications during pregnancy,” said Dr. Aliya Naheed, Associate Scientist at the International Centre for Diarrhoeal Disease Research in Bangladesh and one of the paper’s co-authors.

“For overweight and obesity to be rising to the point where nearly 1 in 5 adults are too heavy, we must look for ways to change behaviour and change policy.”

Of the 17% of overweight or obese adults in Bangladesh, just 4% were obese, and obesity rates in Bangladesh are increasing at a slower pace. From 1980 to 2013 obesity rates in adults grew from 2% to 4%, and rates in children and adolescents remained at about 1.5%. While the percentage of people worldwide who are either overweight or obese has risen substantially over the last 30 years, there have been marked variations across regions and countries.¹⁰⁷

Considering the reports of increasing overweight and obesity among English medium schools, this study was conducted to find out the prevalence risk factors of overweight and obesity among students of two selected Schools of Dhaka City, Bangladesh. This cross-sectional study was conducted among 202 students of class Standard-I to Standard-IV in Maple Leaf and Heed International Schools of Dhaka city between the months of February-July 2008. Schools were selected conveniently and sections of the classes were selected by cluster random sampling technique. Data collection was done through a semi structured questionnaire by face to face interview.

About 18.32% students of age 6 to 10 years were found to have overweight and obesity. Among them male were 10.89% and female were 7.43%. The order of birth of the students in family was found significant ($p < 0.05$) having more prevalence of overweight among the first child (56.76% vs 51.52%). Children overusing computer games (70.3% vs 50.9%), reading excess story book (70.3% vs 33.9%), doing less physical activity (18.9% vs 23% rest being occasional) and no sports (64.9% vs 34.6%) were found to be significantly more ($p < 0.05$) among overweight students than others. But the types and frequency of snacks were significantly higher in the overweight than that of non-overweight students ($p < 0.05$). The prevalence of overweight and obesity was found quite high in this study. This is alarming for future planning to combat the non-communicable disease control in the country. Life style modification of the school students can prevent any future sickness profile.¹⁰⁸

Obesity has been declared an epidemic in many high income countries. In low income countries, the coexistence of obesity and underweight makes the situation more grievous. The priority is to explore the overall pictures of body weight status in low income countries and countries that are in transitional phase. Through this country wide cross sectional study we would like to capture the current body weight status among the school aged children, both in urban and rural areas in Bangladesh.

We conducted a countrywide cross sectional study, from June to September 2009. By random sampling, we selected 10,135 students from 6 to 15 years from both the urban and rural schools. We categorized the students into overweight, obese and underweight by using the values for age and sex at +1SD, +2SD and -2 SD of Z scores of BMI respectively.

We observed among 6 to 15 year olds from both the urban and rural areas 3.5% were obese, 9.5% were overweight and 17.6% were underweight. The proportion of obese and overweight students were greater among the students from urban schools (5.6%, 10.6%) compared to the students from rural schools (1.2%, 8.6%) (RD=4.3, 95% CI= 3.6, 5.0; RD=2.0, 95% CI=0.1, 3.1). The proportion of underweight students were lower in the urban schools (16.1%) compared to the rural schools (19.2%) (RD=-3.1; 95% CI=-4.6, -1.6). The rate of obesity and overweight is alarming among school aged children in Bangladesh. Overweight and underweight are coexisting which needs special attention to minimize the dual burden.¹⁰⁹

An article has been published in prothom-alo newspaper on May 04, 2015 titled “Urban child obesity rising fast in Bangladesh” where its stated that Despite a major reduction in child being under-nutrition and undersize over the last three years, there has been a considerable increase in obesity among children in Bangladesh, say studies. A health study, published on 24 April shows the number of undersized children decreased from 41% to 36% and the percentage of underweight malnourished children came down to 14% from 16% in last three years. However, a survey conducted by the Centre for Control of Chronic Diseases of the ICDDR,B with support from the National Nutrition Services of Institute of Public Health Nutrition says ten out of every 100 children, aged 5-18 living in Bangladesh’s urban areas, are overweight while 4% are obese. Another survey conducted separately by ICDDR,B shows the same result. Fast-foods and high caloric beverages, reduced physical activities due to lack of playgrounds in schools and housing societies, widespread use of electronic gadgets by this tech-savvy generation are contributing to this modern epidemic.

As childhood overweight and obesity tend to follow through adulthood, in longer terms, there is increased risk of developing chronic illnesses, said children's nutrition specialists.

Tahmeed Ahmed, director of Centre for Nutrition and Food Security at ICDDR,B told Prothom Alo, "When a country develops financially, the number of its undersized children decreases and obese kids increases. Same is in the case of Bangladesh." "While childhood under-nutrition is still highly prevalent in the country, there has been a steep rise in childhood obesity and overweight in the last two decades leading to double burden of malnutrition. So we should be cautious of the situation before it is too late," said Tahmeed Ahmed. The assessment of their diets reveals that 98% children consumed rice or bread at least four times a week. Consumption of other types of food was less than three times in a week. These were meat (24%), egg (60%), legume (71%), vegetables (61%), milk (56%) and fruits (22%). The study says more than half of the children had frequently taken local fried snacks such as singara, samosa, chop, beguni, peaju while about 20% children ate calorie-rich fast food -- pizza, burger, and fried chicken and so on. The urban children of Dhaka, however, do not get the opportunity to play outside due to lack of playgrounds in schools and housing complexes.

There are only 11 playgrounds in both Dhaka south and north city corporations' command areas and many of them do not have facilities for playing. And, so majority of the urban kids spend their time watching television and playing video games. After having chats with 10 schoolchildren's guardians, this correspondent came to know that most of the schools in Dhaka do not have playgrounds.

A guardian of a Biam Laboratory School student said, "The playground of the school is too small to play outdoor games forcing students to spend free time playing 'pen fight' on the bench." "The playground that Monipur High School has is now tiles-fitted. And so, its students cannot play on it," said another guardian. A mother of an English-medium school student said, "Although the school has a large playground, many guardians do not want their kids to play on it blaming wastage of time."¹¹⁰

An article has been published in progress Bangladesh newspaper on March 21, 2015 titled “obesity rising” stated that Of the children, 14 percent were overweight and four percent obese, found the survey by the Centre for Control of Chronic Diseases at the icddr,b.

However, prevalence of overweight among the children was 27 percent in the richest quintile but it was only 3 percent in the poorest quintile. “Dhaka and Chittagong cities have the highest proportion of overweight mothers and children,” said ICDDR,B Associate Scientist Dr Aliya Naheed who was in the study team. Dr Aliya suggested introducing

healthy lifestyle in schools and a healthy dietary guideline for all. “Urban planners have a great role to play. There could be a separate lane for bicycles to facilitate physical exercise,” she said.¹¹¹

Childhood obesity has become an emerging urban health problem in urban cities in Bangladesh, particularly in affluent families. Risk factors for obesity in this context have not been explored yet. The objective of this study was to identify the risk factors associated with overweight and obesity among school children and adolescents in Dhaka, Bangladesh. From October through November 2007, we conducted a case control study among children aged 10–15 years in seven schools in Dhaka. We assessed body mass index (weight in kg/height in sq. meter) to identify the cases (overweight/obese) and controls (healthy/normal weight) following the Centers for Disease Control and Prevention age and sex specific growth chart. We used a structured questionnaire to collect demographic information and respondent’s exposure to several risk factors such as daily physical activity at home and in school, hours spent on computer games and television watching, maternal education level and parents’ weight and height. We enrolled 198 children: 99 cases, 99 controls. Multiple logistic regression analysis revealed that having at least one overweight parent (OR = 2.8, $p = 0.001$) and engaging in sedentary activities for >4 hours a day (OR = 2.0, $p = 0.02$) were independent risk factors for childhood overweight and/or obesity while exercising ≥ 30 minutes a day at home was a protective factor (OR = 0.4, $p = 0.02$). There were no significant associations between childhood overweight and sex, maternal education or physical activity at school. Having overweight parents along with limited exercise and high levels of sedentary activities lead to obesity among school children in urban cities in Bangladesh. Public health programs are needed to increase awareness on risk factors for overweight and obesity among children and adolescents in order to reduce the future burden of obesity-associated chronic diseases.¹¹²

A cross sectional study was conducted to find out the prevalence and underlying causes of childhood overweight and obesity among 7 selected English medium schools of Dhaka, Bangladesh. For study purpose, 112 participants were selected from English medium schools located different places of Dhaka city to collect data through a well structured questionnaire by face to face interview. The prevalence of overweight and obesity was found 20.5% and 24.1 % respectively and also the prevalence of overweight and obesity among boys were 16.4% and 26.9% respectively, and for girls were 26.7%, 20.0% respectively. Most (7.46% and 8.95%) of the male obese students were in the age group of 9-10, 13-14 years and most (6.67% and 6.67%) of the female obese students were in the age group of 9-10 & 11-12 years. The prevalence of overweight and obesity was found quite high in this study. It is demonstrated that several risk factors such as more meal taking habit, snacking habits, physically less active lifestyle and high levels of sedentary activities to be major underlying factors for increasing prevalence of childhood overweight and obesity among English medium school children in Dhaka, Bangladesh.¹¹³

No published information is available on the status of childhood obesity in Bangla- deshi primary school children of urban middle and upper-middle income group. The aim of the study was to explore the proportion of childhood obesity in the primary school children of middle and upper-middle income group in capital city and to gather information on their dietary pattern and physical activity. Methods: One hundred and fifty children (age 9 ± 1 years, height (ht) 118 ± 20 cm, weight (wt) 36 ± 8 kg, wt/ht% 126 ± 24 , mean $\pm$ SD) were selected purposively from the primary schools of Dhaka city. On the basis of predefined scoring, subjects were classified as underweight, normal, overweight and obese if their weight-for-height values were <90%, 91% - 110%, 111% - 120% or >120% of median values

for Bangladeshi children respectively. Dietary intake and energy expenditure of the study subjects were calculated by standard techniques. The proportion of childhood overweight and obesity was 52% and 20%. The proportion of overweight and obesity was higher (78%) among girls compared to boys (54%). Similarly, height, weight and other anthropometrics indices were significantly ($p < 0.05$) higher in girls compared to boys. The daily intake of carbohydrate and protein was significantly ($p < 0.05$) higher among obese group. Total energy balance was significantly correlated with weight-for-height% ($r = 0.541$, $p = 0.0001$). A higher proportion of overweight and obesity had been found in girls' children than their counterparts in this study. Positive energy balance with higher energy intake from carbohydrate and fast/processed food culture habit were found among primary school children of middle and upper-middle income group in the capital city of Bangladesh.¹¹⁴

CHAPTER III

RESEARCH METHODOLOGY

3.1 Study Objectives

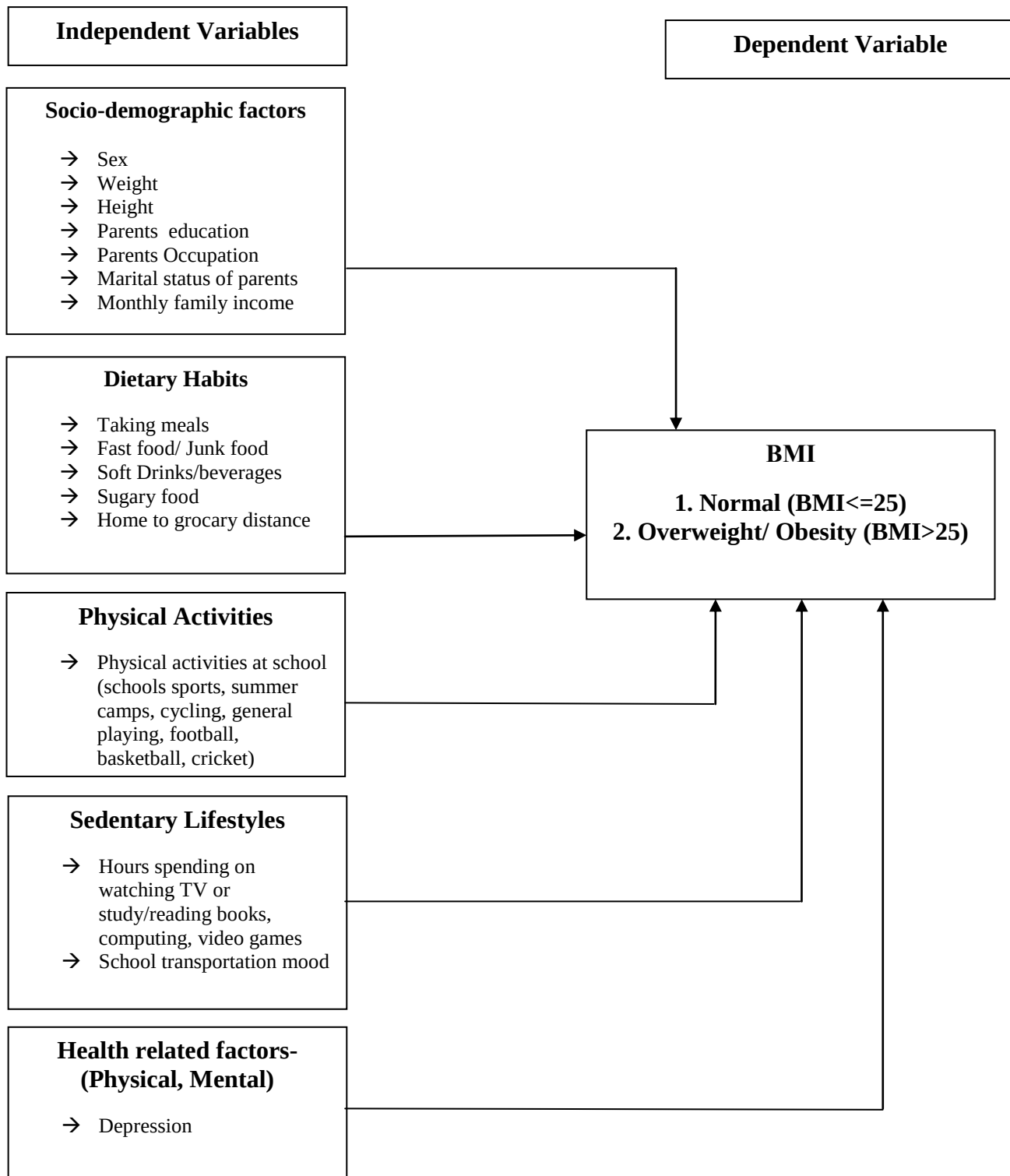
3.1.1 General Objective

- Assess the prevalence and risk factors of being overweight or obese among students in selected English medium schools (standard 6-10) of Dhanmondi, Dhaka.

3.1.2 Specific Objectives

- To know the affects of socio-demographic factors regarding overweight or obesity among students.
- To describe the dietary habits and physical activities among students.
- To find out sedentary lifestyles practice among students.
- To determine the association among dietary habits, physical activities sedentary lifestyle and BMI.
- To find out the correlation between health related factors (physical & mental) and BMI.

3.2 Conceptual Framework



3.3 Study Design

Population-based cross-sectional study.

3.4 Target Population

129 students from standard 6-10.

3.5 Study Site & Area

The study was conducted in 2 different English medium schools of Dhanmondi Area in Dhaka city.

3.6 Study Period

The study was conducted during October to December 2015

3.7 Inclusion Criteria

- All the students from standard 6-10
- Those who were willing to participate in the study

3.8 Exclusion Criteria

- Those who were unfit to give information
- Those students who were using any kind of steroids during the data collection

3.9 Data Collection Tools

A semi-structured English questionnaire was used for the data collection. The students were filled out the questionnaires by themselves. Among 212 students 169 students filled out the questionnaire & rest of the students were either busy with their O'level exams, coaching or were on vacation.

3.10 Data Management & Analysis Plan

Data Entry & Cleaning

- The questionnaire was labeled and coded
- Data were cleaned and edited before analyzing

Statistical Analysis

- We analyzed the data using software R. Descriptive statistics were calculated for all of the variables, including continuous variables (presented as boxplots) and categorical variables (presented as frequencies).
- The unadjusted association between each categorical variable was evaluated by chi-square test.
- The results were reported by odds ratios (ORs) and corresponding 95 % confidence intervals (CIs). P-values less than 0.05 were considered statistically significant.

3.11 Ethical Considerations

Ethical approval from the study protocol was obtained from the North South University Review Committee and a written informed consent was obtained from all participants

CHAPTER IV

RESULT

A population based cross-sectional study was conducted among 129 students from two different English medium schools in Dhanmondi area to assess the prevalence and risk factors of being overweight or obese. In this study the data of weight and height of all students collected from school's health management data book. For the data collection, a semi-structured English questionnaire was used. The students were filled out the questionnaires by themselves. Among the respondents 63% were female whereas 66% of the respondents were male.

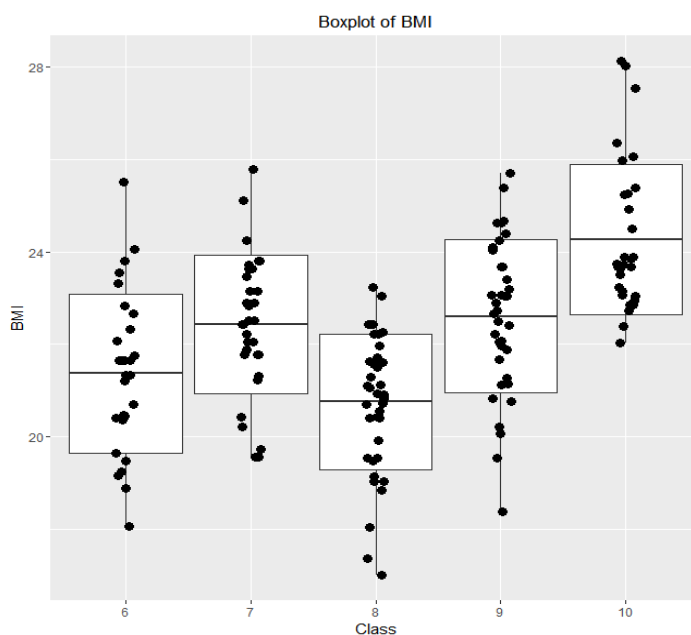
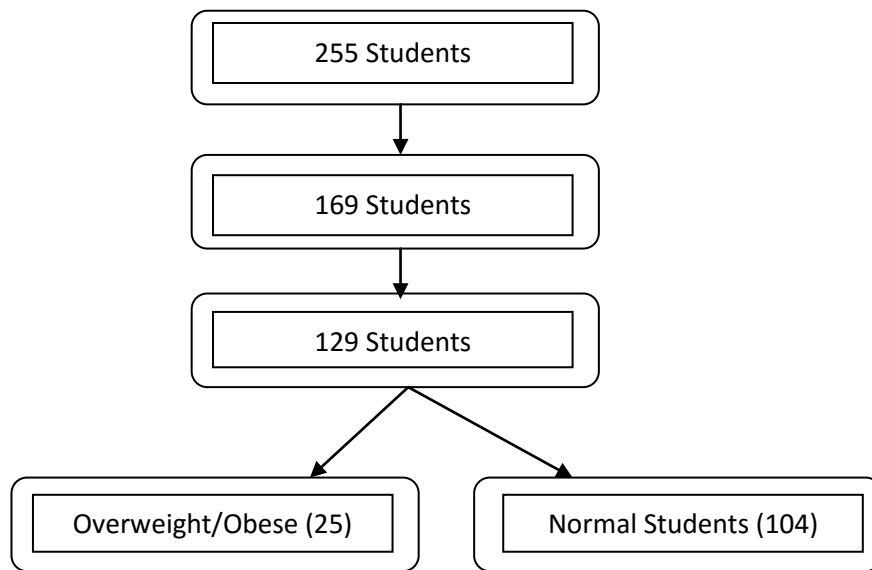


Figure:1

My study population was 212 English medium school students in total from class 6 to class 10 but among 212 students 169 students filled out the questionnaire & rest of the students were either busy with their O'level exams, coaching or were on vacation.

From the Figure 1 (boxplot for BMI) it appears that BMI value has decreased with the increase of age among the class 8 students. This represented wrong interpretation. As there might have information bias so I have decided to omit the observation regarding standard 8 students so I eliminated all the students of standard 8 (40 students) from my study. So after omitting standard 8 students my study population is 129 in total from class 6 to class 10. Here in Figure 1 BMI is considered as continuous variable.

From the result I have found 25 students are overweight or obese among the 129 students and the prevalence rate of overweight or obesity is 19.38%.



Flow Chart of the Data Collection Procedure: 1

Table 1: Socio-Demographic & Socio-Economic Characteristics

Variables		Overweight/Obesity		χ^2 Values	p-values
	Categories	Yes	No		
Sex	Female	13	52	0	1
	Male	12	52		
Father's Education	Below Graduation	10	41	1.2692e-31	1
	Graduation & Above	15	63		
Mother's Education	Below Graduation	10	59	1.6451	0.1996
	Graduation & Above	15	45		
Father's Occupation	Business	14	64	0.078829	0.7789
	Others	11	40		
Mother's Occupation	Housewife	11	50	0.0206	0.8859
	Working	14	54		
Monthly Family Income	<50000	7	20	0.4816	0.4877
	>=50000	18	84		

In table 1 attempts was made to show that mother's education is one of the major factors of being overweight or obese among the English medium school children. The group whose mothers were post-graduate showed higher risk of being overweight or obese than the mothers who were below graduate. So the result is statistically very close to significant as the p-value at 5% level of significance is 0.1996. Whereas there is no statistical significance of being overweight with sex, father's education, father's occupation, mother's occupation, monthly family income. No significant association was found between sex of school children and obesity or overweight, however the overall prevalence of overweight or obesity was found to be higher in females (13%) compared to males (12%).

Table 2: Behavioral Factors Associated With Overweight/Obesity

Variables		Overweight/Obesity		χ^2 Values	p-values
Categories		Yes	No		
Eat meals each day	≤ 3	18	65	0.43282	0.5106
	≥ 4	7	39		
Eat breakfast everyday	Irregular	16	61	0.068776	0.7931
	Regular	9	43		
Eat lunch everyday	Irregular	6	47	2.9154	0.08774
	Regular	19	57		
Intake of fast/junk food	Often	16	73	0.12978	0.7187
	Rarely	9	31		
Intake of soft drinks	Often	13	67	0.84577	0.3578
	Rarely	12	37		
Intake of sugary food	Often	15	57	0.060088	0.8064
	Rarely	10	47		
Distance of grocery shop from home	< 5 minutes	12	56	0.091579	0.7622
	≥ 5 minutes	13	48		
Regular physical activity at school	No	17	51	2.1962	0.1383
	Yes	8	53		
Duration of watching TV or playing video games	≤ 2 hours	9	57	2.1502	0.1425
	> 2 hours	16	47		
School transportation mode	Others	7	32	0.00079512	0.9775
	Vehicle	18	72		

In table 2 attempts has been made to associate the behavioural factors with overweight/obesity and it can be seen that the students who were regular about having their lunch are more prone of being overweight or obese than the students who don't take their lunch everyday. So the p-value 0.08774 is very close to significant which indicates the relationship between the eat lunch every day and being overweight or obese. Moreover the

students who spend time watching tv more than 2 hours they have high chance of being obese or overweight so the p-value 0.1425 which is significantly associated with overweight or obesity status.

Table 3: Health Related Factors Associated With Overweight/Obesity

Variables		Overweight/Obesity		χ^2 Values	p-values
Categories		No	Yes		
Depression	Often	7	36	0.15505	0.6938
	Rarely	18	68		

In table 3 attempts was made to find relationship between the health related factors with overweight or obese. The p-value is as follows 0.6938 which has no significant relationship between health related factors & overweight/obese status.

Table 4: Results From Multivariate Logistic Regression

Variable	Reference	Estimate	OR	LCL	UCL	p-values
Sex	Female	-0.20060	0.818	0.290	2.272	0.6993
Father's Education	Below Graduation	0.60260	1.826	0.575	5.978	0.3075
Mother's Education	Below Graduation	-0.58225	0.558	0.192	1.563	0.2706
Monthly Family Income	<50000	0.80634	2.239	0.671	7.286	0.1789
Eat meals each day	<=3	0.37894	1.460	0.518	4.447	0.4840
Eat breakfast everyday	Irregular	0.05885	1.060	0.379	3.055	0.9109
Eat lunch everyday	Irregular	-0.77546	0.460	0.139	1.345	0.1727
Intake of fast/junk food	Often	-0.07556	0.927	0.314	2.883	0.8926
Intake of soft	Often	-0.86216	0.422	0.143	1.208	0.1092

drinks

Intake of sugary food	Often	0.42828	1.534	0.504	4.912	0.4564
Distance of grocery shop from home	<5 minutes	-0.58630	0.556	0.202	1.482	0.2444
Regular physical activity at school	No	0.55246	1.737	0.606	5.234	0.3092
Duration of watching TV or playing video games	<=2 hours	-0.97687	0.376	0.122	1.075	0.0754
School transportation mode	Others	-0.46062	0.630	0.199	1.836	0.4112
Depression	Often	0.002988	1.002	0.303	3.124	0.9959

The results in Table 4 represented that 20% of below graduate mother's children have fewer chance of being overweight or obese. Moreover 62% of students are at less risk of being overweight/obese who watch tv less than 2 hours. In addition 10% the students who don't have lunch everyday have less chance of being overweight or obese.

CHAPTER V DISCUSSION

Childhood obesity has become a serious public health problem because of its strong association with adulthood obesity and the related adverse health consequences. Childhood obesity most likely results from an interaction of nutritional, psychological, familial, and physiological factors. Although there are studies available from India, Pakistan, Thailand, Malaysia, Beirut, China and the UK, no published information is available on the prevalence of childhood obesity in the Bangladeshi population. The present study was undertaken to find out the prevalence and risk factors associated with overweight or obesity among English medium school students of Dhanmondi area.

A prevalence of overweight or obesity (19.38%) has been found among the children. International literature has portrayed developing countries as having a relatively low prevalence of obesity coexisting with a high prevalence of underweight.¹¹⁵ Increasing economic development is often associated with an increasing prevalence of obesity. The present data suggests that Bangladesh is showing a similar trend regarding obesity.

In Bangladesh, social and environmental changes are also occurring rapidly in the upper, middle and poor class, resulting in lifestyles that incorporate the use of high energy density

diets and reduced physical activity.¹¹⁶ Such changes in lifestyle are resulting in a higher prevalence of overweight and obesity especially among the children in our country.

High-energy intake, and particularly fat intake during lunch time, is a major contributor to the development of overweight or obesity. Access of more food and less physical activities contributed to the higher prevalence of obesity/were associated factors.

In this study we found that there was no significant associated risk factor found in the overweight groups when adjusted with sex, household income and parents' occupation whereas The group whose mothers were post-graduate showed higher risk of being overweight or obese than the mothers who were below graduate in the present study. No significant association was found between sex of school children and obesity or overweight, however the overall prevalence of overweight or obesity was found to be higher in females (13%) compared to males (12%).

From the study it can be seen that the students who were regular about having their lunch are more prone of being overweight or obese than the students who don't take their lunch everyday. So the p-value 0.08774 is very close to significant which indicates the relationship between the eat lunch every day and being overweight or obese. Moreover the students who spend time watching tv more than 2 hours they have high chance of being obese or overweight so the p-value 0.1425 which is significantly associated with overweight or obesity status.

There was no significant relationship between health related factors & overweight/obese status. Its also showed from the study that 20% of below graduate mother's children have fewer chance of being overweight or obese. Moreover 62% of students are at less risk of being overweight/obese who watch tv less than 2 hours. In addition 10% the students who don't have lunch everyday have less chance of being overweight or obese.

CHAPTER VI

CONCLUSION & RECOMMENDATION

This epidemiological survey was conducted to find the prevalence and risk factors of being overweight or obese among English medium school children of Dhaka City of Bangladesh. This study has found that prevalence of overweight or obese (19.38%) exist in English medium schools children in Dhaka, Bangladesh. From this study it is obvious that overweight among English medium school is considerably high in a developing country perspective. It was found that the physically less active lifestyle with food habit of high energy yield was more related to overweight among English medium school students. Excessive use of computer, less access to play ground and sports are other notable risk factors for students with overweight. Hence idle overuse of computer for games, and watching TV can be reduced by parent. Instead a variety of physically active recreational activities and healthy dietary practices should be encouraged through School Health Service.

RECOMENDATIONS

The present study was a population based one which provides baseline data regarding the prevalence and risk factors of childhood overweight and obesity. Therefore this study contributes to appropriate prevention approaches and suggestions to address these problems. The result of the current study may lay the foundation of awareness to develop policies in order to address the challenges to prevent childhood overweight and obesity. It could contribute to all phases of prevention strategies in this population. Primary management aims

at a modification of the risk factors such as sedentary lifestyle and food habit and the high risk of children to reduce the occurrence overweight. Furthermore, weight management to control weight, such as changing the food habit or lifestyle, to prevent obesity and improve the quality of life could also be developed. It can also enhance the parents concern of obesity prevention. Moreover, associated factors identified in our study are expected to be similar with other Bangladeshi children in other parts of the country or Bangladeshi overseas immigrants. Therefore, similar interventions and prevention suggestions can be made for Bangladesh in general.

As explained in the beginning, prevention is the most cost-effective method to deal with these problems. Extensive prevention and control of lifestyle factors in the society is, in fact, not simply a research issue anymore, but needs the cooperation and effort of family, media and society. This is the only the feasible approach to help reverse the negative trends of overweight and obesity.

In a society like Bangladesh, where the resources are already diminutive relative to its population size, the increasing life expectancy and elevated prevalence of diabetes, heart disease, hypertension and many others disease dramatically raise the burden and expenses of the health care system. In order to prevent this burden the community needs to be mobilized. So everybody needs to be aware of the risk factors.

Additional obesity prevalence surveys should be carried out in different socioeconomic classes in Bangladesh at regular intervals in order to be able to assess the probable rate of increases childhood obesity. Also, public health intervention should be focused on the control and prevention of obesity in children through an integrated community approach.

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APPENDICES

APPENDIX-A

INFORMED DECISION MAKING CONSENT FORM

NORTH SOUTH UNIVERSITY

Code: -----

Date: ----/----/ ----

Name of the respondent-----

I am Rashenda Aziz, student of MPH program, North South University. As a course requirement I am doing a research on **“Prevalence and risk factors of being overweight or obese among English medium school students of Dhanmondi, Dhaka: A population-based cross-sectional study”**.

I am inviting you to participate in this research study.

I need some valuable information from you as a part of my academic purpose. Your co-operation will be highly appreciable. You can refuse to answer any questions or may leave any time you feel like. If you refuse to leave you will not face any problem.

All the information given by you will be kept confidential. Your identity will not be disclosed. Only study-related personnel will be allowed to see the information.

I would appreciate your cooperation. If you agree to join the study please sign at the space indicated below.

Volunteer Signature
Name
Date

Witness Signature
Name
Date

Investigator's Signature
Date

APPENDIX-B

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QUESTIONNAIRE

APPENDIX-C

“Prevalence and risk factors of being overweight or obese among English medium school students of Dhanmondi, Dhaka: A population-based cross-sectional study”

Date:

Part I: Background

1. Name:
2. Contact no (if applicable):
3. Name of School:
4. Class:
5. Roll:
6. Section:
7. Present Address:
.....
8. Cell or phone number (Father/Mother):

Part II: Socio-Demographic Factors

9. Student's Age:
10. Student's Sex: (1) Male (2) Female
11. Body Weight:Kg
12. Height: Feet andcm
13. Family members:
14. Father's Education: (1) No education (2) Primary school (3) Secondary school (4) Diploma (5) Bachelor (6) Masters (7) PhD
15. Mother's Education: (1) No education (2) Primary school (3) Secondary school (4) Diploma (5) Bachelor (6) Masters (7) PhD
16. Father's Occupation: (1) No job (2) Business (3) Doctor (4) Engineer (5) Government officer (6) Others
17. Mother's Occupation: (1) No job (2) Household (3) Business (4) Doctor (5) Engineer (6) Government officer (7) Others
18. Marital Status of Parents: (1) Living together (2) Living separately (3) Divorced (4) Father died (5) Mother dies (6) Parents dies (7) Others

19. Monthly Family Income: (1) <10000 (2) 10000-20000 (3) 20000-30000 (4) 30000-40000 (5) 40000-50000 (6) >50,000

20. Are of living:

Part III: Dietary Habits

21. How many meals do you usually eat each day?

1. One
2. Two
3. Three
4. Four

22. Do you eat something for breakfast every day?

1. Yes
2. No
3. Sometimes
4. I skip breakfast

23. Do you eat something for lunch every day?

1. Yes
2. No
3. Sometimes
4. I skip lunch

24. If “Yes” then where do you typically eat your lunch?

1. Out usually at a Restaurant
2. Take food from home
3. At school canteen
4. I skip lunch

25. Do you eat something for evening every day?

1. Yes
2. No
3. Sometimes
4. I skip evening snacks

26. Do you eat something for dinner every day?

1. Yes
2. No
3. Sometimes
4. I skip dinner

27. How often do you eat take-out dinners?

1. Every night
2. Twice a week
3. Once a week
4. Once a month
5. Never

28. How often do you eat this kind of food below?

Everyday: 7 days per week, Often: 4-6 days per week, 1-3 days pr week, Never eat

Food Items	Never	Sometimes	Often	Everyday
Fast food/ Junk Food				
Fried food, fried chicken, fried potatoes, roasted beef, burger, sandwich, fried sausages, fried chicken ball, pasta, pizza				
Drinks/beverages				
Full cream milk, chocolate milk				
Ovaltine, Milo				
Soft drinks (sprite, coke, 7up, mirinda)				
Fruit Juice,				
Sweets				
Chocolates, ice-cream, muffins, chocolate cake, pastry, cupcake				

29. What time do you usually have the last meals of the day?

1. <7 pm
2. 7-8 pm
3. 9-10 pm
4. >10 pm

30. What is the distance from your home to grocery shop

1. Walking distance
1. 5-10 minutes
2. 20-30 minutes
3. More than 30 minutes

31. If you skip a meal, which meal is it usually?"

1. Breakfast
2. Lunch
3. Dinner

32. How much do you usually have per day from your parents as pocket money (mention in tk)

Part IV: Physical Activities

33. Do you have regular physical activities at school?

1. Yes
2. No

34. If "Yes" then what kind of physical activities do you have at school? (Tick all that apply)

1. None
2. School Sports
3. Cycling
4. Swimming

5. Fitness Camps
 6. Housework
 7. Walking/Riding to School
 8. Play groups
 9. Summer Camps
 10. Out-of-School Sports (eg. football, gymnastics, basketball etc)
 11. Walk-in a park
 12. Family Outings
 13. General Playing
- 35.** Duration of physical activities each day- option hours
1. 30 minutes
 2. 1 hours
 3. More than 1 hour
- 36.** How many days in a week have physical activities?
1. Never or rarely
 2. 1-2 times
 3. 3-4 times
 4. 5 or more times
 5. Don't know
 6. No idea
 7. None
- 37.** Do you have regular physical activities in home?
1. Yes
 2. No
- 38.** If "Yes" then how many times do you spend on doing physical activities in home?
1. 30 minutes
 2. 1 hours
 3. More than 1 hour
 4. None
- 39.** How many times per week do you play sport such as football, running, basket ball, badminton, swimming, tennis..?
1. Never
 2. < 3 times
 3. ≥ 3 times
 4. Others.....
- 40.** How long per times do you usually spend for playing above sports?
1. < 20 mins
 2. ≥ 20 min
 3. None
 4. Others.....
- 41.** How many times per week do you have activities such as: walking, bicycling, housework
1. Never
 2. < 5 times
 3. ≥ 5 times
 4. None

42. How long per time do you usually spend for above activities?
1. < 30 minutes
 2. ≥ 30 minutes
 3. None

Part V: Sedentary Lifestyles

43. What do you think about how many hours do you estimate to sit and watch TV or video games/ reading books, computing on an average in a school day?
1. Less than 1 hour
 2. 1-2 hours
 3. 3-4 hours
 4. 5 or more hrs
 5. None
 6. Don't know
 7. Others
44. Playing video games, watching TV, or spending time on the computer instead of playing outside or participating in a sport has a major role in causing obesity?
1. Yes
 2. No
 3. Don't know
 4. No idea
45. Do you usually have food during the time of watching TV or playing video games or reading books?
1. Yes
 2. No(if the answer is "no" skip to question no.49)
46. If "Yes" What kind of food do you have during the time of watching TV?
1. Sweet/Cake
 2. Snacks
 3. Fast food
 4. Soft drink

47. What do u usually do in your leisure time? (Choose only 1 answer)
1. Vigorous physical activity such as football, running, basketball, badminton, swimming, tennis, and other sport
 2. Moderate physical activity such as: walking, cycling, housework, gardening
 3. Passive entertainment activities such as: go on internet, chatting, computer game, reading book
 4. Watching TV
 5. Other, please specify
48. How do you usually go to school/ back from school to home every day?
1. By car/bus
 2. By motorbike
 3. By Bicycle
 4. On foot

Part VI: Health Related Factors

49. Did you previously take any medicine (like steroids) for any diseases?
1. Yes

2. No
3. Sometimes
4. Never

50. Are you currently taking any medicine (like steroids)?

1. Yes
2. No
3. Sometimes
4. Never

51. Did you ever feel depressed? (If “No” then skip the questions 50 & 51)

1. Yes
2. No
3. Sometimes
4. Never

52. If “Yes” then do you take food to beat depression?

1. Yes
2. No
3. Sometimes
4. Never

53. If “Yes” then what type of food do you usually eat to beat depression?

1. Sweets/ Chocolates/
2. Fast food/junk food
3. Drinks/ beverages
4. Others if any please
specify.....

**“Thank you very much for taking the time to complete this questionnaire,
your views are very important to us”.**

APPENDIX-D

cÖkægvi

ÒXvKvi avbgwÛZ Bs†iwR gva" g we"vjq,†jvi QvÎ-QvÎx†i g†a" gvÎvwZwi³ IRb ev Lye †ewk †gvUv nIqvi e"vcKZv I SuzwKi welq,wji RbmsL"v wfwËK GKwU cÖ"†Q` M†elYvÓ

ZvwiLt

Ask-1 t cUf~wg

- 1| t
bvg
- 2| AvBwW bs t
3| t
we"vj†qi bvg
- 4| †kÖYx t
5| †ivj t
6| †mKmb t
7| t
eZ©gvb wVKvbv
- 8| †gvevBj bv∩^vi (evev/gv)t

Ask-2 t Av ©-RbmsL"vZvwËK welq,wj

- 9| QvÎ/QvÎxi eqm t
10| QvÎ/QvÎxi wj½ t (1) †Q†j (2) †g†q
11| kix†ii IRb t †KwR
12| D"PYv t dzU Ges †m.wg.
13| cwiev†ii m`m"msL"v t
14| wcZvi wkÿvMZ †hvM"Zv t (1) wkwÿZ bv (2) cÖv_wgK we"vjq
(3) Gm.Gm.wm.
(4) wW†cøvgv/GBP.Gm.wm (5) ¯ævZK (6)
gv÷vm© (7) wc.GBP.wW
15| gvZvi wkÿvMZ †hvM"Zv t (1) wkwÿZ bv (2) cÖv_wgK we"vjq
(3) Gm.Gm.wm.
(4) wW†cøvgv/GBP.Gm.wm (5) ¯ævZK (6)
gv÷vm© (7) wc.GBP.wW
16| wcZvi †ckv t (1) †Kvb wKQBz K†ib bv (2) e"emvq (3) Wv³vi
(4) BwÄwbqvi (5) miKvwi Kg©KZ©v (6) Ab"wkQz
17| gvZvi †ckv t (1) †Kvb wKQzB K†ib bv (2) M,,wnbx (3) e"emvq
(4) Wv³vi (5) BwÄwbqvi (6) miKvwi Kg©KZ©v (7)
Ab"wkQz
18| gvZv-wcZvi ^eevwnK m∩úK© t (1) GK mv†_ _vKv (2) Avjv`v

_vKv (3) ZvjvKcÖvß

(4) wcZv g,,Z (5) gvZv g,,Z (6) wcZv-gvZv

Dfq g,,Z (7) Ab"wkQz

19| gvwmK cvwievwii Avq t (1) 10,000†_†K Kg (2) 10,000-20,000

(3) 20,000-30,000

(4) 30,000-40,000 (5) 40,000-50,000 (6) 50,000 †_†K †ewk

20| Avcwb †Kv_vq_v†Kb ?

.....

Ask-3 t Lv" Af"vm

21| Avcwb cÖwZw`b KZevi Lvevi Lvb ?

(1) GK (2) `yB (3) wZb (4) Pvi

22| Avcwb wK cÖwZw`b mKv†ji Lvevi wnmv†e wKQz Lvb ?

(1) n"uv (2) bv (3) gv†S gv†S (4) Avwg mKv†j Lvevi LvB

bv

23| Avcwb wK cÖwZw`b `ycy†ii Lvevi wnmv†e wKQz Lvb ?

(1) n"uv (2) bv (3) gv†S gv†S (4) Avwg `ycy†ii Lvevi LvB

bv

24| hw` Òn"uvÓ Zvn†j mvaviYZ `ycy†i †Kv_vq LvIqv nq ?

(1) mvaviYZ †i÷z†i†>U (2) evmv †_†K Lvevi wb†q Avwm (3)

¯<zj K"vw>U†b (4) Avwg `ycy†i LvB bv

25| Avcwb wK cÖwZw`b mÜ"v†ejvi Lvevi wnmv†e wKQz Lvb ?

(1) n"uv (2) bv (3) gv†S gv†S (4) Avwg mÜ"v†ejvi Lvevi

LvB bv

26| Avcwb wK cÖwZw`b iv†Zi Lvevi wnmv†e wKQz Lvb ?

(1) n"uv (2) bv (3) gv†S gv†S (4) Avwg iv†Zi Lvevi

LvB bv

27| Avcwb wK cÖvqB iv†Z evB†i Lvb ?

(1) cÖwZ iv†Z (2) mßv†n `yBevi (3) mßv†n GKevi (4) gv†m

GKevi (5) KL†bvB LvB bv

28| wb†Pi Lvevi,wj Avcwb cÖvqB KZevi Lvb ?

(1)cÖwZw`bt mßv†n 7 w`b, (2) cÖvqBt mßv†n 4-6 w`b, (3)

mßv†n 1-3 w`b, (4) KL†bvB LvB bv

Lv" ZvwjKv	KL†bvB bv	gv†S gv†S	cÖvq B	cÖwZw`b
dv÷ dzW/Rv¼ dzW				
fvRv Lvevi, d&³vBW wP†Kb, Avjy d&³vBW, exd †iv÷,				

evM©vi, m·vûDBP, d&ªvBW m‡mR, d&ªvBW wP‡Kb ej, cv¯İv, wcRv				
cvbxq				
`y‡ai wµg, PK‡jU `ya				
I‡fjUvBb, wg‡jv				
‡Kvgj cvbxq (¯úªxU, ‡KvK,‡m‡fb Avc, wgwıûv)				
d‡ji Rym				
wgw÷ RvZxq Lvevi				
PK‡jU, AvBPwµg, gvwdb, PK‡jU ‡KK, ‡cw÷ª, Kvc‡KK				

29| w`‡bi ‡kl Lvevi KLb Lvb ?

(1) ivZ 7Uvi Av‡MB (2) ivZ 7 Uv-8Uvi g‡a" (3) ivZ 8Uv-9Uvi g‡a" (4) ivZ 10Uvi c‡i

30| Avcbvi evmv ‡_‡K gyw` ‡`vKv‡bi `yiaZi KZ ?

(1) cv‡kB (2) 5-10 wgw‡Uı c_

(3) 20-30 wgw‡Uı c_ (4) 30 wgw‡Uı ‡ewk `y‡ii c_

31| hw` Avcw‡ ‡Kvb GKwU Lvevi ev` ‡`b, ‡mUv mvavibZ ‡Kvb Lvevi ?

(1) mKv‡ji Lvevi (2) `ycy‡ii Lvevi (3) iv‡Zi Lvevi

32| Avcw‡ cÖwZw`‡bi nvZ LiP wnmv‡e eev/gv‡qi ‡_‡K mvavibZ KZ UvKv ‡bb ?

(UvKvq D‡jØL Kiæb)

Ask-4 t kvixwiK KvH©µg

- 33| Avcwb wK ¯<z†j cÖwZw`b kvixwiK KvH©µg K†ib ?
(1) n`uv (2) bv
- 34| hw` Òn`uvÓ nq, Zvn†j ¯<z†j wK wK ai†bi kvixwiK KvH©µg K†ib ?
(hv hv K†ib †m,wji meKqwU†Z wUK wPý w`b)
(1) †KvbwU bq (2) ¯<z†ji †Ljvayjvq Ask MÖnY (3) mvB†Kj Pvjv†bv (4) mvZvi KvUv
(5) wdU†bm K`vóú (6) evwoi KvR (7) †n†U ¯<z†j hvIqv (8) `j †e†a †Ljv Kiv
(9) MÖx®§Kvjxb K`vóú (10) ¯<z†ji evB†ii †Ljvayjvq Ask MÖnY (11) cv†K© nvUv
(12) cwiev†ii mv†_ ágb (13) mvavib †Ljvayjv
- 35| cÖwZw`b KZ mgq a†i kvixwiK KvH©µg K†ib ?
(1) 30 wgwU (2) 1 N>Uv (3) 1 N>Uvi †ewk
- 36| mßv†n Kq w`b kvixwiK KvH©µg K†ib ?
(1) LyeB Kg (2) 1-2 w`b (3) 3-4 w`b (4) 5 w`†bi †ewk
(5) Rvwb bv (6) †Kvb aviYv †bB (7) †KvbwUB bq
- 37| Avcwb wK cÖwZw`b evwo†Z kvixwiK KvH©µg K†ib ?
(1) n`uv (2) bv
- 38| hw` Òn`uvÓ nq, Zvn†j evwo†Z KZ mgq kvixwiK KvH©µg K†ib ?
(1) 30 wgwU (2) 1 N>Uv (3) 1 N>Uvi †ewk (4) †KvbwUB bq
- 39| mßv†n Kq evi †Ljvayjv K†ib (†hgb, dzUej,†Šo,ev†¯<U ej,e`vWwg>Ub,mvZvi,†Uwbm)?
(1) KL†bvB bv (2) 3 ev†ii Kg (3) 3 evi ev 3 ev†ii †ewk (4) Ab` wKQz.....
- 40| cÖwZevi †Ljvayjvq m†e©v`P KZ mgq e`q K†ib ?
(1) 20 wgwU†Ui Kg (2) 20 wgwU ev 20 wgwU†Ui †ewk (3) †KvbwUB bq (4) Ab` wKQz.....
- 41| mßv†n KZ evi nvUvnvU, mvB†Kj Pvjv†bv Ges evwoi KvR K†ib ?
(1) KL†bvB bv (2) 5 ev†ii Kg (3) 5 evi ev 5 ev†ii †ewk (4) †KvbwUB bq
- 42| cÖwZevi KvH©µ†g m†e©v`P KZ mgq e`q K†ib ?
(1) 30 wgwU†Ui Kg (2) 30 wgwU ev 30 wgwU†Ui †ewk (3) †KvbwUB bq

Ask-5 t ^vfvweK Rxebaviv

43| Avcbvi g†Z, ¯zj †Lv jv _vK†j w`†b M†o KZ N›Uv wUwf †`Lv / wfwWI †Mg / eB cov / KwóDUvi Pvj†bvi Rb` ivLv DwPr ?

(1) 1 N›Uvi Kg (2) 1-2 N›Uv (3) 3-4 N›Uv (4) 5 N›Uv ev 5 N›Uvi
†ewk

(5) †KvbwUB bq (6) Rvwbbv (7) Ab` wKQz

44| wfwWI †Mg †Ljv, wUwf †`Lv Ges KwóDUvi Pvj†bvi
cwie†Z© evwn†i †Ljvayjv Kiv A_ev evB†ii †Ljvayjvq AskMÖnY
Kiv †g` Kgv†Z h†_ó f~wgKv iv†L ?

(1) n`uv (2) bv (3) Rvwb bv (4) †Kvb aviYv †bB

45| Avcwb wK mvaviYZ wfwWI †Mg †Ljv/wUwf †`Lv/eB covi
mgq †Kvb Llevi Lvb ?

(1) n`uv (2) bv (DËi hw` ÒbvÓ †`b, Zvn†j 46 cÖkœ ev` w`b)

46| hw` Òn`uvÓ nq, Zvn†j wUwf †`Lvi mgq †Kvb ai†bi Llevi Lvb ?

(1) wgw÷/†KK (2) ¯œ`vK (3) dv÷ dzW (4) cvbxq Llevi

47| Avcwb Aemi mg†q wK K†ib ? (iaygvÎ 1Uv DËi w`†eb)

(1) wewfbœ ai†bi kvixwiK KvH©Kjvc (†hgbt dzUej,†`Šo,ev†`U
ej,e`vWwg›Ub,mvZvi,†Uwbm)

(2) nvUvnvwU, mvB†Kj Pvj†bv Ges evwoi KvR, evMv†b KvR
Kiv

(3) we†bv`b g~jK KvH©Kjvc †hgbt BbUvi†bU, P`vwUs,
KwóDUvi †Mg, eB cov

(4) wUwf †`Lv

(5) Ab` wKQy n†j, `qvK†i D†jØL Kiæb

48| Avcwb cÖwZw`b wK†m K†i ¯z†j hvb Ges wd†i Av†mb ?

(1) evm (2) gUi evBK (3) evB mvB†Kj (4) cv†q †n†U

Ask-6 t ¯^v` welqK

49| Avcwb wK c~†e© †Kvb †iv†Mi Rb` †Kvb ai†bi †gwWwmb
wb†q†Qb ? (†hgbt †÷i†qW wb†q†Qb)

(1) n`uv (2) bv (3) gv†S gv†S (4) KL†bvB bv

50| Avcwb wK eZ©gv†b †Kvb †iv†Mi Rb` †Kvb ai†bi †gwWwmb
wb†`Qb ? (†hgbt †÷i†qW)

(1) n`uv (2) bv (3) gv†S gv†S (4) KL†bvB bv

51| Avcwb wK KLbI welbœZv Abyfe K†i†Qb ev K†ib ? (hw` ÒbvÓ
DËi †`b, Zvn†j 52 Ges 53 cÖkœ ev` †`b)

(1) n`uv (2) bv (3) gv†S gv†S (4) KL†bvB bv

52| hw` DËi Òn`uvÓ e†jb, Zvn†j welbœZv Kgv†bvi Rb` Avcwb wK
†Kvb Llevi Lvb ?

(1) n`uv (2) bv (3) gv†S gv†S (4) KL†bvB bv

53| hw` DËi Òn`uvÓ e†jb, Zvn†j welbœZv Kgv†bvi Rb` Avcwb
mvaviYZ †Kvb ai†bi Llevi Lvb ?

(1) wgw÷/PK†jU (2) dv÷ dzW/R`vb&K dzW

(3) cvbxq Lvevi (4) Ab" wKQy n†j, `qvK†i D†jøL
Kiæb



Ò cÖkæ,wj mæúbæ Ki†Z mgq †`Iqvi Rb" Avcbv†K
A†bK A†bK ab"ev`, Avcbvi gZvgZ Avgv†`i Rb" LyeB
. - ~ ~ ~

Rashenda Aziz Mohona

Personal Detail:

Father's name: Dr. AzizurRahmanJoardar (Ultrasonologist)

Mother's name: Dr. Prof. Merinakhanam (Gynecologist, Former Head of the
Dept of Dhaka &Rajshahi Medical College)

Date of Birth: 25thJanuary, 1987

Nationality: Bangladeshi

Religion: Islam

Marital status: Unmarried

NavanaVeneziane, House # 43, Road # 9/A, Flat # A-1Dhanmondi, Dhaka-1209,

Contact No: +88-0172-5777687, E-mail: mohona.aziz@yahoo.com

Career Aspiration:

To pursue a highly rewarding career, seeking for a job in challenging and
healthywork environment where I can utilize my skills and knowledge efficiently
for organizational growth.

Educational Background:

- 2013- Masters in Public Health, North South University, Dhaka
- 2015
- 2007- Bachelor of Social Science in Media Studies & Journalism, University
- 2011 Liberal Arts Bangladesh, Dhaka
- 2005 H.S.C, Lalmatia Women's College (Dhaka), Dhaka Board
- 2003 S.S.C. P.N. Girls High School (Rajshahi), Rajshahi Board

Volunteer Work:

- Surveyor for Department of Public Health North South University: Survey on the knowledge, Attitude and Practice on Waste Management among the Visitors of Cox's Bazaar and survey on the Level of patients' Satisfaction on Health Service Management at Hope Foundation, Cox's Bazaar.
- Visited Old-age home named ProbinBhaban and Hospital, Agargaon, Sher-e- Banglanagar, Dhaka and distributed winter clothes and food among the older people.

Professional Skills:

Prioritizing tasks & time management, Decision-making, Effective organizational, interpersonal and communication skills; Ability to meet deadlines and work under pressure; Ability to work both individually and as part of a team; Excellent written analytical skills; Good problem solving skills; Ability to perform detailed work of a confidential nature and/or to handle a large volume of work systematically, effectively and accurately, Ability to deal patiently and tactfully with people of different national and cultural backgrounds, Ability to work in a multicultural environment

Technical competency:

- Standard knowledge of MS Word, Excel, PowerPoint, Outlook
- Good command of social media
- Bangla Typing

Language Competence:

- English - very good
- Bengali – excellent
-

Fields of Work:

- **April 2010-** Successfully participated in a video documentary on Disaster Risk Reduction “**MrittuParey Bari-Life in the Shore of Death**” jointly organized by Concern Universal Bangladesh (CUB) & The University of Liberal Arts Bangladesh (ULAB)
- **June 2014-** Conducted 5 days training for field investigators of SMC project-“**To evaluated the knowledge and effectiveness of community sales agent activities in selected study areas**”
- **July 2014-** Worked as **Quality Controller** in field for the SMC project-“**To evaluated the knowledge and effectiveness of community sales agent activities in selected study areas**”

Employment Record:

Nov 2015-Present **Children's Hope (CH)**

Program Supervisor, Education (Child Focused Integrated Development Program)

Job Responsibilities:

- Visit home and meet the students on a regular basis, Meet school teachers and pay monthly school fees, Supervise and monitor academic performance of the university applicants, Verify academic expenses of both undergraduate, Higher secondary students and School students, Carry out university, college and school sessions, Notice student's attendance, Visit homes of referred and other students in order to counsel and monitor their activities, Visit RP session at Vashantak, Karail and Mirpur, Carry out regular home visits as scheduled responsible home visitor and review updated info's to the RP concerned, Meet nutrition officers and perceive Nutrition activity both in Mirpur, Vashantak and Karail, Review the updates of student's attendance, Notify irregular students at nutrition session, Meet nutrition officer and following up Nutrition activity both in Mirpur, Vashantak and Karail, Inform the RPs concerned and meet the irregular students at nutrition session, Liaise with Nutrition Officer and get the updates of students attendance, Meet students at Karail field office and doing, Attend regular health & nutrition sessions Others, Arrange potential supports and meet for EE staff development program of CH, work on CH lift let, CH students profile and also upcoming Eid greeting card.

Aug 2014-Sep 2015 **Friendship Bangladesh**

USAID Fellow – Capacity Development & Quality),

Health**Job Responsibilities:**

Conducted Friendship Medic-Aide (FCM) basic training at different hard to reach areas such as-Kurigram, Gaibandha,Chalna,Shyamnagar, Prepared training budget, Prepared monthly and annual training plan, Prepared exam questions, Checked pre-test and post-test exam papers, Prepared pre-test and post-test result sheet, Evaluation sheet ,and Reviewed handbook of FCM (Friendship Community Medic-Aide), Assisted in preparing training report for FCM, Planed and prepared logistical arrangements, Provided logistical support during trainings,Supervised and monitored the field training, Supervised field stuffs.

Jan 2014-August 2014

Eminence

Management Trainee Officer, Maternal, Newborn and

Child Health**Job Responsibilities:**

Assisted in report writing, Assisted to provide training of data collectors,

Ensured quality control of primary data during field survey,
Prepared questionnaire, prepared training and travel related budgets,
Arranged conference, Prepared meeting minutes, Handled administrative support, Prepared presentations and worked on MS Office and the Internet.

Training:

- Currently attending training as “**Trainee**” in USA based health company “**Augmedix**”
- Working as “**Team Leader**” with “Sparks-Nurturing Leaders”
- September 2014-Attended 12 days training on “**Training of Trainers**” organized by **Bangladesh Institute of Management (BIM)**

Conference/Seminar/Short Course:

- **September 16-18, 2011:** Attended Millennium Campus Conference (MCC), arranged by Millennium Campus Network, the Jenzabar Foundation, and Hewlett-Packard, at Harvard University Campus in Boston.
- **19-22 March, 2014:** Attended & organized Global Conference on Community organized by Health PARTNERS for World Health Eminence at NababNawab Ali Chowdhury Senate Bhaban, University of Dhaka, Bangladesh.
- **March 9-12, 2015:** Participated Short course on “Core Elements of Counselling for Sexuality, Sexual and Reproductive Health, and Rights (SRHR) organized by brac&icddr,b; funded by USAID’s The Next Generation Public Health Experts Project (NGPHEP) James P. Grant School of Public Health, Brac University at James P. Grant School of Public Health, BRAC University, ICDDR, B Bhaban (5th Floor), Dhaka, Bangladesh.
- **10-11 December, 2015:** Attended Third International Conference on Global Public Health organized by ICOPH at Colombo, Sri Lanka.

Publications:

- “**Growing up healthy**” in Dhaka Tribune
- “**Childhood Obesity: A public health problem**” in Daily Star

Member:

- BYF (Bangladesh Youth Forum) – March 10, 2011- Present
- Quantum Graduate and Member of Quantum Meditation Foundation – 2nd January, 2010 - Present

Internship:

- **1st June-20th August 2011-** Completed Bachelor’s Internship on “Customer service department” at Adverting agency “Dhansiri Communications Limited”.
- **March 2015 -** Completed Master’s internship on “Hospital Management and Programme Management” at Bumrungrad International Hospital,

Bangkok, in Thailand.

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Prevalence of primary dysmenorrhea & its associated symptoms amongst IMS medical students (Malaysians) and BBH nursing students (Indians) : A comparative study

Nur Kamalia Iqma Bt Ahmad Kamal *, Nur Aina Bt Ab Kadir*, Suryanarayan SP, Patki.PS.

*Medical students.

(Department of Community medicine, International Medical School, Bangalore, India.)

ABSTRACT

Objectives: To study the prevalence of primary dysmenorrhea & its associated symptoms among students from Malaysia & India and to study the relationship between selected risk factors (race, culture, eating habits) with prevalence of primary dysmenorrhea.

Study design: Comparative randomised study

Setting and Participants: 100 female medical students of International Medical School (Malaysian) & 100 female nursing students of Bangalore Baptist Hospital (Indians) aged between 18-25 years old.

Statistical analysis: Percentages and Chi-square test.

Results: The prevalence of dysmenorrhoea in Indian students was found to be 80%, meanwhile only 65% among Malaysians. $P = 0.018$. Severity of dysmenorrhea is higher in Indian (25%) compared to Malaysian (22%). $P = 0.008$. The most common symptom during menstruation for both groups is lethargy and tiredness. Indians 76 %, Malaysians 78%.

The three most common symptoms during menstruation for Indian and Malaysian are found to be different. For Malaysians, it is lethargy& tiredness (78%), mood swings (71%) and acne (65%) while for Indians, lethargy& tiredness (76%), inability to concentrate (43%) and sleeplessness (42%). Indians that has dysmenorrhea are more likely to also have lethargy and tiredness (86.8%, $p = 0.002$) compared to Malaysians (66.7%, $p = 0.511$). Only 30% of Indians take non vegetarian diet daily compared to Malaysians (99%).

Both groups practice taking warm bath during menstruation as regular general measure, but the percentage is significantly higher among Indian (92%) compared to Malaysians (77%). $P = 0.003$. Prevalence of dysmenorrhea among Malaysians is the most in overweight group (83.3%) meanwhile in Indians population it is higher in obese group (100%). Thus, for both groups, increase in prevalence of dysmenorrhea is positively correlated to higher BMI. There are no relationship between age of menarche and duration of menstruation with prevalence of dysmenorrhea.

Conclusion: The finding of this study shows that, prevalence of dysmenorrhea and its associated symptoms is significantly different among races. Knowledge of the possible risk factors contributing to this result can be used in further researches regarding dysmenorrhea. It also indicates the importance of the problems and the need for appropriate intervention through a change in lifestyle and increase in awareness of general care during menstruation.

INTRODUCTION

Dysmenorrhea is defined as difficult menstrual flow or painful menstruation. It is one of the most common gynecologic complaints in young women who present to clinicians.

Primary dysmenorrhea is defined as menstrual pain that is not associated with macroscopic pelvic pathology (ie, occurs in the absence of pelvic disease). It typically occurs in the first few years after menarche and affects as many as 50% of postpubertal females.

According to journal 'A prevalence study of dysmenorrhoea among university students in Malaysia' by Htut, Amran and Shukri in 1996¹, it shows that prevalence of dysmenorrhoea was 58% and 40% within one year after menarche among Malaysian university students.

A dysmenorrhea incidence of 33.5% was reported by Nag (1982)², among adolescent girls in India. The true incidence and prevalence of dysmenorrhea are not clearly established in India. In recent times, George and Bhaduri, concluded that dysmenorrhea (87.87%) is a common problem in India (2002)³. Similar findings had been reported by Jayashree and Jayalakshmi, in rural married women of Andhra Pradesh⁴.

Both studies above show the prevalence of dysmenorrhea in Indians & Malaysian female population. But, currently there is no study that compares prevalence of dysmenorrhea between these two races or between any other races. Our study aimed to investigate between Malaysian & Indian, which group has higher prevalence of primary dysmenorrhea. If the difference is significant in one of the group, this will bring out questions on what possible risk factors that can contribute to it, such as genetics, eating habits, BMI and more. The knowledge of these possible risk factors can be used in deeper researches about different races and prevalence of dysmenorrhea with its associated symptoms.

According to other studies :-

Dysmenorrhea is found to be highly prevalent among college going girls. Family history, bleeding duration and presence of clots were significant risk factors for dysmenorrhea.⁵

The prevalence of dysmenorrhea in adolescent girls was found to be 79.67%. Most of them, 37.96%, suffered regularly from dysmenorrhea severity. The three most common symptoms present on both days, that is, day before and first day of menstruation were lethargy and tiredness (first), depression (second) and inability to concentrate in work (third), whereas the ranking of these symptoms on the day after the stoppage of menstruation showed depression as the first common symptoms. Negative correlation had been found between dysmenorrhea and the General Health Status as measured by the Body surface area.⁶

Inconclusive evidence was found for modifiable factors such as cigarette smoking, diet, obesity, depression, and abuse. Dysmenorrhea is a significant symptom for a large proportion of women of reproductive age; however, severe pain limiting daily activities is less common. This review confirms that dysmenorrhea improves with increased age, parity, and use of oral contraceptives and is positively associated with stress and family history of dysmenorrhea.⁷

A low-fat vegetarian diet was associated with increased serum sex-hormone binding globulin concentration and reductions in body weight, dysmenorrhea duration and intensity, and premenstrual symptom duration. The symptom effects might be mediated by dietary influences on estrogen activity.⁸

The prevalence of dysmenorrhea was 85.15%. Most of the girls (63.95%) had dysmenorrhea of grade 3-4 according to visual analogue scale and 70.93% girls did not take pain medication for it. College/class absenteeism was present in 10.47% girls having dysmenorrhea there was no significant association of dysmenorrhea with age of menarche, menstrual cycle regularity, BMI, blood groups and diet (vegetarian/nonvegetarian)($P > 0.05$).⁹

A U-shaped association was revealed between dysmenorrhea and BMI, revealing a higher risk of dysmenorrhea for both underweight and obese women. Maintaining a healthy weight over time may be important for women to have pain-free periods.¹⁰

Relation between dysmenorrhea and BMI was found to be significant ($p < 0.01$) with increased prevalence in the low BMI group. Hence, improving the nutritional status of adolescent girls may reduce dysmenorrhea.¹¹

Girls with bleeding duration more than 5 days had 1.9 times more chance of getting dysmenorrhea.¹²

The earlier age at menarche, longer duration of menstrual flow, prior family history of dysmenorrhea and smoking at least one cigarette a day are important risk factors associated with dysmenorrhea. Smoking cessation should be strongly encouraged.¹³

AIM

The study was carried out to estimate the prevalence of dysmenorrhea and its common symptoms, and determine the relationship between dysmenorrhea and the selected risk factors such as race, culture & eating habits.

OBJECTIVES

- To study the prevalence of primary dysmenorrhea & its associated symptoms among Malaysians & Indians.
- To study the relationship between selected risk factors (race, culture, eating habits) with prevalence of primary dysmenorrhea.

HYPOTHESIS

1. Prevalence of primary dysmenorrhea and its associated symptoms are higher among IMS medical students (Malaysians) in comparative to BBH nursing students (Indians).
2. There appears to be positive relationship between non vegetarian diet with prevalence of dysmenorrhea & its associated symptoms.
3. The commonest symptoms associated with menstruation is lethargy & tiredness in both group of students.
4. There is positive correlation between prevalence of dysmenorrhea with higher BMI of both Indian & Malaysian students.

METHODOLOGY

Type of study: Comparative study

Study setting: International Medical School (IMS) Bangalore & Bangalore Baptist Hospital (BBH) Nursing College

Study duration: 4 weeks

Universe of study: female student of IMS (Malaysian) & BBH (Indians) aged between 18-25 years old

Sample size and sampling method: 200 students using non-probability and non-convenient sampling

Data collection procedure:

The questionnaire was finalized after pilot testing, permission and verbal consent were taken and all of them were assured confidentiality. The questionnaires was administered in form of question papers.

Study Instrument: Pre-tested questionnaire

First part: Consist of personal details including age, race, culture & eating habits.

Second part: Questions regarding their menstrual history (age of menarche, duration etc)

Third part: Questions regarding occurrence of dysmenorrhea & its associated symptoms (bloating, breast tenderness, acne etc), any relieving and aggravating factors.

Method of Analysis: Descriptive statistic

DEMOGRAPHIC DATA

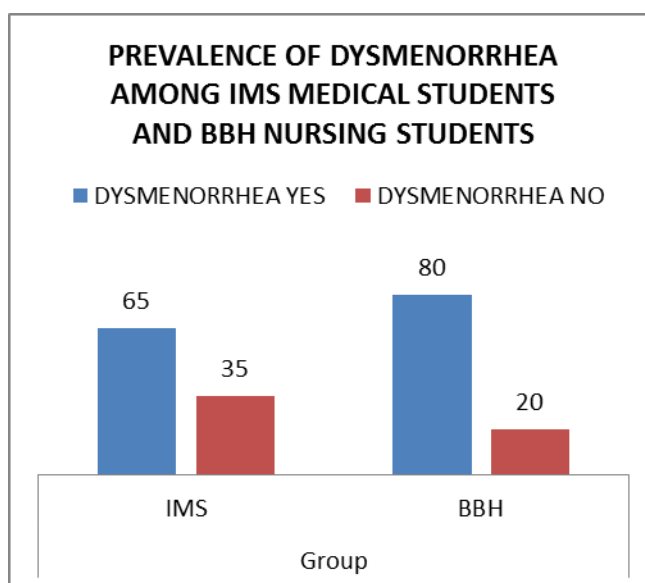
RACE	MALAYSIAN	INDIAN
GENDER	FEMALE	
AGE	18 – 25 YEARS OLD	
NUMBER	100	100
VEGETARIAN	0	3
NON VEG ONCE / WEEK	1	45
NON VEG TWICE / WEEK	0	13
NON VEG THRICE / WEEK	0	9
NON VEG EVERYDAY	99	30
UNDERWEIGHT	18	23
NORMAL	72	72
OVERWEIGHT	6	3
OBESITY	4	2

RESULT ANALYSIS

TABLE 1:PREVALENCE OF DYSMENORRHEA AMONG IMS MEDICAL STUDENTS AND BBH NURSING STUDENTS

		DYSMENORRHEA		Total
		YES	NO	
Group	IMS	65	35	100
		65.0%	35.0%	100.0%
	BBH	80	20	100
		80.0%	20.0%	100.0%
Total		145	55	200
		72.5%	27.5%	100.0%

Chi square: 5.643, p=0.018



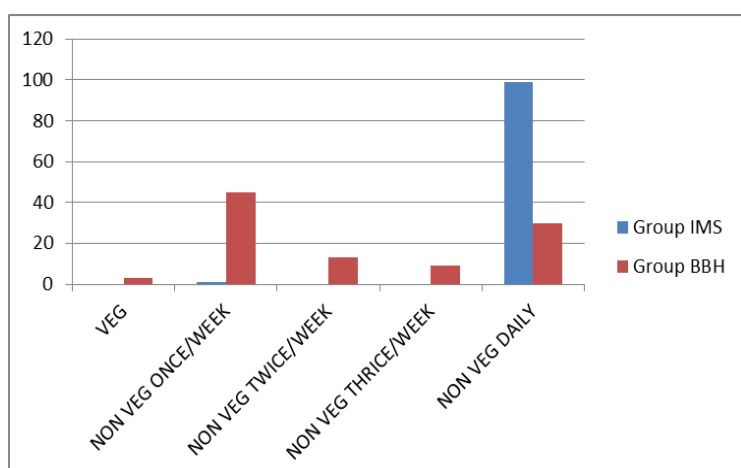
In this study, prevalence of primary dysmenorrhea is more among BBH nursing students (80%) compared to IMS medical students (65%).

The difference between prevalence of dysmenorrhea among BBH nursing students & IMS medical students is statistically significant (p = 0.018).

TABLE 2: EATING HABIT AMONG MEDICAL AND NURSING STUDENTS

		EATING HABIT					Total
		VEG	NON VEG ONCE/WEEK	NON VEG TWICE/WEEK	NON VEG THRICE/WEEK	NON VEG DAILY	
Group	IMS	0	1	0	0	99	100
		0.0%	1.0%	0.0%	0.0%	99.0%	100.0%
	BBH	3	45	13	9	30	100
		3.0%	45.0%	13.0%	9.0%	30.0%	100.0%
Total		3	46	13	9	129	200
		1.5%	23.0%	6.5%	4.5%	64.5%	100.0%

Chi-square=103.994' p=0.000

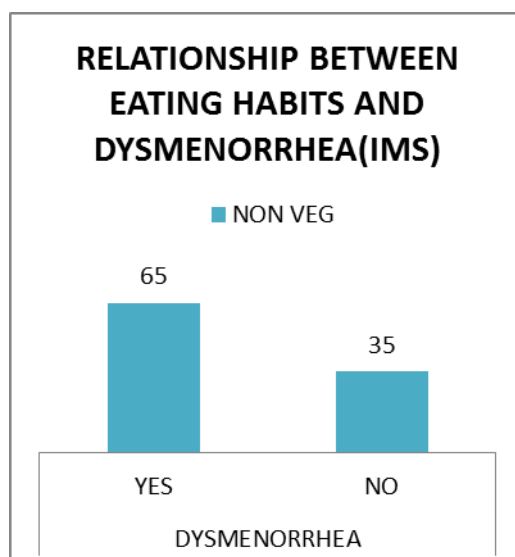


In this study, 99% of medical students and 30% of nursing students are taking non vegetarian diet daily.

The difference between eating habit between medical & nursing students is statistically significant (p = 0.000)

TABLE 3: RELATIONSHIP BETWEEN EATING HABITS AND DYSMENORRHEA AMONG MEDICAL STUDENTS

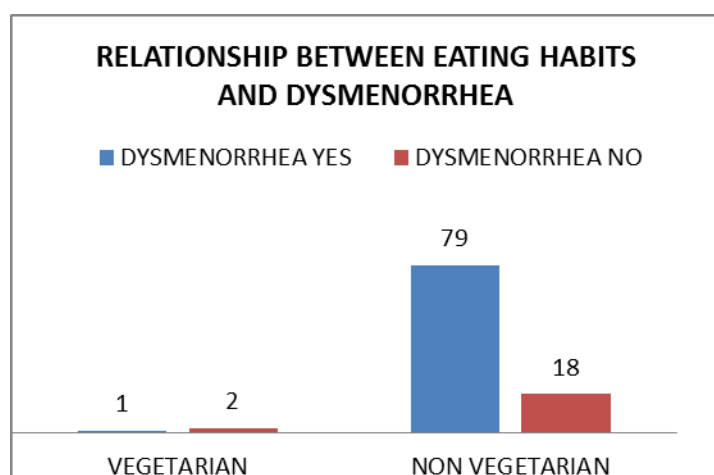
	DYSMENORRHEA		Total
	YES	NO	
NON VEG	65	35	100
	65.0%	35.0%	100.0%
Total	65	35	100
	65.0%	35.0%	100.0%



In this studies, 100% of medical students are having non-vegetarian diet and 65% of them have dysmenorrhea.

TABLE 4: RELATIONSHIP BETWEEN EATING HABITS AND DYSMENORRHEA AMONG NURSINGSTUDENTS

EATINGHABIT * DYSMENORRHEA			
	DYSMENORRHEA		Total
	YES	NO	
VEGETARIAN	1	2	3
	33.3%	66.7%	100.0%
NON VEGETARIAN	79	18	97
	81.4%	18.6%	100.0%
TOTAL	80	20	100
	80.0%	20.0%	100.0%
Chi-Square = 4.210	P = 0.040		



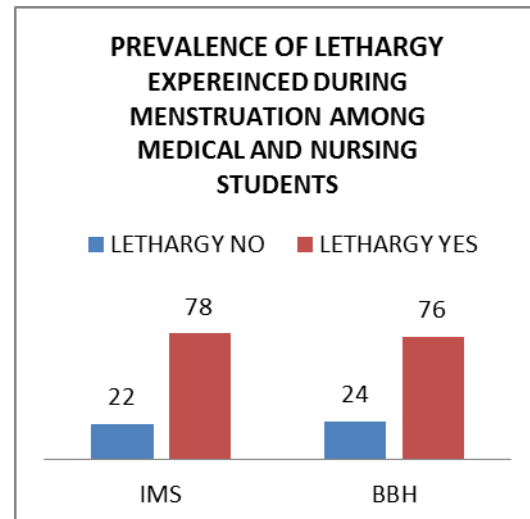
In this study, prevalence of dysmenorrhea is higher in nursing students who consume non vegetarian diet (81.4%) compared to vegetarian diet (33.3%).

The difference between eating habits and prevalence of dysmenorrhea amongst nursing students is statistically significant ($p = 0.04$)

TABLE 5: PREVALENCE OF LETHARGY EXPERIENCED DURING MENSTRUATION AMONG MEDICAL AND NURSING STUDENTS

		LETHARGY		Total
		NO	YES	
Group	IMS	22	78	100
		22.0%	78.0%	100.0%
	BBH	24	76	100
		24.0%	76.0%	100.0%
Total		46	154	200
		23.0%	77.0%	100.0%

Chi-square=0.113p=0.737



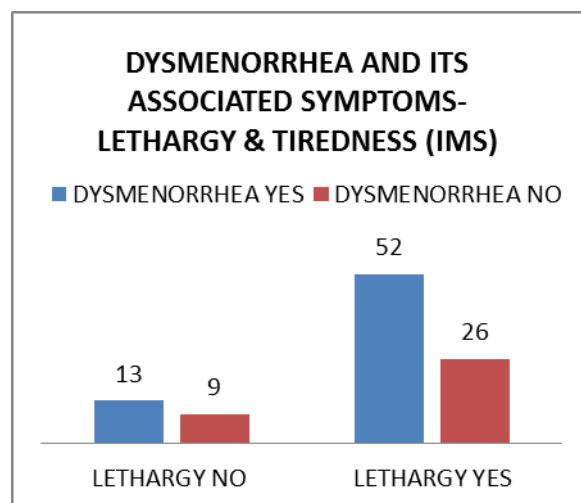
In this study, lethargy and tiredness is the most commonest symptoms experienced during menstruation both by IMS medical students (78%) and BBH nursing students (76%).

The difference between both values are not statistically significant ($p = 0.737$)

TABLE 6: RELATIONSHIP BETWEEN DYSMENORRHEA AND LETHARGY AMONG MEDICAL STUDENTS

LETHARGY	DYSMENORRHEA		Total
	YES	NO	
NO	13	9	22
	59.1%	40.9%	100.0%
YES	52	26	78
	66.7%	33.3%	100.0%
	65	35	100
	65.0%	35.0%	100.0%

Chi-square=0.433, $p=0.511$



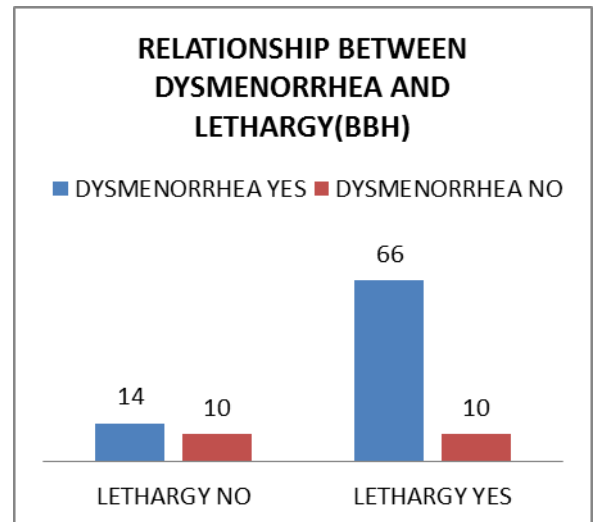
Interpretation : in this study, IMS medical students that have dysmenorrhea associated with lethargy & tiredness is 66.7%, meanwhile the students that have dysmenorrhea not associated with lethargy & tiredness in 59.1%.

Thus, the difference between these values is not statistically significant ($p = 0.511$)

TABLE 7: RELATIONSHIP BETWEEN DYSMENORRHEA AND LETHARGY AMONG NURSING STUDENTS

LETHARGY	DYSMENORRHEA		Total
	YES	NO	
NO	14	10	24
	58.3%	41.7%	100.0%
YES	66	10	76
	86.8%	13.2%	100.0%
TOTAL	80	20	100
	80.0%	20.0%	100.0%

Chi-square=9.265, p=0.002



Interpretation : in this study, BBH nursing students that have dysmenorrhea associated with lethargy & tiredness is 86.8%, meanwhile the students that have dysmenorrhea not associated with lethargy & tiredness is 58.3%.

Thus, the difference between these values are statistically significant (p = 0.002)

TABLE 8: COMPARISON OF BMI MEASUREMENTS BETWEEN MEDICAL AND NURSING STUDENTS.

		BMI				Total
		UNDERWEIGHT	NORMAL	OVERWEIGHT	OBESITY	
Group	IMS	18	72	6	4	100
		18.0%	72.0%	6.0%	4.0%	100.0%
	BBH	23	72	3	2	100
		23.0%	72.0%	3.0%	2.0%	100.0%
Total		41	144	9	6	200
		20.5%	72.0%	4.5%	3.0%	100.0%

Chi square: 2.276, p=0.517

In this study, there is no significant difference between BMI of IMS medical students & BBH nursing students

Difference between these values are statistically not significant (p = 0.517).

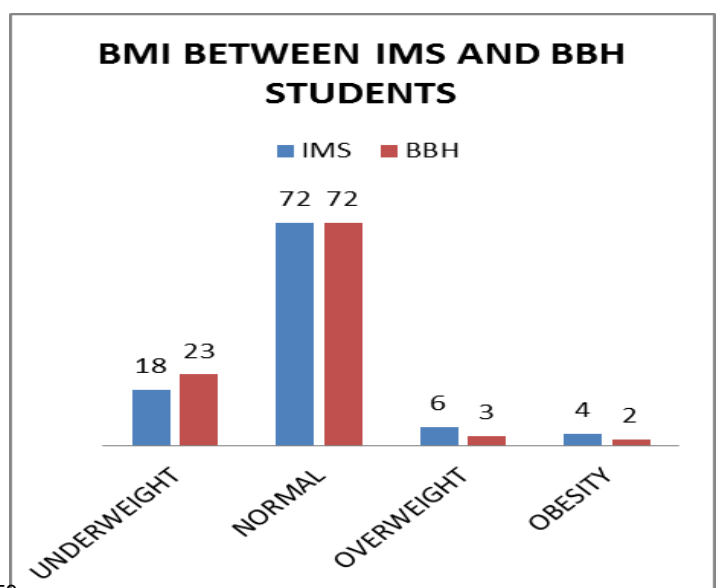
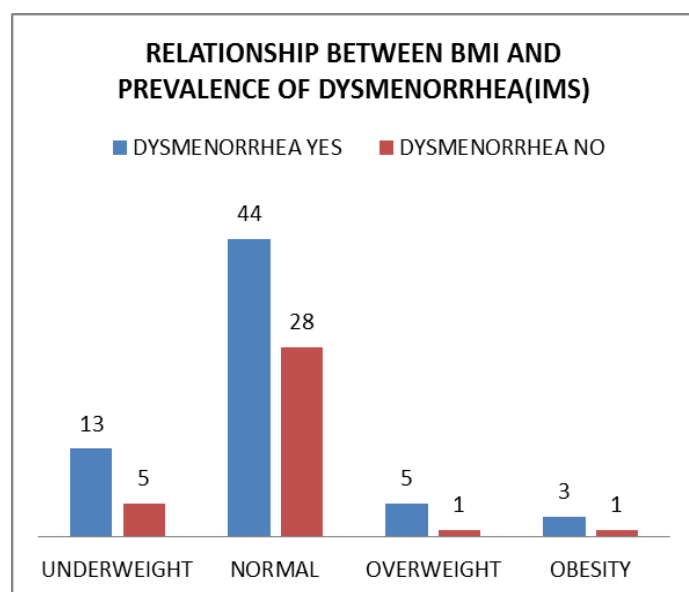


TABLE 9: RELATIONSHIP BETWEEN BMI AND PREVALENCE OF DYSMENORRHEA AMONG MEDICAL STUDENTS.



Chi-square: 1.954, p=0.582

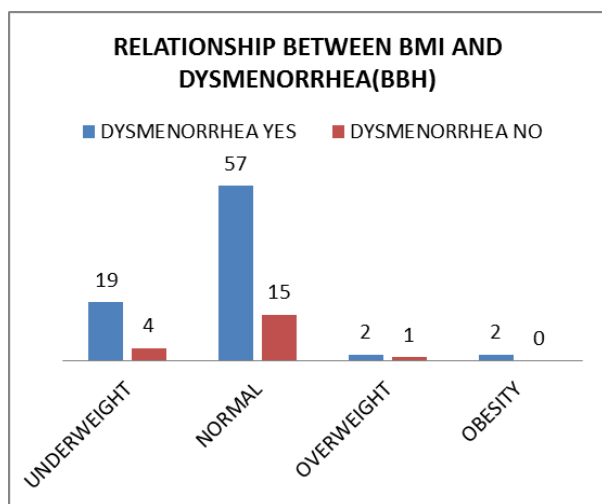
BMI	DYSMENORRHEA		Total
	YES	NO	
UNDERWEIGHT	13 76.5%	5 23.5%	17 100.0%
NORMAL	44 60.6%	28 39.4%	71 100.0%
OVERWEIGHT	5 83.3%	1 16.7%	6 100.0%
OBESITY	3 75.0%	1 25.0%	4 100.0%
TOTAL	65 65.0%	35 35.0%	100 100.0%

In this study, prevalence of dysmenorrhea is the most in overweight group of IMS medical students (83.3%) and the least in normal weight group of IMS medical students (60.6%).

Difference between these values are not statistically significant (p = 0.582)

TABLE 10: RELATIONSHIP BETWEEN BMI AND PREVALENCE OF DYSMENORRHEA AMONG NURSING STUDENTS.

BMI	DYSMENORRHEA		Total
	YES	NO	
UNDERWEIGHT	19 82.6%	4 17.4%	23 100.0%
NORMAL	57 79.2%	15 20.8%	72 100.0%
OVERWEIGHT	2 66.7%	1 33.3%	3 100.0%
OBESITY	2 100.0%	0 0.0%	2 100.0%
TOTAL	80 80.0%	20 20.0%	100 100.0%

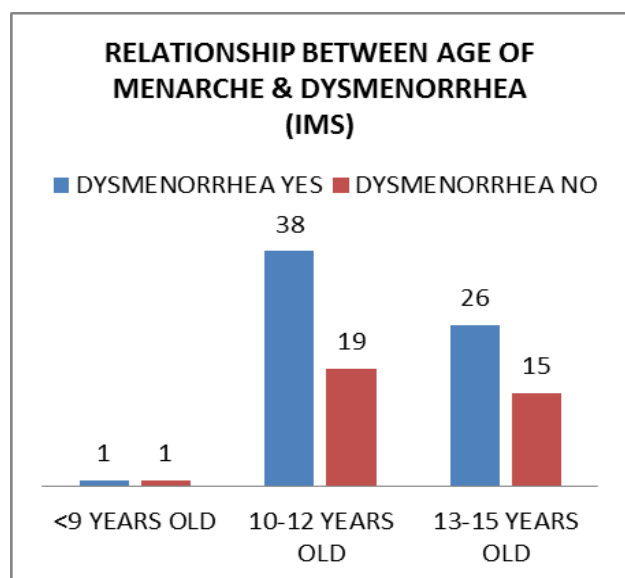


Chi-square=0.962, p=0.810

In this study, prevalence of dysmenorrhea is the most in obese group of BBH nursing students (100%) and the least in overweight group of BBH nursing students (66.7%).

Difference between these values are statistically not significant (p = 0.810)

TABLE 11 :RELATIONSHIP BETWEEN AGE OF MENARCHE AND PREVALENCE OF DYSMENORRHEA (IMS)



Chi-square:0.313, p=0.855

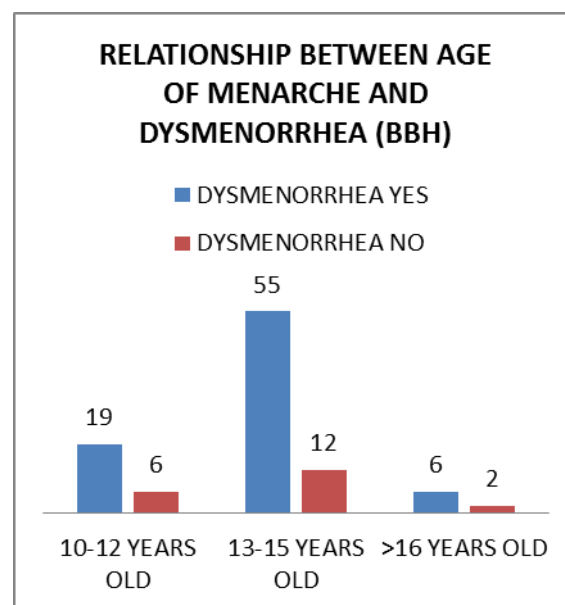
In this study, prevalence of dysmenorrhea among medical students is the highest at 10 – 12 years old age of menarche and the lowest at < 9 years old age of menarche.

Difference between these values are statistically insignificant (p = 0.855)

AGE OF MENARCHE	DYSMENORRHEA		Total
	YES	NO	
< 9YEARS OLD	1	1	2
	50.0%	50.0%	100.0%
10-12 YEARS OLD	38	19	57
	66.7%	33.3%	100.0%
13-15 YEARS OLD	26	15	41
	63.4%	36.6%	100.0%
TOTAL	65	35	100
	65%	35%	100.0%

TABLE 12. RELATIONSHIP BETWEEN AGE OF MENARCHE AND PREVALENCE OF DYSMENORRHEA(BBH)

AGE OF MENARCHE	DYSMENORRHEA		Total
	YES	NO	
10-12 YEARS OLD	19	6	25
	76.0%	24.0%	100.0%
13-15 YEARS OLD	55	12	67
	82.1%	17.9%	100.0%
>16 YEARS OLD	6	2	8
	75.0%	25.0%	100.0%
TOTAL	80	20	100
	80.0%	20.0%	100.0%



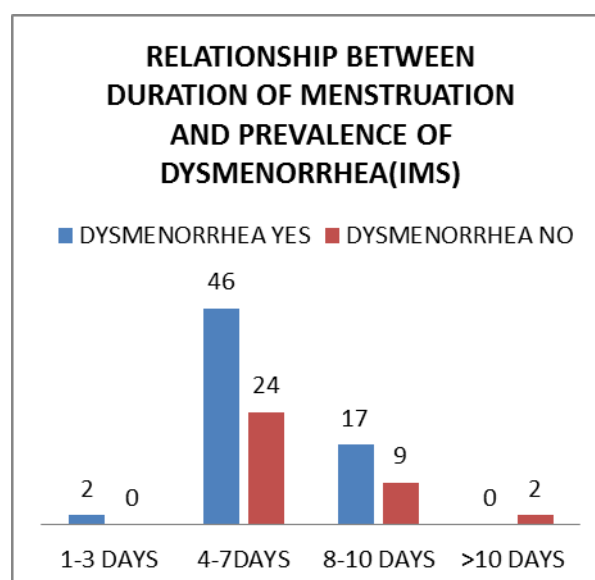
Chi-square=0.558, p=0.757

In this study, prevalence of dysmenorrhea among nursing students is the highest at 13 – 15 years old age of menarche and the lowest at >16 years old age of menarche.

Difference between these values are not statistically significant (p = 0.757)

TABLE 13. RELATIONSHIP BETWEEN DURATION OF MENSTRUATION AND PREVALENCE OF DYSMENORRHEA AMONG (IMS)

DURATION OF MENSTRUATION	DYSMENORRHEA		Total
	YES	NO	
1-3 DAYS	2	0	2
	100.0%	0.0%	100.0%
4-7DAYS	46	24	70
	65.7%	34.3%	100.0%
8-10 DAYS	17	9	26
	65.4%	34.6%	100.0%
>10 DAYS	0	2	2
	0.0%	100.0%	100.0%
TOTAL	65	35	100
	65.0%	35.0%	100.0%



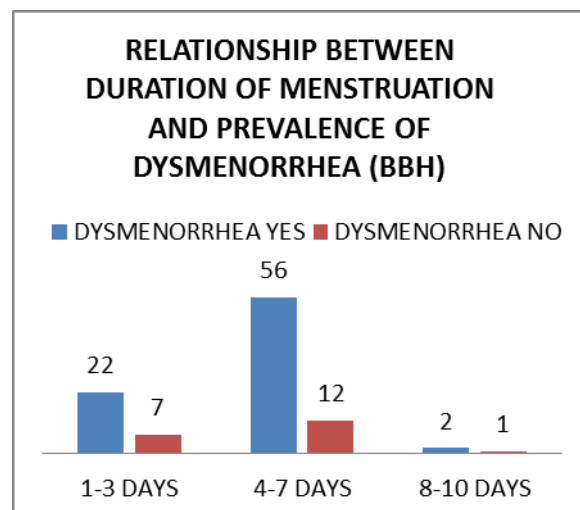
Chi-square: 4.809, p=0.186

In this study, prevalence of dysmenorrhea among medical students is the highest at 1- 3 days duration of menstruation (100%) and the lowest at >10 days duration of menstruation (0%).

Difference between these values is not statistically significant (p= 0.186)

TABLE 14. RELATIONSHIP BETWEEN DURATION OF MENSTRUATION AND PREVALENCE OF DYSMENORRHEA (BBH)

DURATION OF MENSTRUATION	DYSMENORRHEA		Total
	YES	NO	
1-3 DAYS	22	7	29
	75.9%	24.1%	100.0%
4-7 DAYS	56	12	68
	82.4%	17.6%	100.0%
8-10 DAYS	2	1	3
	66.7%	33.3%	100.0%
TOTAL	80	20	100
	80.0%	20.0%	100.0%



Chi-square=0.879, p=0.644

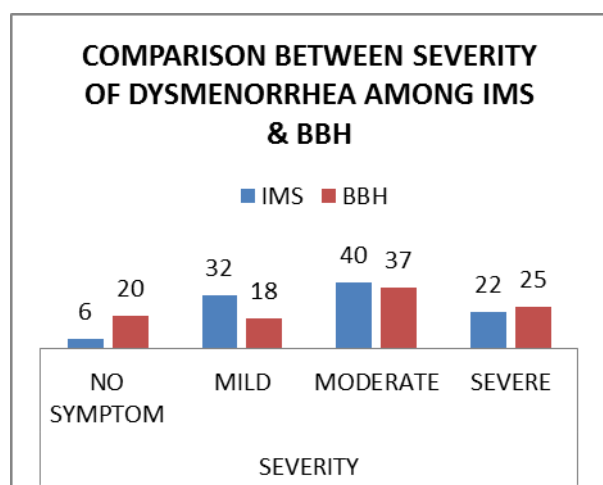
In this study, prevalence of dysmenorrhea among nursing students is the highest at 4-7 days duration of menstruation (100%) and the lowest at 8-10 days duration of menstruation (66.7%).

Difference between these values is not statistically significant (p= 0.644)

TABLE 15.COMPARISON BETWEEN DURATION BETWEEN SEVERITY OF DYSMENORRHEA AMONG MEDICAL AND NURSING STUDENTS

		SEVERITY				Total
		NO SYMPTOM	MILD	MODERATE	SEVERE	
Group	IMS	6	32	40	22	100
		6.0%	32.0%	40.0%	22.0%	100.0%
	BBH	20	18	37	25	100
		20.0%	18.0%	37.0%	25.0%	100.0%
Total		26	50	77	47	200
		13.0%	25.0%	38.5%	23.5%	100.0%

Chi-square=11.767, p=0.008



In this study, the medical (40%) and nursing students (37%) are experiencing moderate severity.

The difference between these values is statistically significant (p=0.00).

TABLE 16: RELATIONSHIP BETWEEN TAKING REST TO RELIEVE THE SYMPTOMS DURING MENSTRUATION AMONG IMS & BBH STUDENTS

RELIEVING FACTOR		REST		Total
		YES	NO	
IMS		89	11	100
		89.0%	11.0%	100.0%
BBH		91	9	100
		91.0%	9.0%	100.0%
TOTAL		180	20	200
		90.0%	10.0%	100.0%

Chi-square=0.222, p=0.637

In this study, it is been observed that medical (89%) and nursing students (91%) taking rest to relieve the symptoms during menstruation

The difference between these values is not statistically significant (p=0.637)

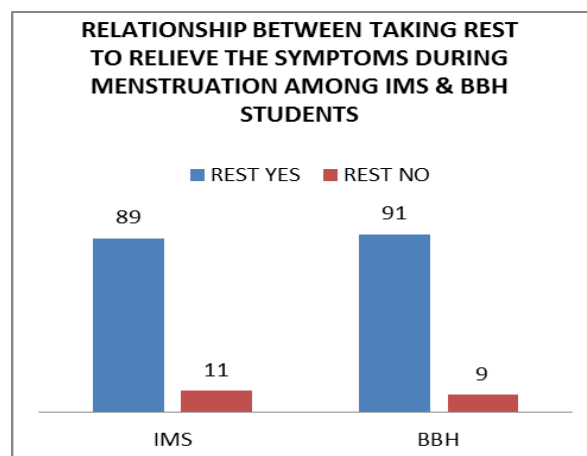


TABLE 17: RELATIONSHIP BETWEEN TAKING MEDICATION TO RELIEVE THE SYMPTOMS DURING MENSTRUATION AMONG IMS & BBH STUDENT

RELIEVING FACTOR		MEDICATION		Total
		YES	NO	
Group	IMS	27	73	100
		27.0%	73.0%	100.0%
	BBH	12	88	100
		12.0%	88.0%	100.0%
Total		39	161	200
		19.5%	80.5%	100.0%

Chi-square=7.167, p=0.007

In this study, it is been observed that medical (27%) and nursing students (12%) taking medication to relieve the symptoms during menstruation

The difference between these values is statistically significant (p=0.007)

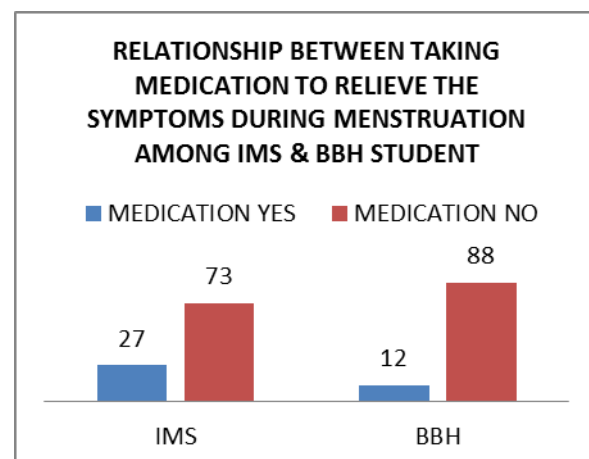
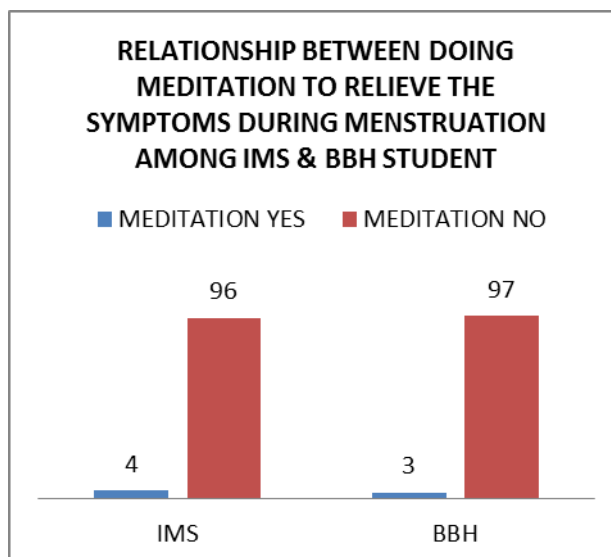


TABLE 18: RELATIONSHIP BETWEEN DOING MEDITATION TO RELIEVE THE SYMPTOMS DURING MENSTRUATION AMONG IMS & BBH STUDENT

RELIEVING FACTOR		MEDITATION		Total
		YES	NO	
Group	IMS	4	96	100
		4.0%	96.0%	100.0%
	BBH	3	97	100
		3.0%	97.0%	100.0%
Total		7	193	200
		3.5%	96.5%	100.0%

Chi-square=0.148, p=0.700



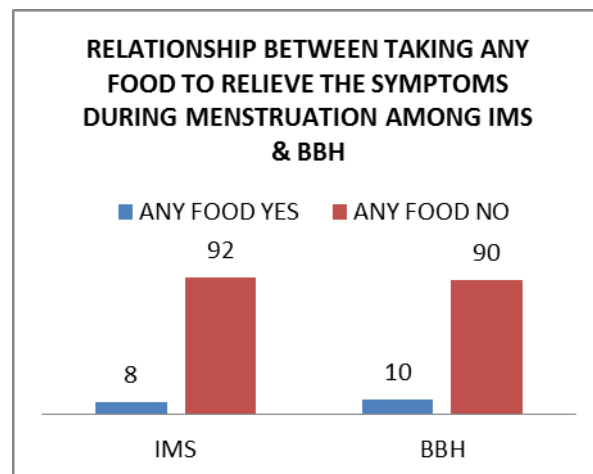
Interpretation: in this study, it is been observed that medical (4%) and nursing students (3%) doing meditation to relieve the symptoms during menstruation

The difference between these values is statistically not significant (p=0.700)

TABLE 19: RELATIONSHIP BETWEEN TAKING ANY FOOD TO RELIEVE THE SYMPTOMS DURING MENSTRUATION AMONG IMS & BBH

RELIEVING FACTOR		ANY FOOD		Total
		YES	NO	
GROUP	IMS	8	92	100
		8.0%	92.0%	100.0%
	BBH	10	90	100
		10.0%	90.0%	100.0%
Total		18	182	200
		9.0%	91.0%	100.0%

Chi-square=0.221, p=0.621



In this study, it is been observed that medical (8%) and nursing students (10%) taking any food to relieve the symptoms during menstruation

The difference between these values is statistically not significant (p=0.621)

TABLE 20: RELATIONSHIP BETWEEN INCREASE PHYSICAL ACTIVITY AGGRAVATES THE SYMPTOMS DURING MENSTRUATION AMONG IMS &BBH STUDENTS

AGGRAVATING FACTOR		INCREASE PHYSICAL ACTIVITY		Total
		YES	NO	
Group	IMS	43	57	100
		43.0%	57.0%	100.0%
	BBH	56	44	100
		56.0%	44.0%	100.0%
Total		99	101	200
		49.5%	50.5%	100.0%

Chi-square=3.380, p=0.066

Interpretation: in this study, it is been observed that increase in physical activity aggravates the symptoms during menstruation among medical (43%) and nursing students (56%) .

The difference between these values is statistically not significant (p=0.066)

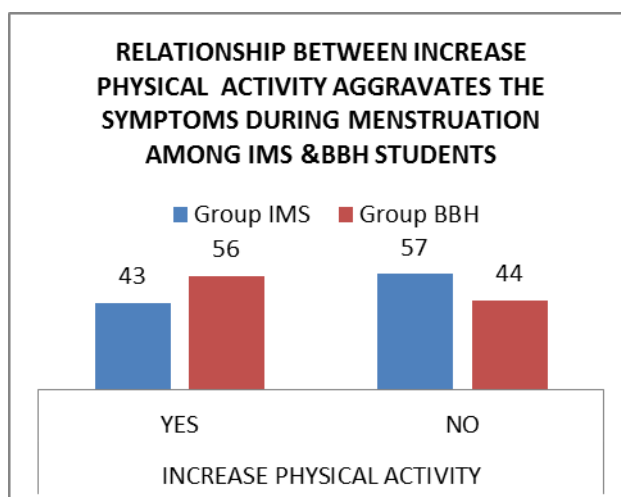


TABLE 21: RELATIONSHIP BETWEEN TAKING COLD & SOFT DRINKS AGGRAVATES THE SYMPTOMS DURING MENSTRUATION AMONG IMS&BBH STUDENTS

AGGRAVATING FACTOR		COLD&SOFT DRINK		Total
		YES	NO	
Group	IMS	36	64	100
		36.0%	64.0%	100.0%
	BBH	35	65	100
		35.0%	65.0%	100.0%
Total		71	129	200
		35.5%	64.5%	100.0%

Chi-square=0.022, p=0.883

In this study, it is been observed that taking cold & soft drinks aggravates the symptoms during menstruation among medical (36%) and nursing students (35%) .

The difference between these values is statistically not significant (p=0.883)

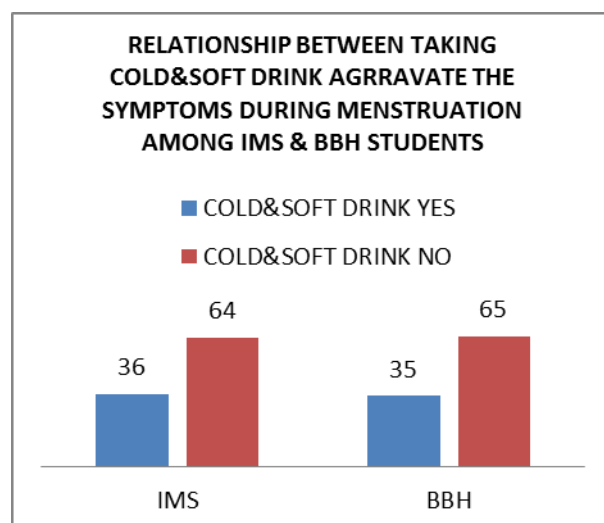
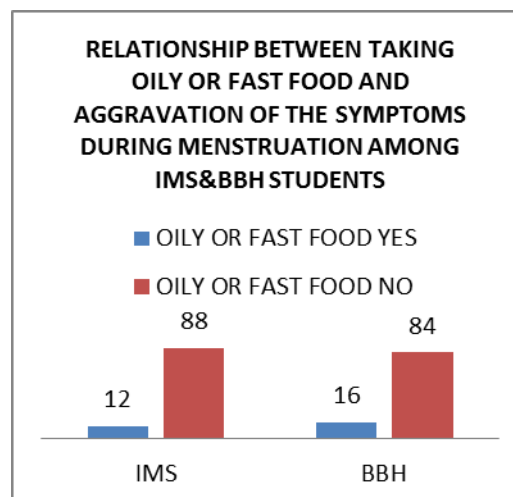


TABLE 22: RELATIONSHIP BETWEEN TAKING OILY OR FAST FOOD AND AGGRAVATION OF THE SYMPTOMS DURING MENSTRUATION AMONG IMS&BBH STUDENTS

AGGRAVATING FACTOR		OILY OR FAST FOOD		Total
		YES	NO	
Group	IMS	12	88	100
		12.0%	88.0%	100.0%
	BBH	16	84	100
		16.0%	84.0%	100.0%
Total		28	172	200
		14.0%	86.0%	100.0%

Chi-square=0.664, p=0.415



Interpretation: in this study, it is been observed that taking oily or fast food aggravates the symptoms during menstruation among medical (12%) and nursing students (16%) .

The difference between these values is statistically not significant (p=0.415)

TABLE 23: THE MOST REGULAR GENERAL PRACTICE DURING MENSTRUATION

REGULAR GENERAL PRACTICE		TAKE WARM BATH		Total
		YES	NO	
Group	IMS	77	23	100
		77.0%	23.0%	100.0%
	BBH	92	8	100
		92.0%	8.0%	100.0%
Total		169	31	200
		84.5%	15.5%	100.0%

Chi-square=8.589, p=0.003

In this study, it is been observed that medical (77%) and nursing students (92%) are taking warm bath as their most regular general practice during menstruation

The difference of these values is statistically significant (p=0.003)

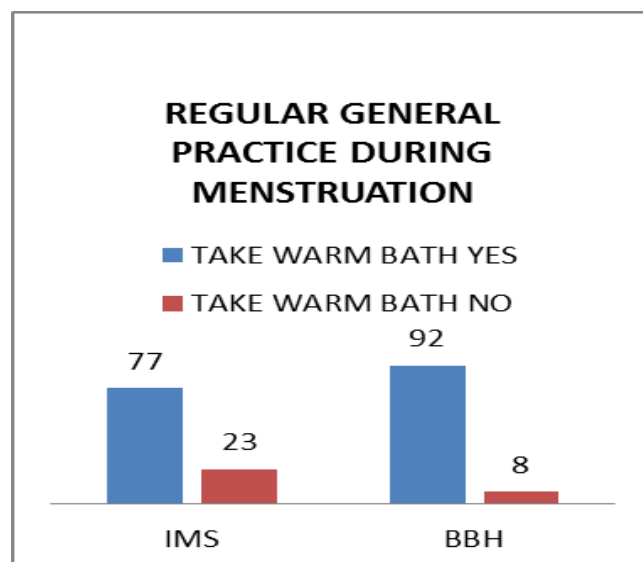
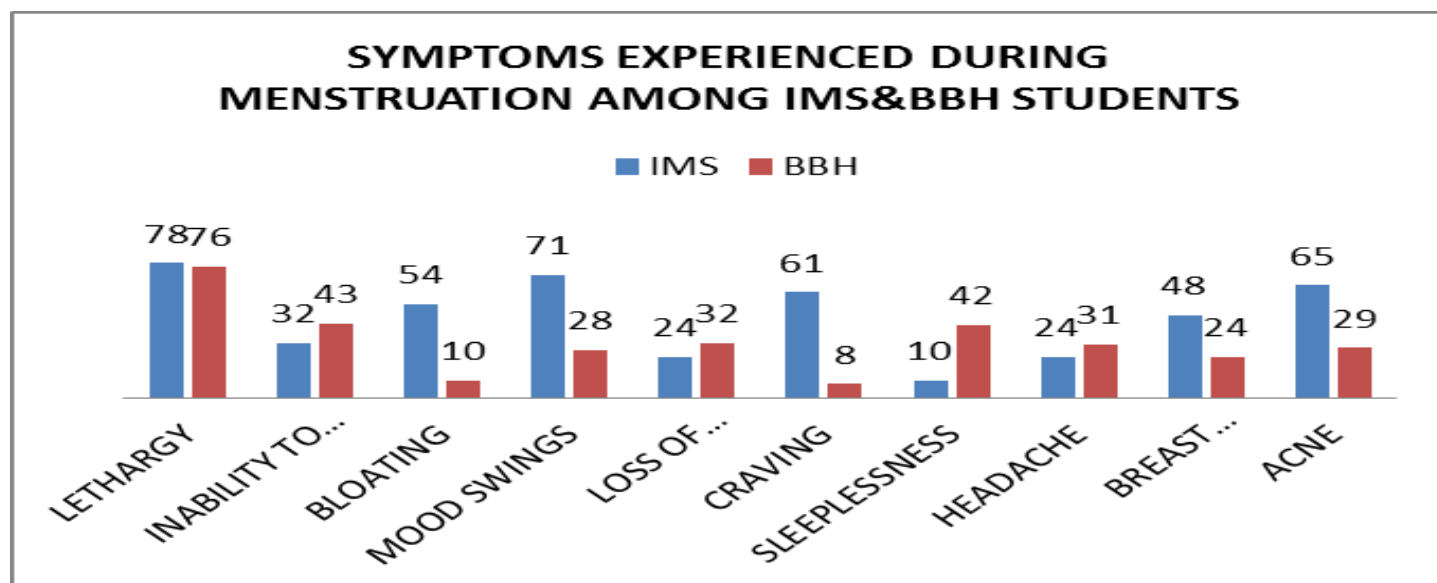


TABLE 24: COMPARISON OF SYMPTOMS DURING MENSTRUATION AMONG MEDICAL AND NURSING STUDENTS



SYMPTOMS	IMS(%)	RANK	BBH(%)	RANK	TOTAL(%)	RANK
LETHARGY	78	1	76	1	77	1
INABILITY TO CONCENTRATE	32	7	43	2	37.5	4
BLOATING	54	5	10	9	32	7
MOOD SWINGS	71	2	28	7	49.5	2
LOSS OF APPETITE	24	8	32	4	28	9
CRAVING	61	4	8	10	34.5	6
SLEEPLESSNESS	10	9	42	3	26	10
HEADACHE	24	8	31	5	27.5	8
BREAST TENDERNESS	48	6	24	8	36	5
ACNE	65	3	29	6	47	3

For Malaysians, the three most commonest symptoms are lethargy(78%), mood swings(71%) and acne(65%), meanwhile for Indians, lethargy(76%), inability to concentrate(43%) and sleeplessness(42%).

DISCUSSION

At first our hypothesis is, prevalence of primary dysmenorrhea and its associated symptoms are higher among IMS medical students (Malaysians) in comparative to BBH nursing students (Indians). However, after all the data are collected and tabulated it is shown that prevalence of primary dysmenorrhea is significantly higher among Indians (80%) compared to Malaysians (65%). $p = 0.018$

Hence, there must exist some different factors between these 2 groups that contribute to this results such as genetic, eating habits, body morphology and others that will be further discussed below.

EATING HABIT

In this study, almost all Malaysians are consuming non vegetarian diet everyday (99%), meanwhile only 30% of Indians are taking non vegetarian diet daily. Most of the Indians are taking non vegetarian diet once weekly (45%) and only 1% on Malaysian is practising the same.

On prevalence of dysmenorrhea among these group, it is found that Indians that take non vegetarian diet has higher prevalence of dysmenorrhea (81.4%) compared to Malaysians non vegetarian eaters (65%).

Our hypothesis, 'there appears to be positive relationship between non vegetarian diet with prevalence of dysmenorrhea & its associated symptoms' is accepted based on this result.

So, non vegetarian diet could be the protective measure against higher prevalence of dysmenorrhea in Malaysian population.

According to study by Barnard ND, Scialli AR, Hurlock D, Bertron P on 2002 , it has shown that low fat vegetarian diet reduce body weight, dysmenorrhea duration and intensity, and premenstrual symptom duration. They concluded that the symptom effects might be mediated by dietary influences on estrogen activity.

Thus, this study contradict our result on effect of non vegetarian diet on prevalence of dysmenorrhea.

SYMPTOMS

In this study, we distributed a questionnaire on symptoms experienced during menstruation which are :

- Lethargy & tiredness
- Inability to concentrate
- Bloating
- Mood swings
- Loss of appetite
- Craving
- Sleeplessness
- Headache
- Breast tenderness
- Acne
- Others

Other than that, some students also mentioned back pain, leg pain, nausea and vomiting as other option of symptoms.

Based on observation, the most common symptom experienced by both groups is lethargy and tiredness which is 78% among Malaysians and 76% among Indians.

Hence, our hypothesis 'the commonest symptoms associated with menstruation is lethargy & tiredness in both group of students' is accepted.

For Malaysians, the 3 most common symptoms are lethargy (78%), mood swings (71%) and acne (65%). Meanwhile for Indians, lethargy (76%), inability to concentrate (43%) and sleeplessness (42%). As there are

differences between these 3 most commonest symptoms experienced by both group, there could lie some significant factors responsible for this that can be further investigated.

On 2003, a study by Anil K Agarwal and Anju Agarwal reported that the three most common symptoms present on both days, that is, day before and first day of menstruation were lethargy and tiredness (first), depression (second) and inability to concentrate in work (third), whereas the ranking of these symptoms on the day after the stoppage of menstruation showed depression as the first common symptoms.

Thus, this study supports our result on lethargy and tiredness as the commonest symptoms during menstruation.

DYSMENORRHEA AND LETHARGY

Relationship between prevalence of dysmenorrhea with lethargy and tiredness is significantly higher among Indians (86.8% , $p=0.002$) compared to Malaysian (66.7%, $p = 0.511$)

Thus, Indians that have dysmenorrhea during menstruation are more likely to also have lethargy & tiredness compared to Malaysians.

BMI MEASUREMENTS BETWEEN MEDICAL AND NURSING STUDENTS

Majority of both groups are having normal body mass index (BMI) , both 72% of the population.

There is also not much difference between underweight group of Malaysians & Indian (18% and 23% respectively).

However, Malaysian population has slightly higher number of overweight & obesity (6 % and 4%) compared to Indians (3% and 2 %).

In conclusion, there is difference between BMI of Malaysian & Indians. $p = 0.517$.

BMI AND PREVALENCE OF DYSMENORRHEA

Based on our hypothesis, there is positive correlation between prevalence of dysmenorrhea with higher BMI of both Indian & Malaysian students.

In this study, prevalence of dysmenorrhea among Malaysians is the most in overweight group (83.3%) meanwhile in Indians population it is higher in obese group (100%).

From this result, it is observed that higher BMI in both populations have higher prevalence of dysmenorrhea. Therefore, our hypothesis is valid.

There were 2 studies that relate body mass index with prevalence of dysmenorrhea.

The first one is by Hong Ju, Mark Jones, and Gita D. Mishra that reveals a higher risk of dysmenorrhea for both underweight and obese women.

The next one is by Madhubala Chauhan and Jyoti Kala who reported significant increase in prevalence of dysmenorrhea in the low BMI group ($p < 0.01$).

Hence, prevalence of dysmenorrhea is higher in abnormal BMI group.

AGE OF MENARCHE AND PREVALENCE OF DYSMENORRHEA

In this study, it was found that prevalence of dysmenorrhea among Malaysians is the highest at 10 – 12 years old age of menarche meanwhile prevalence of dysmenorrhea among Indians is the highest at 13 – 15 years old age of menarche.

Hence, relationship between age of menarche and prevalence of dysmenorrhea is not significant as it is found that the prevalence is more in normal range of age for menarche.

This result is supported with study conducted by Vibha Gangwar , Durgesh Kumar , Ritesh Singh Gangwar , Manjulata Arya, and Hajra Banoo which reported there was no significant association of

dysmenorrhea with age of menarche, menstrual cycle regularity, BMI, blood groups and diet (vegetarian/non vegetarian) ($P > 0.05$).

However a study by Pejčić A, Janković S reveals that , earlier age at menarche, longer duration of menstrual flow, prior family history of dysmenorrhea and smoking at least one cigarette a day are important risk factors are associated with dysmenorrhea.

DURATION OF MENSTRUATION AND PREVALENCE OF DYSMENORRHEA

In this study, prevalence of dysmenorrhea among Malaysian is the highest at 1- 3 days duration of menstruation (100%) while, in Indians it is the highest at 4-7 days duration of menstruation (100%) . Thus there is no significant relationship between duration of menstruation and prevalence of dysmenorrhea in both groups.

But, a study by Pejčić A, Janković S reveals that longer duration of menstrual flow is one of the important risk factors associated with dysmenorrhea which contradict with our result.

COMPARISON BETWEEN SEVERITY OF DYSMENORRHEA

In this study, dysmenorrhea is more severe among Indians (25%) compared to Malaysians (22%). The difference between these values is statistically significant ($p=0.008$). This could be due to less intake of medication to relieve dysmenorrhea among Indians compared to Malaysians.

TAKING REST TO RELIEVE THE SYMPTOMS DURING MENSTRUATION

In this study, it is been observed that medical (89%) and nursing students (91%) taking rest to relieve the symptoms during menstruation. The difference between these values is not statistically significant ($p=0.637$). It is one of the most easiest way to relieve the symptoms.

RELIEVING FACTOR: MEDICATION

In this study, it has been observed that medical (27%) and nursing students (12%) take medication to relieve the symptoms during menstruation. The difference between these values is statistically significant ($p=0.007$).

Possibly, this could be the reason why dysmenorrhea in Indians is more severe compared to Malaysians population.

RELIEVING FACTOR: MEDITATION

In this study, it has been observed that medical (4%) and nursing students (3%) doing meditation to relieve the symptoms during menstruation. The difference between these values is statistically not significant ($p=0.700$)

RELIEVING FACTOR: TAKING ANY FOOD

In this study, it is been observed that medical (8%) and nursing students (10%) taking any food to relieve the symptoms during menstruation. The difference between these values is statistically not significant ($p=0.621$)

AGGRAVATING FACTORS: INCREASE IN PHYSICAL ACTIVITY

In this study, it is been observed that increase in physical activity aggravates the symptoms during menstruation among medical (43%) and nursing students (56%) . The difference between these values is statistically not significant ($p=0.066$)

AGGRAVATING FACTORS: TAKING COLD & SOFT DRINKS

In this study, it is been observed that taking cold & soft drinks aggravates the symptoms during menstruation among medical (36%) and nursing students (35%) .The difference between these values is statistically not significant ($p=0.883$)

AGGRAVATING FACTORS: TAKING OILY OR FAST FOOD

In this study, it is been observed that taking oily or fast food aggravates the symptoms during menstruation among medical (12%) and nursing students (16%). The difference between these values is statistically not significant ($p=0.415$)

THE MOST REGULAR GENERAL PRACTICE DURING MENSTRUATION

In this study, it has been observed that Malaysians (77%) and Indians (92%) are taking warm bath as their most regular general practice during menstruation. The difference of these values is statistically significant ($p=0.003$)

Coming to regular general practice, during menstruation of both Malaysian and Indian it was observed that taking warm bath is more prevalent among Indian (92%) compared to Malaysians (77%).

This could be due to different norm practiced by Malaysian whom usually do not take warm bath as the weather in Malaysia is quite hotter compared to India.

CONCLUSION

From the study it can be concluded that dysmenorrhea is a very common problem among women of child bearing age despite of different races, but the prevalence is significantly higher among Indians compared to Malaysians. There could be some factors that influence this result.

Based on our findings, we concluded that this may be the potential factor causing higher prevalence of dysmenorrhea among Indians:

Eating habit: only 30% of Indians take non vegetarian diet daily compared to Malaysians (99%). Eating non vegetarian diet everyday could be a protective measure against dysmenorrhea.

Other than that, we also found that the severity of dysmenorrhea is higher in Indian compared to Malaysian. This may be because, Indians are not prone to take medication to relieve the symptoms compared to Malaysian.

The most common symptom during menstruation for both groups is lethargy and tiredness. The three most common symptoms during menstruation for Indian and Malaysian are found to be different. For Malaysians, it is lethargy & tiredness, mood swings and acne while for Indians, lethargy & tiredness, inability to concentrate and sleeplessness. It could be due to higher severity of dysmenorrhea among Indians.

Indians that has dysmenorrhea are more likely to also have lethargy and tiredness compared to Malaysians.

Furthermore, both groups practice taking warm bath during menstruation as regular general measure, but the percentage is significantly higher among Indian. We assumed that they take warm bath in order to reduce the pain.

Then, for both groups, increase in prevalence of dysmenorrhea is positively correlated to higher BMI.

Last but not least, there are no relationship between age of menarche and duration of menstruation with prevalence of dysmenorrhea.

The findings of this study thus indicate the enormity of the problems and the need for appropriate intervention through a change in lifestyle and increase in awareness of general care during menstruation.

LIMITATIONS

- The sample size for vegetarian diet is only 3 out of 100 Indians subjects. If the sample size is more, the result could be more reliable.
- Some of our subjects were unable to answer the questionnaire given appropriately.
- The time given to complete this project is not sufficient. If we were given more time, the sample size could be more and the result could be more accurate.

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PSYCHOLOGICAL AND SOCIAL DETERMINANTS OF PROFESSIONAL BURNOUT OF SOCIAL WORKERS

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Summary

Introduction

Social workers, within their professional duties, are obliged to help their charges in facilitating or regaining their abilities to live normally within society. Specific nature of this profession involves being faced with difficult situations concerning social problems and pathologies. Responsibility for the other human being, stress, ethical doubts, charge's unwillingness to cooperate, no progress, axiological conflicts, social expectations and individual problems of social workers themselves can result in occurrence of professional burnout.

Purpose of the research

The purpose of the conducted research was to define the range of professional burnout of social workers and determine psychological and social factors which make the subject individuals feel stressful and professionally burnout.

Material and method

Diagnostic survey among 240 social workers in the Świętokrzyskie region was applied during the research. In order to verify made assumptions SPCC/PC statistical package was used.

Results

Description of the subject individuals show that women (76%), people working in the subject field for 10 years (55,9%), people with higher education (52,3%) and married individuals (61,2%) prevailed among respondents. The level of stress frequency of professional activities is experienced differently by respondents. This is often accompanied by severe physical disruptions, general anxiety, concentration difficulties, fear of new tasks. Social workers point out various reasons for anxiety and professional tiredness, resulting, among others, from contacts with social work charges, excessive emotional engagement in their problems, wide range of analyzed and solved human problems. Factors which diversify the range of professional burnout are: age, employment period and team support.

Conclusions

The phenomenon of professional burnout appears as a result of being overburdened with stress and it is manifested by emotional and physical and mental exhaustion and distancing relations with their charges. This results in depersonalization and reduced satisfaction, as well as professional engagement. Fundamental factors which make professional burnout more intense are difficulties in elimination of stress which is present in the course of everyday life tasks realization. Social workers perceive their profession as not prestigious. Typical psychological, social and specific profession-related factors appear as determinants.

Key words: social workers, burnout, determinants

Public health outcomes of complex community interventions: community volunteering and Time Credits in the UK

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Abstract:

Time Credits are a way of recognising and celebrating the time people spend volunteering with a local organisation, community group, volunteer group or a statutory sector service provider. In exchange for their contribution, they ‘earn’ printed Time Credit notes, one for every hour they give, which they can then ‘spend’ on a range of leisure and other opportunities in a network of Spice partners across the UK.

A Time Credit project has been established in Wisbech, England, an area with above average levels of deprivation and a range of challenging social issues. The outcomes of the project are being researched by the University of Cambridge. The aim of the research is to evaluate the potential of the Time Credit project to tackle social exclusion, loneliness and deprivation and to assess the extent to which it can reduce health inequalities and secure positive public health outcomes.

The research uses a mixed methods approach that engages service users, practitioners and policy makers through interviews, surveys, focus groups and ethnographic research methods. In particular, it uses validated scales to measure change in health behaviours, social determinants of health and health outcomes.

This paper presents emerging findings about the ways in which this community intervention can lead to positive public health outcomes and the conceptual underpinnings of such an approach to reducing health inequalities.

Reflections on the translation process

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Abstract

Collecting data for a qualitative study in one language and writing the report in another raise many issues that can influence the rigor and credibility. This paper raises some of these issues and examines the strategies employed to ensure that the quality of the study was not compromised.

The study examined the experiences of Thai student nurses when communicating with clients with mental health disorders. The data sources were documents, observations and semi-structured interviews conducted in Thai. Field notes were also written in Thai. Practical, linguistic and accuracy were some of the issues faced as Thai language has a different grammatical style and nuance to English. In addition, some words related to mental health care have different meanings in English as they do in Thai.

Some of the strategies that employed included expert checking of translations and several levels of member checking to ensure conformability of the codes and categories from the analysis of data. The main conclusion of this paper is that researchers who are aiming to work in two or more languages need to adopt a range of approaches to ensure the trustworthiness of the research remains at the same level as if only one language was used.

Keywords: reflection, translation, qualitative study

Introduction

Translation is the process whereby the original written texts (source text) is changed to another language (target text) (Munday, 2001). In other words, translation can be defined as transferring the meaning of the source text into another and the aim of translation is to ensure that the meaning in both languages is equivalent (Nord, 1997). Thus, translation is undertaken in a light manner because translation is not only about translating texts but it also involves cultural translation and this causes translation issues to be more complex. If the translation is not performed accurately, the research findings may also be incorrect and this can threaten the trustworthiness of the study. There are a number of risk factors that may threaten the validity of data within the process of translation namely: the translator; translating within languages; translating across languages; the translation process, and translation validity.

Method

The study examined the experiences of Thai student nurses when communicating with clients with mental health disorders using grounded theory. Data collection was undertaken between December 2008 and May 2009. This study was carried out with the student nurses of the Boromarajonani College of Nursing Udonthani (BCNU), Udonthani province in the Northeast of Thailand. Twelve student nurses undertaking mental health nursing training in the psychiatric hospital had participated in the study.

Data was collected from observations, examinations of interaction reports and semi-structured interviews. Direct observations in the natural setting were used in order to gain first-hand exposure to how students communicated with patients. The precise length of observation varied from 15 to 71 minutes. The interaction reports were one of students' essential requirements. The reports were written by students as accounts of interaction between student nurses and patients with a mental illness. The interviews took place for the purposes of this study with times varying from 54 minutes to 1 hour 47 minutes. All three sources of data including 12 interviews, 23 observation notes, and 22 interaction reports were conducted in Thai and then translated into English.

Translation Process

In this paper, I will discuss factors influencing the translation, problems I faced, and how I tackled these problems to enhance the validity of research findings.

1. Selection of translator

If a researcher analyses data in the same language as it was collected, it would help ensure the quality of the study but this was not possible in this study as the language in which data was collected was different from the one in which it was to be analysed. Therefore, a translator was required to carry out this important role in this project. The translation problems that occur with one translator may not happen with another (Newmark, 2001). Translators may affect the research findings because they bring their own perspectives to translation and this means that the selection of translators needs to be carefully managed.

The ability and translating experiences of translators are significant. A professional translator can produce a high quality of translation compared to the novice translator (Squires, 2008). However, not every professional translator can translate accurately from the original texts, especially when they have no background in the specific field of their work. Also, they may find it difficult to translate the terminology of those disciplines or to apply the concepts of that subject knowledge (Sykes, 1989). In this study, if I as a translator had no experience of mental health

nursing, I may have a limited view on the psychiatric vocabularies. I may not correctly understand the interview questions from the researcher and the answers from the student nurses regarding mental health nursing terms resulting in misinterpretation of meaning. Another significant point which needed to be considered in this study is cultural language because texts of verbatim transcripts were written in both *Isan* and Central Thai language (Central Thai language is the national language in Thailand whereas *Isan* is a dialect used in the Northeast of Thailand). A translator who was able to understand both languages was therefore required. As the criteria for selecting the translator was very specific, it turned out to be very difficult to find such an individual. Moreover, hiring a professional translator is costly and was not possible in this research because of limited funding. Therefore, in this study, I undertook the translation myself because the two languages spoken by participants were familiar to me. Moreover, I have been working in the area of mental health nursing for 12 years and understand the terminology of psychiatric nursing. In addition, I was the only one who translated all the data and this was important so as to maximise the internal consistencies of data (Twinn, 1997).

2. Translating text and culture

In the translation process, ‘...Nothing is purely objective or subjective. There are no cast-iron rules. Everything is more or less...’ (Newmark, 2001, p.21); however, it is important to make the target text equivalent to the source text. It is acknowledged that each language has its own specific elements and use and consequently ‘different types of texts require different methods of translation’ (Sager, 1989, p.91); hence, a translator needs to take numerous factors into account when s/he translates any type of text. In addition, translation is difficult where there are different cultures. I will discuss about the problems of translation and how I dealt with them when I worked as a translator in the following section.

2.1 The difficulty of translating transcribed text. Transcribing data, especially interview data is a necessary feature in a qualitative study (Lopez *et al.*, 2008) because they help the researcher avoid any misinterpretation or misconceptions when summarising the participants’ words. Transcribing usually means converting spoken words into the written form and this is sometimes difficult because the spoken work usually include incomplete phrases or sentences. For example, in this study, students often omitted subjects (a word that names the person, place or thing) and conjunctions (a word that links words, phrases, clauses or sentences). Moreover, some spoken words of students in the verbatim written transcripts were not in order and this made it difficult to capture the meaning of the source language. Therefore, during translation, whenever I did not catch the meaning of statements of participants in the written transcripts I re-listened to the audio recordings where those statements were contained in order to make sense of the communication experiences of students. Then I modified the sentences in order to make it easier for the target language reader to understand. Mostly, I added subjects or conjunctions in order to make sentences more clear.

Example: Before modification: ‘on the first day of communication, thought for long periods of time even though I am a very talkative person, kept quiet, had no idea about what topic to talk about, was scared and shaking, only smiling’

After modification: ‘on the first day of communication, I thought for long periods of time and even though I am a very talkative person, I kept quiet as I had no idea what topic to talk about. I was scared and shaking but smiling.’

2.2 Not every Thai word can be translated. Some Thai texts need to be kept in the original language because they have no equivalent meaning in English language, particularly when words contain the Thai culture. For example, students greeted a patient with a *wai*. *Wai* is a Thai word

which means to hold the two palms together in front of the chest with the head bowed. *Wai* is a greeting in Thai society and is similar to when European people greet each other by kissing a cheek or shaking hands. However, *wai* is more than greeting because it demonstrates the Thai culture of hierarchy. It does not only mean the greeting in general but it also demonstrates respectfulness. Another example is Thai proverbs. Thai proverbs are not easily translated and can be misunderstood by people from different cultures. For example, ‘*Tum-Num-Prig-La-Lai-Ma-Nam*’ can be translated literally ‘*pound the hot sauce and pour it away in the river*’. This proverb means ‘being extravagant or wasteful’. Therefore, whenever there was no equivalent source text to English language, I used an original word and gave an explanation of the original word in order to solve the problem of the lack of a specific word in the target language.

2.3 Jargons or specific words about psychiatric nursing context are not always understood by lay people. If any words regarding treatment programmes, nursing care, features of mental problems arose, the same word was retained as was used by participants and did not convert it into a word that could be understood by a lay person. For example, one student talked about ECT (electroconvulsive therapy). The term of ECT (as mentioned exactly by a participant) was used in order to preserve the accurate words of the participant and also to illustrate the specific treatment method used in psychiatric treatment. Then I gave an explanation of this word in the right hand margin as this being a form of treatment for patients with mental disorders, where an electric current is passed through the brain of a patient. Some Thai words associated with features of people with mental problems may not be easily understood by the target language reader. For example, one student said that ‘*the villagers called the patient ‘pee-baa*’. I explained the meaning of this word in the right margin. *Pee-baa* is made up for two words: 1) *pee* means *ghost* and 2) *baa* means *mad*. However, *pee-baa* does not mean a *mad ghost* but it means a *mad person* and this word carries a stigma for people with mental problems in Thai society.

2.4 A direct translation is unable to transmit the intended meaning within the context of dialogue. Direct translation is the type of translation that occurs when the target language is translated directly from the original language. To solve this problem I clarified the words by giving an explanation of context in the parentheses following those words. For example, a student stated ‘*I began to talk with the patient because one reason is that I thought I had limited time...*’

In the above statement, I was uncertain about what the student actually meant about *limited time*. After I reviewed the phrase, it was rephrased to:

‘*I began to talk with the patient because one reason is that I thought I had limited time (in nurse training)...*’

Another problem was when some words needed to be considered in the context of the words around it and/or the sentence. For example, a student stated that ‘*patients with mentally ill may differ from good people*’. However, when I considered the context rather the exact meaning of the text, I found that ‘good people’ was not appropriate in this statement within this context because the student was comparing people with mental illnesses with people who do not have a mental health problem. Therefore, the words ‘normal people’ was used as it was more appropriate in this context.

2.5 The cultural difference is a difficult issue in translation. One student talked about her feeling of pity towards the patient with a mental illness when the student heard about the patient’s life and that he had no one to take care of him so he had to ask for *a monk’s bowl rice*. People who are not Buddhist may not easily understand this sentence and some additional notes were needed. I noted that it is a tradition of Buddhism that every morning Buddhist people give food to a monk and people who are hungry ask for any food that is leftover by a monk.

2.6 *The translation is complicated where there is different in the structure of grammar between two languages.* Thai grammatical structures are different from English in many aspects, such as Thai verbs do not inflect whereas verbs in English change following tense, person, or number. Another different grammatical style is nouns. Nouns in Thai language have no singular or plural. In addition, pronouns are frequently omitted or used implicitly and nicknames are used instead of pronouns. For example, 'nakseuksa' (means student) was stated by a student it can be two different pronouns: I or we, and its meaning can depend on the context.

'...the patient looked after nakseuksa's mind rather than nakseuksa (I) would look after patient's mind'

In the above statement, *nakseuksa* refers to 'I' rather than 'we'.

2.7 *The translator works as an interpreter in the intralingual and interlingual translation.* In order to maximise the validity of translation, I had to produce neutral messages and this was not always possible when vague words appeared. I worked as a translator but could not avoid conducting intralingual and interlingual translation. Intranlingual translation means to interpret the same language, here I translated *Isan* into Central Thai language as well as within the Central Thai language. On the other hand, interlingual translation is to translate between different two languages. Within this study, Thai was translated into English. For example, one patient asked a student the following.

Isan language: 'เป็นหยังคือว่าแต่ไทยแท้'

Central Thai language: 'ทำไมพูดเฉพาะภาษาไทย'

English language: 'Why did you speak only Central Thai dialect?'

3. Translation checking

There are several techniques to achieve equivalence of meaning between two languages. For example, back translation with monolingual test (one translator conducts forward-translation whereas another performs back translation) is mostly used in many quantitative studies in order to retain the validity of translated research instrument (Maneesriwongul and Dixon, 2004). However, back translation is not always possible in qualitative research as it time-consuming and expensive and furthermore Lopez *et al.* (2008) state that there is no standard for translation process in qualitative research. Fenner (1989) also states that '...accuracy of content being of more importance than the formulation or style...'. One possible way is that the researchers who conduct their own translations in qualitative research should demonstrate the quality of their translation by verification of the method and accuracy of concepts by a qualified native speaker (Squires, 2008); furthermore, evaluating the accuracy of the translation should take into account the content and intention (Sager, 1989). In order to enhance the quality and conceptual equivalence of translations, a qualified bilingual person who has the ability to understand the discipline of qualitative study can do this task (Squires, 2008). Therefore, in this study, I used a qualified bilingual person who understood both Thai and English but has no experience of mental health nursing, a nurse educator working in mental health nursing area, and two supervisors who are fluent in English and have experience in carrying out qualitative research to examine the quality of my translations. I will demonstrate four steps of translation checking (Figure 1) as following.

Step 1. *Translating and revising the first draft.* The raw data including interview transcripts, observation notes, and interaction reports were translated by myself from Thai to English. Two fellow Thai PhD students checked the data translated for meaning and grammatical style. The

translated data validated by the fellow PhD students were reviewed by myself and then I produced the first draft of translation.

Step 2. *Detecting misinterpretation of meaning, conceptual equivalence and grammar by a qualified bilingual scholar.* The first draft of translation was checked by a qualified bilingual scholar (who did not have a nursing background) but who has over 20 years of experience as a translator and interpreter for both meaning equivalence and grammatical style.

Step 3. *Checking the conceptual equivalence and terminology of mental health nursing by a nurse educator working in mental health nursing area.* A Thai nurse educator who has been working in mental health nursing area for over 16 years checked the translated data that had been validated by the qualified bilingual scholar in Step 2 for meaning and specific vocabularies associated with psychiatric nursing. This helped to ensure that various terminologies were used in appropriate situations.

Step 4. *Confirming by the target language speakers (supervisors).* According to Fenner (1989), one fundamental requirement of translation is that texts translated need to be in an acceptable form to the reader not the translator. Therefore, the first draft of translated transcripts that had been validated by the two scholars in different fields in the Steps 2 and 3 were checked for meaning and grammatical styles by two supervisors who use English as a mother tongue language.

The results of translation checking were that there were some grammatical errors and some phrases were accurate in Thai but they did not make sense for the target readers and some sentences needed reconstruction.

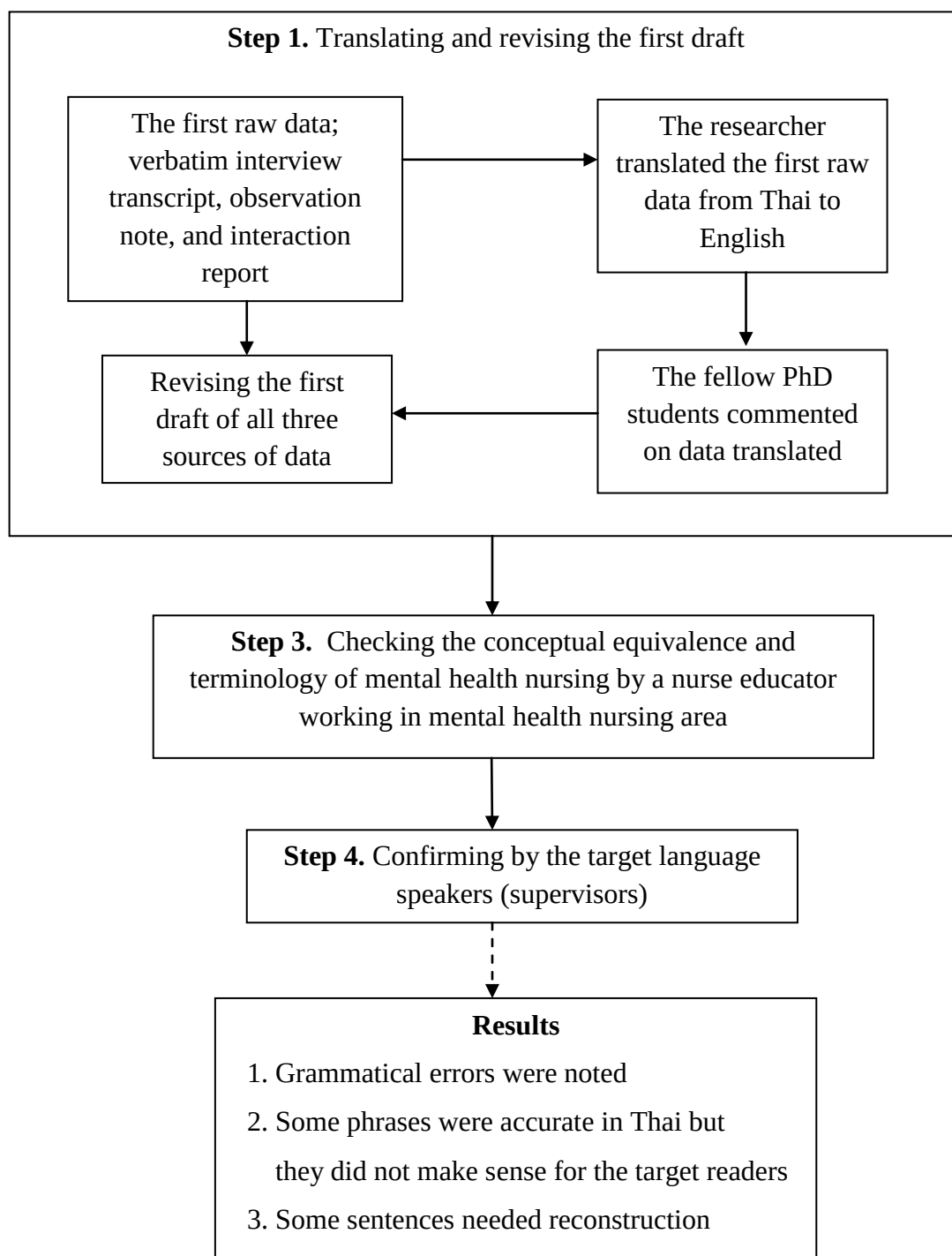


Figure 1 Process of translation validation

4. Confirming the validity of translation

The process of confirming the validity of data translated was done continually with the Step 4 in process of translation validation by two supervisors who use English as the first language. To ensure that the validity of data was established, I and my supervisors separately conducted line-by-line coding of the same verbatim interview transcript. The line-by-line codes were later compared in order to check for similarities and differences. The process of confirming the validity of translation is demonstrated in Figure 2. The results showed that the majority of the codes were similar. The minor different aspects emerging were that some different vocabularies of codes were used by the researcher and the supervisors.

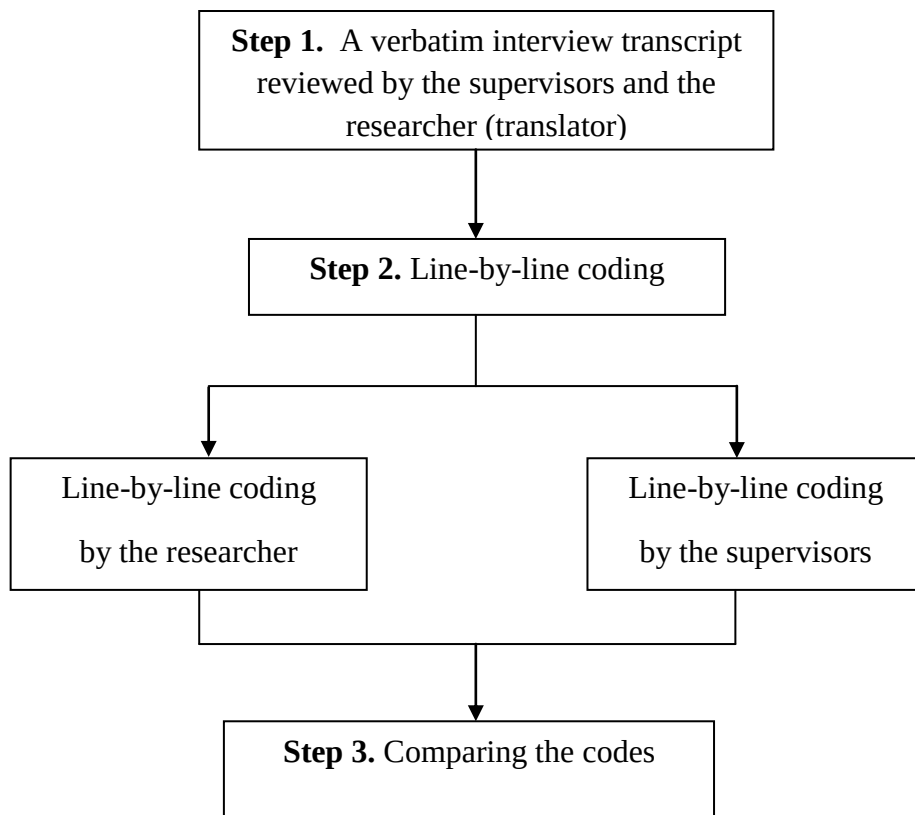


Figure 2 The process of confirming the validity of translation

5. Conclusion

The aim of qualitative study is to explore the accuracy of participants' experiences. However, when the researchers carry their study in the different languages from the primary language of participants, the research findings are risks of misrepresentation. Several aspects including the translators, process of translation, and process of translation validation influence the risks. In qualitative research, there is no standard of translation process. The appropriate way is that the researchers need to demonstrate clearly about the process of decision making on how they tackle the dilemmas of translation when it is found. Moreover, they need to illustrate the process of translation evaluation. If the process of translation is applicable and the native speakers can capture the meaning of texts translated, it means that the translation is achieved.

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**“SANJEEVANI.....LIFE BEYOND CANCER” - A pioneer organization
for supporting cancer patients..... A CASE STUDY**

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ABSTRACT

A diagnosis of cancer marks the beginning of a journey full of emotional, psychological, physical and practical challenges. Challenges can relate to the shock of a cancer diagnosis and fears about the future. Or they may be due to physical side effects of treatment, such as nausea and fatigue. There are also practical aspects of treatment to deal with, including costs and travel. More specific emotional problems may include concerns about body image after treatment or periods of anxiety or depression.

Sanjeevani...Life beyond cancer is an organization which is committed to provide holistic care to cancer patients by holding their hands to care, counsel and rehabilitate them.

The power of the NGO can be seen in changes they have stimulated in government policy and political processes to drive action from the ground up. Their independence from the government allows NGOs to advocate for issues that may not be on the political agenda and, as such, NGOs play an important role in increasing the awareness of the general public and key decision-makers about cancer control issue.

Keywords- Cancer, emotional, practical, challenges, NGO, Sanjeevani, control, counsel, rehabilitate.

Sanjeevani- Life Beyond Cancer- A case report

Cancer is a disease of the cells, which are the body's basic building blocks. Cancer occurs when abnormal cells grow in an uncontrolled way. These abnormal cells can damage or invade the surrounding tissues, or spread to other parts of the body, causing further damage. Sometimes cancer cells break off the primary tumour, enter the bloodstream or lymphatic system, and travel to a new organ to form secondary tumours. This is called metastasis.

LIVING WITH CANCER

A diagnosis of cancer marks the beginning of a journey full of emotional, psychological, physical and practical challenges.

Challenges can relate to the shock of a cancer diagnosis and fears about the future. Or they may be due to physical side effects of treatment, such as nausea and fatigue. There are also practical aspects of treatment to deal with, including costs and travel. More specific emotional problems may include concerns about body image after treatment or periods of anxiety or depression.

The emotional, physical and practical journey can take a different direction altogether if cancer comes back or spreads.

It's not always easy, to cope up with such situation resulting in mortality of a huge number of people every year.

CANCER STATISTICS IN INDIA

One woman dies of cervical cancer every 8 minutes in India. (1)

For every 2 women newly diagnosed with breast cancer, one woman dies of it in India. (2)

As many as 2,500 persons die every day due to tobacco-related diseases in India. (3)

Smoking accounts for 1 in 5 deaths among men and 1 in 20 deaths among women, accounting for an estimated 9,30,000 deaths in 2010(4)

SOME FACTS (5)

- Estimated number of people living with the disease: around 2.5 million

- Every year, new cancer patients registered: Over 7 lakh

Cancer-related deaths: 5,56,400

Deaths in the age group between 30-69 years (6)

- Total: 3,95,400 (71% of all cancer related deaths)

- Men: 2,00,100

- Women: 1,95,300

Role of NGOs-

No individual institution has the capacity to provide comprehensive cancer control initiatives and care services. Often we find a consortium of agencies from government, for-profit and not-for-profit sectors that come together to provide a spectrum of services. In cancer control, role of non-government organisations (NGOs) is critical as most NGOs, generally operate at a local level and have strong local community ties with cancer patients and their carers.

In the absence of inadequate skilled supporting work force and due to a huge load of the cancer patients the role of NGOs even becomes more significant in developing countries like India to hold the hands of cancer patients in their hour of need.

SANJEEVANI... LIFE BEYOND CANCER

Sanjeevani is an NGO in India which is founded by Ms Ruby Ahluwalia, a cancer survivor herself. While going through her journey of cancer she realised the inadequacy of the cancer care system and the wide gaps that exist in it.

Sanjeevani ... Life Beyond Cancer, is committed to provide holistic care to cancer patients by holding their hands, counseling and rehabilitating them by providing emotional, financial and logistic support and job opportunities to help them lead an enriched life.

Sanjeevani impacts the lives of its its beneficiaries through various programs it undertakes at its centres across India.

Initiatives of Sanjeevani- Life beyond cancer

1.Patient-Support Program

Sanjeevani has been working in cancer hospitals across the country at and reaches out to approx 300 patients per day and approx 72000 patients on an annual basis through this Program at;

- ACTREC, Navi Mumbai ,
- Tata Memorial Hospital, Mumbai
- RST Cancer Hospital, Nagpur
- GCRI, Ahmedbad
- SMS Hospital, Jaipur
- ATRC, Bikaner
- JIPMER, Puducherry
- MGIMS, Wardha
- Chittranjan Hospital, Kolkatta (in process)

The coordinators at all these centres facilitate in

Bridging the gap, if any, to reinforce importance of regularity in seeking treatment and taking medication.

Counseling, when required, to patients and/or their family members on specific concerns. Facilitate a platform for patients to connect with survivors or co-patients and/or medical staff for heart-to-heart conversations.

Bringing festivals, special occasions right at the doorstep of patients, through social programs by school/college children.

Social, Emotional, financial, spiritual and psychological support to patients and relatives to bounce back at life with positivity and zest after treatment.

2.Nutritional support program

Approx 36000 underprivileged cancer patients benefit from this program on an annual basis.

The underprivileged section of the society is provided with nutrition rich food packets that help them in recovering from damage to body after chemo cycles. This runs at Nagpur, Mumbai and Ahmedabad.

3.Wellness Centres for Cancer Patients

Sanjeevani has come up with the novel concept of wellness Centres for underprivileged cancer patients. The whole idea behind them is that as we all know that cancer cells are present in all bodies. Just that in healthy bodies our immunity system keeps them in check. When the immunity system is weak for some reason, various diseases including cancer take over. Our immunity system can be strengthened to enable the body to fight these diseases by Right Nutrition, Right Breathing and Positive thoughts.

Therefore in the Wellness Centre, cancer patients and survivors are given inputs through

Psychological counseling
Yoga and pranayam training
Nutritional Guidance
Reflexology
Art, Music and dance Therapy
Group Therapy

These spaces also help cancer patients deal with the side effects of modern medicine in a better way and equip them with skills which help them to take responsibility of their own health and build up their immunity systems.

Patients from unprivileged backgrounds are provided services free of cost so that they can play an active role in the society rather than living as depressed beings carrying the baggage of scars of cancer.

4.Awareness and Detection Camps

To hold Outreach camps for creating awareness about causes of cancer , need for early detection and screening so as identify cancer in early stage leading to full cure and saving of lives.

Not only this, Sanjeevani has created awareness content for breast cancer in form of 12 Films which are available on their Youtube channel. HYPERLINK "<http://www.youtube.com/user/SanjeevaniLBC>"www.youtube.com/user/SanjeevaniLBC

It also releases (Satori), a compilation of motivational stories of cancer victors to develop a zeal of fight against cancer.

The content is also shared online on the official website and social media so that majority can benefit from it. www.sanjeevani-lifebeyondcancer.com

5.Certificate Course in Professional Oncological Care-Giving

This is a unique course and one of its kind that has been designed for underprivileged cancer survivors to become cancer care givers.

The goal is to hone the wisdom that is generated in a person through his treatment to use it for providing empathetic care to people undergoing cancer treatment and thus raise the bar of cancer care in India.

Sanjeevani therefore along with Tata Institute of Social Sciences, Mumbai designed this curriculum for a course of 4 months and is now cultivating a pool of professional oncological care givers to function as aides to cancer patients as the practioners in India face a real challenge of providing affordable and equitable care to the cancer patients.

The couse curriculum is designed keeping in mind the empathetic,pharmacological,nutritional and physio- therapeutical needs of oncological care.

The course has been immensely successful in placing cancer survivors from underprivileged group with the relatively affluent patients in need of care.

CONCLUSION

The power of the NGO can be seen in changes they stimulate in government policy and political processes to drive action from the ground up. Their independence from the government allows NGOs to advocate for issues that may not be on political agenda cancer .

Not only this, most NGOs are formed with focussed issues in mind and thus are able to work with undivided attention on those issues. Sanjeevani... life beyond Cancer looks like a fine example of the above in terms of their contribution in the field of cancer.

THE WAY AHEAD

Sanjeevani has been appreciated for its work at all its centres by hospital managements, doctors and the main beneficiaries ie Patients.

Sanjeevani plans to reach out to patients and create impact by taking all its Programs to various parts of the country.

In order to sustain its working, Sanjeevani is looking forward to appropriate platforms to present their work and for support from like minded individuals and organisations.

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The Effects of ‘Haze’ on the respiratory health of the Malaysian Population

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Abstract

For the past 3 years, much of the ASEAN region has been engulfed with prolonged periods of *jerebu* (or 'haze'): in June/July 2013, February/March 2014 and June to October 2015. The effect was made worse by long periods of hot, dry weather. This 'haze' has arisen from the illegal 'slash and burn' practices used to clear land for agricultural development, predominantly palm oil. In many regions, unhealthy Air Pollution Index (API) readings were consistently recorded. Newspapers across the region reported increases in respiratory illnesses and cardiovascular disease during these periods of increased 'haze'. Malaysia, amongst other countries was badly affected.

This paper aims to discuss our current project, exploring small area health effects of the 'haze' on the population of Malaysia, in particular whether hospital admissions and mortality rates for respiratory illnesses show a significant increase during periods of prolonged 'haze'. The project uses Hospital Episode Statistics (HES) data and Standardised Mortality Ratios (SMRs) by month and year at district level for all ages, all under 75 and under 18s from the Ministry of Health, Malaysia. This will be combined with data on the API and multiple regressions used to explore the relationship. Previous evidence suggests poorer, more disadvantaged communities have worse health outcomes overall, therefore income data will be included as a proxy to adjust for these effects. Whilst this project is currently in its infancy, this conference provides the opportunity to discuss this and future projects, allowing experts in public health to help shape both the project design and the potential outcomes. This important study could have implications for future policies on 'slash and burn' practices and lead to further research and collaborations across Asia.

Key words: haze; palm oil; respiratory; hospital admissions; mortality

The effects of familiar, unfamiliar music and audiobooks exposure on speech parameters of elderly Alzheimer's disease patients: A within case studies

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Abstract

Alzheimer's disease is a cognitive disorder common among the elderly whereby neurodegeneration occurs rapidly as a result of decline in brain activity. There has been many studies linking music memory with cognition among patients with Alzheimer's disease. However, the types of music exposed, the familiarity of the music and their effects on speech production is still not adequately explained. Improvement in speech can be demonstrated in alteration of several speech parameters. This multiple case study ($n = 3$), seeks to investigate the effects of familiar and unfamiliar music on the speech fundamental frequency (F_0), intensity range, and speech rate of 3 elderly subjects with Alzheimer's disease. The speech parameters after exposure to familiar and unfamiliar music were measured longitudinally over a period of 21 weeks. A listening task to an audiobook was treated as control. Data revealed that in all of these subjects, there was wide variability in performance with no common pattern for familiar music. However, for unfamiliar music, two subjects showed increase in their speech rate. The third subject showed increase in F_0 range. It is suggested that there may be more to understand how familiar and novel stimuli influence speech production in Alzheimer's disease patients.

Keywords

Alzheimer's Disease (AD), Familiar, Unfamiliar, Music, Speech production

The importance of power and potable water in the public health: consider solutions in developing countries

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ABSTRACT

Purpose

Intermittent energy and water supply are current challenges faced by many residents in South Africa. With the millennium development goals not being addressed in many areas, residents experience sub-standard living conditions, which drastically increases the likelihood of a disease outbreak. There is a need for a mobile laboratory that demonstrates power and water self-sufficiency, which is capable of on-site diagnosis and water treatment. The unit will have the ability to perform independent compliance monitoring of municipal water supply, treat inadequate water and provide surplus electricity to surrounding areas.

Methodology

A literature-based study was performed utilizing the databases Google scholar, Scopus and Pubmed; 40 peer-reviewed publications were selected to identify current methods of power and water production in previous disaster management strategies.

Findings

The Chinese base deployed in Sierra Leone during the recent Ebola outbreak serves as an example of the structural and logistical requirements. A prototype of an energy and water emergency module was identified that utilizes wind, solar and biological systems for its energy requirements were identified. For waste disposal, several mobile laboratories in the Antarctic were examined and a combination of technologies was selected.

Conclusion

A completely self-sufficient laboratory is necessary in a rural setting and it is possible through the adoption of a stand-alone hybrid renewable energy system, which produces greater flexibility by drawing on multiple resources. Water treatment technologies, coupled with renewable energy, purify and treat water to within compliance. In addition, the laboratory developed will be a delocalized point of diagnosis for disaster relief and disease outbreaks. Furthermore, the self-sufficient technology may be utilized for a low-cost housing approach.

Keywords: Energy and Water self-sufficiency; Renewable energy; Disaster relief; Disease diagnosis; Water purification; Water compliance monitoring

INTRODUCTION

A disaster is defined as “a serious disruption in the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources” (UNHCR, 2013). The Germanwatch Global Climate Change Index stated that of the top ten countries most affected by disasters from 1995 to 2014, nine of those were developing countries (Kreft et al., 2014). According to the United Nations High Commissioner for Refugees, 38.7 million people were being supported by humanitarian relief by mid-2013 (UNHCR, 2013). For displaced humanitarian relief camps, in the instance of a disaster; energy, potable water and adequate waste disposal are the most essential basic needs and human rights (Nerini et al., 2015).

A disaster such as a disease outbreak may occur at any point, often prompted by substandard environmental conditions such as inadequate water supply, which may be associated with cholera and typhoid fever (UNICEF, 2014). In 2008, a cholera epidemic prompted by inadequate water supply occurred in Zimbabwe. Fatalities were above the international norm of 1% stipulated by the World Health Organization (WHO, 2008). The disease outbreak was catalyzed by sewer pipes in disrepair, inadequate water supply for prolonged periods and subsequent faecal accumulation in rural areas; the major cause for sanitation concerns (Chambers, 2009). In South Africa, similarly, infrastructural problems are leading to the microbial contamination of water and in 2010, 47.6% of South Africans experienced water outages and, of these 36.2% were for prolonged periods (longer than 15 days) (Luyt et al., 2012). This creates a need, not only to have the capability to manage a disease outbreak by providing the necessary needs such as potable water supply, but to monitor water supply for microbial contamination as for a means of prevention (Luyt et al., 2008).

Currently the Water Service Regulation (WSR) (Section 62 of the Water Service Act) is the underpinning legislation responsible for compliance monitoring of potable and wastewater in South Africa. In 2008, the incentive based Blue and Green drop potable and wastewater compliance certificates respectively, were introduced to address ill-monitored water sources (DWA, 2012). Despite some metropolitan municipalities thriving with this new incentive based approach, many rural municipalities were not able to meet the minimum requirements. The lack of compliance is mainly due to lack of skills and resources, mis-understanding of the necessary standards and inadequate intervention from regulatory authorities (DWA, 2012). Biggs et al., (2009) suggests that the major difficulty is the mismanagement of already limited resources within the rural municipalities. With the inability of the majority of rural municipalities to comply with regulatory standards, it is a question of when and not ‘what if’ a major sanitation concern and possible disease outbreak will occur. The major need for water compliance monitoring is not being met by individual rural municipalities. A possible solution would be a mobile laboratory capable of performing independent water compliance monitoring as well as the capability to treat non-compliant water to within compliance.

Apart from cause-specific disease outbreaks, there can also be pathogen epidemics such as the recent Ebola virus disease outbreak in West Africa in 2013 (Briand et al., 2014). The outbreak of Ebola virus disease (EVD) in West Africa in late 2013 was declared a Public Health Emergency of International Concern (PHEIC) by the World Health Organization (WHO) (Briand et al., 2014). As of April 18, 2015, there are 14889 laboratory confirmed EVD cases and 10730 confirmed deaths. Of these, 11323 laboratory confirmed cases (76.2 %) and 9592 deaths (89.4 %) were confirmed by international portable laboratories situated in West Africa (Briand et al., 2014). In Sierra Leone (high outbreak area) there were 13 international mobile laboratories established by January 2015, before which, there were only 5 at the end of December 2014. Operation Western Area Surge (WAS) successfully established 8 additional mobile laboratories between the 6th of December 2014 and the 15th of January 2015 (Zhang et al., 2015). According to Zhang et al., (2015), the three weeks post the 15th of January 2015 has seen a 39.0% increase in samples tested (Zhang et al., 2015). This highlights the great importance of portable, mobile, field laboratories in the diagnosis stage of emerging epidemics and the ability to provide preventative measures. Transport or self-presentation of the patient to treatment site for phlebotomy is a major challenge along with the transport time needed of the sample to a diagnostic laboratory equipped to run molecular diagnostics (Moghadam et al., 2015). Both of these could be overcome with a displaced mobile laboratory. Moghadam and colleagues (2015) identifies that field deployment of rapid diagnostic tests in geographically isolated areas could fast identify individual's positive for EVD in their community and therefore better the chances of survival. The World Health Organisation identifies the diagnostic tests that can be used to confirm symptoms of Ebola. These tests include antibody-capture enzyme-linked immunosorbent assay (ELISA), antigen-capture detection tests serum neutralization test, reverse transcriptase polymerase chain reaction (RT-PCR) assay electron microscopy and virus isolation by cell culture (Bhadelia, 2015). Having highlighted these diagnostics tests, the laboratory should contain the capacity to handle all the laboratory specimens in their recommended storage conditions as this ensures accurate results (Bhadelia, 2015).

In South Africa, the National Health Laboratory Service (NHLS) is responsible for diagnostic pathology service for provincial and national health departments. One of its key services is in the diagnosis of communicable diseases, such as EVD. Due to billing problems, the provincial department of health of KwaZulu Natal and Gauteng are in substantial debt with the NHLS. The NHLS has stopped diagnosis testing for many clinics in KZN, and is in financial turmoil, requesting the National Treasury supply funds to rectify the situation (National Treasury, 2014). The NHLS is responsible for diagnostic testing for Human Immunodeficiency Virus (HIV) and Tuberculosis (TB); both communicable diseases require rapid diagnostic testing. With the NHLS falling short, a disaster management strategy needs to account for the flagship HIV/AIDS and TB programs that are in operation as well as account for other communicable disease outbreaks.

Earthquakes are unavoidable natural disasters that can affect large groups of people. Due to the unpredictability of their onset, it is challenging to provide preventative measures. The UN-ISDR aims at providing strategies to offer post-relief for disasters of this nature; their strategies place emphasis on post-event emergency shelter and humanitarian relief camp establishment (Khazai et al., 2015). An earthquake occurred in 4 regions of Nepal in 2015 affecting approximately 8 million

people; of which 7,557 fatalities and 14,409 injured people were subsequently reported on the in May of 2015 (Khazai et al., 2015). With an estimated 2.8 million people being evacuated from damaged areas, there was a major need for displaced emergency shelters. Even in the more unaffected cities, power is limited with most residences relying on generator-supplemented supply (UN, 2015).

Of the 269 relief sites, none have sufficient water supply, and, many are lacking in supply and/or require boreholes to access water. This is not ideal because the sites are for short-term displacement and also because the water would require additional treatment (Khazai et al., 2015). As of the UN situation report published in June 2015, potable water has been delivered to 1,028,849 people by the UN relief workers in Nepal; 34,978 people have received sustainable water interventions and 566,617 people have been given access to sanitation kits. However many areas are still without adequate water and sanitation; relief organizations have not been able to access 7 village development communities in Dhading and 11 in Dolkaha due to damaged road which has major implications on waterborne disease outbreaks (UN, 2015).

In order for adequate disaster management, mobile displaced laboratories as defined by Saito and Aoyama (1989) are imperative. Typically, with regard to mobile labs in humanitarian relief situations, energy needs are provided for by diesel generators and potable water supply is sourced from central locations; this is expensive and highly reliant on fossil fuels (Nerini et al., 2015). Currently water and power are in short supply in South Africa; this calls for a mobile laboratory, which in protracted situations, in addition to providing diagnostic services, potable water supply and compliance monitoring can provide both energy services, for itself and others. Mobile, decentralized laboratories may be able to address the sanitation concerns caused by inadequate power and water supply in this manner (Nerini et al., 2015).

The approach of this thesis is to address the water and sanitation concerns caused by poor municipal supply and a disaster situation as holistically and sustainably as possible. The two main concerns highlighted to best address these are water compliance monitoring as a means of prevention and disease diagnosis to allow for timely response and cure. The focus of the intervention is to utilize these functions in disaster management situations; because of this, portability and self-sufficiency of the unit are of vital importance. The aim is to develop a self-sufficient mobile laboratory capable of water compliance monitoring and disease diagnosis; literature was examined to determine the relevance of the following objectives in the South African and global context.

Objectives:

- Power supply
- Water supply
- Waste disposal

METHODOLOGY

A literature review was performed with 90 peer-reviewed publications from Google scholar, Scopus and Pubmed over a period of three months; 40 papers were found to be significantly relevant for the study and the remainder were rejected. The following keywords were used to search literature databases: decentralized power, water and waste disposal; power outage; water outage; water scarcity; off-the-grid laboratory; point-of-use; point-of-care; disaster; infectious-disease diagnosis; water compliance monitoring; post-disaster and humanitarian relief.

POWER SUPPLY

Energy is not considered a sustainable commodity in South Africa due to the reliance on fossil fuels such as coal (Baker, 2015). Currently Eskom, the primary electricity producing government-owned company produces 95 % of South Africa's electricity and 45 % of electricity consumed in Africa (Baker, 2015). Poor maintenance of power plants has led to a less than capacity power output, in addition it has also led to a Silo collapse in 2014, which contributed to 10 % of Eskom's total power output (Giglmayr et al., 2015). South Africa is the largest energy producer in Africa with a capability of 43 300 megawatts per day, the closest to which is the 29 000 megawatts per day produced by Egypt (El-Zonkoly, 2015). However, due to infrastructure defects, poor maintenance of current plants and delayed production of new plants the energy capacity is at an average of 71 % of maximum capability (Giglmayr et al., 2015) This is far below the energy demand for South Africa of approximately 40 000 MW per day (Giglmayr et al., 2015). This situation led to the process of "load shedding" in 2015 whereby the available power was distributed, with certain areas being denied power for several hours a day on a schedule; this was to reduce load on the stressed power plants. If the process was not strictly performed on a day-to-day basis this may have lead to a complete blackout. Eskom warned government officials in 2014 that if the system should shut down, it would take two weeks or longer to regain power output based on the power shut down that occurred from Arizona to Southern California in 2011 (Miles et al., 2013).

On September the 8th, 2011, an 11 minute system disturbance lead to a cascading power outage affecting parts of Arizona, Southern California and Baja California, Mexico, subsequently leaving an estimated 2.7 million housing units without power (Miles et al., 2013). Of the major districts affected, San Diego Gas and Electric took 12 hours to restore its 4,293 MW load, Comisión Federal de Electricidad took 10 hours to restore 2,150 MW of its load (Miles et al., 2013). Considering the load Eskom requires would be substantially larger than that restored by districts in California, it would take a considerably longer time. In addition, power was purchased from neighbouring states to restore the power in each district in California (Miles et al., 2013) and currently there is no neighbouring country capable of producing the 43 300 MW needed to restart the system. The cause for the Arizona-Southern California outage was due to deviations in the flow of voltage, overloading some systems and leaving others without load. Over the 11-minute power distribution occurrence, transformers, transmission lines and generators were overloaded and subsequently tripped offline (Miles et al., 2013). Similarly, if Eskom units were to be overloaded at any point, it may lead to a sustained power outage. In the 12-hour outage, the direct economic loss was estimated to be between \$97 and \$118 million by the National University System Institute for

Policy Research (NUSIPR) (NUSIPR, 2011). These estimates factor in food spoilage, government overtime and lost productivity, all of which are largely based on population and length of the outage (NUSIPR, 2011). The potential economic cost of a total blackout in South Africa the estimated 18-fold population increase and the estimated two week restoration time must be taken into account.

In light of recent conditions, alternative systems need to be put into place in case of a power crisis. Currently, hospitals are of primary importance to have sustained power through outages (scheduled or total shut down), and they already contain such systems with generators and boilers producing their electricity for such adverse events (Bizzarri and Morini, 2006). However for private residences, specifically those in newly developed rural areas, a sustained power outage has major implications on sanitation and a disease outbreak might incur as a result (Khazai et al., 2015).

WATER SUPPLY

A global approach aimed at ensuring access to safe drinking water and basic sanitation was envisaged by the Millennium Development Goal (MDG) 7c which aimed to “halve the worlds population without sustainable access to safe drinking water and basic sanitation” by 2015 (WHO and UNICEF 2014). In the year 2015, 663 million people globally still lack improved drinking water sources and the sanitation target still not met with almost 2.4 billion still lacking improved sanitation facilities and 946 million practicing open defecation (UNICEF, 2015). Despite the access to safe drinking water being met, more people are still using unimproved drinking water sources and live in sub-Saharan Africa, while one fifth live in Southern Asia (UNICEF, 2015). In light of this, the Sustainable Development Goal 6 is being implemented to “achieve universal and equitable access to safe and affordable drinking water for all” and to “achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations”.

These are much more comprehensive and ambitious goals than the Millennium development goals as they aim for the complete eradication of water inequality (UNICEF, 2015). In line with water disparities in terms of access to clean safe drinking water in South Africa, the Joint Monitoring Programme Report highlights that, 8 out of 10 people still without improved drinking water sources live in rural areas (WHO, 2015). South Africa is one of the more water scarce countries in the world. The lack of infrastructure makes it challenging to provide every citizen with their right to basic water and sanitation, defined as 50 to 100 litres of water per person per day (Carden et al., 2007). Adewumi et al., (2010a) describes South Africa as semi-arid due to low rainfall and substantial evaporation. Rainfall collection is an important aspect to consider with the current water scarcity situation, however due to geographical variance in rainfall, certain areas may not have the rainfall capacity to supplement other water supplies (DWAf, 2005). The decreased rainfall is also aggravated by climatic change (Mukheibir, 2005). South Africa’s mean cumulative annual rainfall is 263 mm per annum from 2010 to 2015 (DWS, 2016), however as Adewumi et al., (2010a) described, a large majority (73 %) is lost through evaporation and surface runoff into rivers (DWA, 2005). This leaves 13 240 million cubic metres per annum (million m³/annum) (27 %) of usable

water, even though this is larger than the 12 871 million m³/annum (De Lange, 2010) total water requirement, a small fraction of the water is collected and stored and of this it may not be potable without treatment. In addition, Mukheibir (2005) has estimated a 10 % reduction in stream flow by 2025 due to increased population and urbanisation. Water scarcity is a global occurrence; Table 1 shows the top 30 water stressed countries in the world, which emphasizes the importance of water research specifically on developing countries.

Table 1: Top 30 most water scarce countries in the world

Rank	Country Name	Baseline Water stress score	Rank	Country Name	Baseline Water stress score
1	Antigua and Barbuda	5.00	1	Western Sahara	5.00
1	Bahrain	5.00	17	Saudi Arabia	4.99
1	Barbados	5.00	18	Kuwait	4.96
1	Comoros	5.00	19	Oman	4.91
1	Cyprus	5.00	20	Libya	4.84
1	Dominica	5.00	21	Israel	4.83
1	Jamaica	5.00	22	Kyrgyzstan	4.82
1	Malta	5.00	23	East Timor	4.81
1	Qatar	5.00	24	Iran	4.78
1	Saint Lucia	5.00	25	Yemen	4.67
1	Saint Vincent and the Grenadines	5.00	26	Palestine	4.63
1	San Marino	5.00	27	Jordan	4.59
1	Singapore	5.00	28	Lebanon	4.54
1	Trinidad and Tobago	5.00	29	Somaliland	4.38
1	United Arab Emirates	5.00	30	Uzbekistan	4.32

(Reig *et al.*, 2013)

In South Africa since 1994, there are policies being implemented to ensure better management and optimal use of water resources. Policies such as the National Water Resource Strategy (NWRS) National Water Act (NWA), which aims to optimize water use and minimize damage to ecosystem. In South Africa in 2014, the implementation of the NWA had successfully provided 90 % of households with access to piped in their or within 200m of their dwellings which is a major improvement from 84.9% in 2002 (Statistics South Africa, 2015). However, even though the water supply is there, there is a concern with the irregularity of potable water supply (Luyt *et al.*, 2012). This is largely due to infrastructural problems and incompetent waste-treatment operators, which leads to microbial contamination of water (Momba *et al.*, 2006). Hence, a large part of the population may experience intermittent and microbially contaminated water supply and diseases such as cholera and typhoid fever may occur as a result (UNICEF, 2014). This creates a need to monitor water supply for microbial contamination (Luyt *et al.*, 2012). Safe drinking water has been identified as one of the scarce essential needs in postdisaster relief operations (Lantagne and Clasen, 2012). Currently, for the most part potable water needs are provided for by bottled water being delivered daily.

However, for prolonged displacement this is not as sustainable and cost effective as on-site treatment technologies (Loo *et al.*, 2012). On-site treatment technology has been investigated for several disaster management operations (Nerini *et al.*, 2015). Research conducted in Nepal, Indonesia, Kenya and Haiti serve as a template for common household water treatment methods (HTWS); these include boiling or chlorination which can be implemented with relative ease

(Lantagne and Clasen, 2012). Methods such as combined flocculation, solar disinfection, ceramic pot filtration and UV light exposure have been also found to be effective in disaster situations. These can suffice for emergency response interventions to provide potable water for natural disasters and in response to outbreaks caused by untreated water. In a bid to incorporate easy to use water treatment technologies, Wendt et al. (2015) highlights that water treatment technologies such as gravity fed point of use devices and Bio-sand filters have demonstrated the ability to significantly reduce the amount of pathogens in laboratory and field studies with minimal cost (<10\$/unit-once-off cost).

Biosand filters have been used successfully in rural communities and studies conducted in River Njoro watershed in Kenya and in the Dominican Republic and displayed significant reduction in days the population experienced diarrhoea (Wendt et al., 2015). The biofilter gravity-fed system uses a multiple barrier approach including water bio-filtration and chlorine disinfection. The water is added to the flocculation bucket along with polyaluminium chloride coagulants and left for approximately 1 hour. The water is then filtered through foam and carbon filter blocks in the second chamber; the water trickles through a chlorine tablet before entering the third chamber. The lower collection chamber allows for an increased holding time for chlorination. The water then passes through a second carbon filter to remove excess chlorine so the water is fit for human consumption (Wendt et al., 2015). The use of chlorination dispensers is highlighted by the work done by Yates et al. (2015) on the effectiveness of chlorine dispensers in emergencies in Haiti, Sierra Leone, Democratic Republic of Congo and Senegal. The chlorine dispensers are valve regulated, and have the capability to automatically treat adjacent water bodies. The use of chlorine dispensers has displayed significant reduction in microbial species in water supply and a decrease in diarrheal disease (Yates et al., 2015).

Loo et al. (2012) suggest treating water at the point of consumption based on the findings that residents in temporary relief camps are already exposed to unhygienic conditions, which are further accentuated by the contamination of treated water. Butler et al. (2013) identify point of use water treatment technologies as a promising alternative to providing access to safe drinking water in emergencies. Coupled with hybrid configurations, Schäfer et al. (2014) identify membrane based water treatment systems as the most appropriate method to remove contaminants from water in decentralized locations. The main membrane technology used consists of microfiltration, ultrafiltration, nanofiltration and reverse osmosis, which are pressure driven processes (Butler et al., 2013). The advantages of this choice for this technology is that it has the ability to remove particles, viruses, bacteria, salt ions, trace contaminants and most importantly, the ability to be coupled with renewable technologies for deployment in the remote areas (Butler et al., 2013). The cost of these technologies vary from 0.7 \$/m³ for membrane filtration to 18.8 \$/m³ for reverse osmosis with seawater (Karagiannis and Soldatos, 2008) Based on data from 23 African cities the cost of water ranges from 0.1-2.7 \$/m³ for tap water and 2.4-9.7 \$/m³ for water tanker supply (Keener et al., 2010). Thus making the treatment technologies economically viable, if not preferable in certain situations.

In a bid to address poor water quality, renewable energy membrane technologies have been identified to have the technical capacity to address this problem. Of interesting note is their ability to be incorporated into hybrid configurations and renewable energy technologies for deployment in the rural areas (Schäfer, et al., 2014). Theoretically, the proposed laboratory can adopt such technology. Although found to be a good alternative in the treatment of water, its challenges mainly which resonate towards, expensive operation and maintenance. Schäfer, et al. (2014) advises that issues ranging from the technical operation of such technology need to be addressed before implementation. Training and retention of skilled operators, water quality monitoring, systems failures, technology adaptation and public awareness, finance and sustainability are some of the issues that need to be carefully addressed. A mobile laboratory would be imperative in both the monitoring of microbial contaminants in water supply but to provide a inexpensive means of treating water. However, considering the intermittent water supply, the primary concern is to supply the laboratory with potable water supply itself. Conversely, the technology used to provide the laboratory with potable water could just as well be applied directly to low cost housing units.

WASTE DISPOSAL

Waste disposal infrastructure in urban areas in South Africa is for the most part in good operation, wastewater is disposed through drainage infrastructure and solid waste is collected routinely by the city council. However, such liberties are not experienced in some peri-urban and many rural areas. In fact in Driftsands, Greenfield, Masipumelela and Tafelsig informal dwellings outside of Cape Town, South Africa, 68% of the settlements did not have a waste bin on their premises (Govender et al., 2011). Of the low-cost housing residents, 8.1% reported disposing excreta and soiled nappies on the streets while 17.8% of informal “dwellers” disposed of these items in storm-water drains (Govender et al., 2011). Additionally, there was only drainage infrastructure for the low-cost housing units, and the informal “shack” inhabitants had to make use of these facilities too. Upon inspection, 92% of the drains of the 173 plots were in disrepair, most likely from over-use (Govender et al., 2011).

The generated greywater from the shack dwellers was for the most part disposed of in the low-cost housing units toilets (Govender et al., 2011). With a limited amount of water resources available, there is an ever increasing need to conserve and reuse water, which due to lack of awareness, potable water is being used for non-potable purposes, which subsequently deteriorates the quality of the water (Al-Jayyousi, 2003). In addition, due to the focus of the constitution, officials generally provide water supply before drainage services, as a result of this, wastewater is often disposed of locally, producing large bodies of malodorous, stagnant water, which could catalyse waterborne related disease outbreaks and contaminate groundwater and rivers (Carden et al., 2007; Zuma and Tandlich, 2010).

A primary concern in producing a self-sufficient housing or laboratory unit is wastewater management. In an attempt to understand the requirement for a decentralized method of treating wastewater produced, both in laboratory and housing units, the research units deployed in the

Antarctic will be examined. According to the protocol on Environmental Protection in the Antarctic Treaty the minimum requirements for sewage treatment and disposal are prescribed to minimize environmental impact and land occupation and to have a safe and reliable system that is easy to manage (Camenzuli et al., 2015). The above criteria are not dissimilar to those that would be required in a decentralized laboratory unit with an operator. Despite the requirements of the Protocol on Environmental Protection of the Antarctic Treaty, there is no unified method of treating waste. Some research laboratories are using unique ways of treating waste (primarily human); Belgrano and Orcadas; the two Argentinian bases; separate greywater and reuse it for toilets to reduce water needed. Dome A, a Chinese base, utilizes a negative pressure ‘freeof-flushing’ system to reduce the volume of greywater produced (Gröndahl et al., 2009).

The Matri and Troll bases of India and Norway respectively utilize incinerator toilets; the ash is collected and disposed of in their respective countries (Gröndahl et al., 2009). Perhaps one of the most efficient techniques used is that of the UK base, Halley VI. They utilize a ‘microbac bioreactor’ sewage treatment plant, with the aid of modified bacteria, which reduces quantity of sludge produced. De-sludging only occurs once a year, subsequent sludge is incinerated; the ash is collected and disposed of in landfills in the UK (Gröndahl et al., 2009). With no stipulated method of wastewater treatment in the Antarctic, the techniques of different bases are highly varied. In the design of an ‘off the grid’ lab many aspects should be taken into account, ideally, a technique that is a combination of different techniques needs to be optimized. A key aspect to consider is cost, therefore simple techniques should be of primary importance; hence; a combination of the aforementioned techniques should be investigated.

DESIGN CRITERION

Ideally, a decentralized unit that is capable of early characterisation of a disease outbreak needs to be considered. In the South African context and focusing on power and water supply the unit cannot rely on municipal support for power, water and waste disposal and will therefore be required to be energy self sufficient and capable of on-site wastewater treatment. For this reason, inexpensive and energy efficient equipment and process design needs to be implemented and/or designed for optimum energy usage. Aside from this, a similar approach can be applied to low cost housing; the on-site wastewater treatment will significantly decrease the pressure on municipal systems; which will minimize the eutrophication of water bodies and the settlement of large malodorous, stagnant bodies of wastewater; which themselves, are the primary concern for disease outbreak. The structure of the laboratory has to be easily constructed, de-assembled and easy to transport among locations in case of disasters. Options for the criterion selection for water treatment technologies that premise on simplicity in terms of use and maintenance stand a better chance for sustainable use in the long run in rural environments (Wendt et al., 2015). Renewable energy production sources will be adopted using the criteria of advantages, cost effectiveness, ease of operation, ease of repair and ease of set up and maintenance in relation to cost and technical support.

The success of the operations of this laboratory will be on the small-scale renewable energy combinations that provide a stand-alone energy system usually called Remote Hybrid Power System (Sigarchian et al., 2014). Renewable energies have many advantages as they are sustainable and have low emissions and economic benefits. The combination of photovoltaic panels, wind energy and batteries is used commonly. The advent of microgrid technology and remote hybrid power system offer the potential to provide electricity and drinkable water in remote areas and disaster situations (Callaway et al., 2014; Sigarchian et al., 2014). The technology uses the same concept of integrating different sources of renewable energy coupled with energy storage units as backup (Sigarchian et al., 2014).

Nerini and colleagues (2015) developed a solution for providing energy and potable water to people in protracted displacement situations. They developed modular components to be incorporated into a shipping container. Their energy module consisted of 22 photovoltaic panels and a battery bank for storing excess power generated. Their system for water purification was a reverse osmosis unit integrated into 2 water storage tanks (Nerini et al., 2015). Work conducted by Callaway et al., 2014, in modelling a deployable microgrid share the same concept as the energy and water emergency module demonstration kit in Stockholm (Nerini et al., 2015). Due to the variable displacement situations and therefore weather conditions Callaway et al. (2014) suggests modelling the renewable energy microgrid to integrate energy from multiple systems simultaneously. This will increase power redundancy of the unit and provide a robust short-term power production solution. Kaundinya and colleagues (2009) concluded that a stand-alone energy system for decentralised power production is imperative for optimum operation of the laboratory in a rural setting (Kaundinya et al., 2009).

CONCLUSION

Each of the objectives mentioned were found to be relevant in the literature examined; power supply is vital in rural areas and in humanitarian relief situations; methods of water treatment have shown promise in many decentralized areas and show promise to improve water access in rural and disaster-affected populations. Waste disposal is a pertinent issue in South Africa and globally; sanitation concerns arise from improper disposal. Small-scale waste incineration shows promise for maintaining sanitation in affected populations. The containerised solution to meet the energy and water needs for people in protracted situations provides an excellent approach to ensuring security of supply of energy and treatment of water (Nerini et al., 2015). However Nerini et al. (2015) identifies the constraint to wind system as a “limited power production in situations when there is no wind or when the module is positioned in such a way that surrounding topography creates turbulences in the wind regimes around the wind turbines”. Schäfer, et al. (2014) acknowledges, “every technique has its own limitation, and hence the originality of the approach lies in utilising a hybrid of techniques that tend to cancel the limitations inherent in any one of the used techniques when used on its own”. A pragmatic approach in the supply of treated water with particular emphasis to developing countries following the models of industrialised developed nations may not be appropriate (Schäfer, et al., 2014). Options to establish a completely self-sufficient laboratory in a rural setting is possible through the adoption of stand-alone renewable energy systems as they

produce greater flexibility in the ability to draw on multiple sources of energy and are more suitable for the rural settings. Water treatment technologies to purify or sample water should be able to be coupled into renewable energy hybrid systems. The utilisation of a hybrid of strategies needs to be used in the selection of technologies for the establishment of this laboratory. The hybrid approach ensures that the continuity of operations is conserved even if other systems fail to perform what is expected of them. There is still a lot of research that needs to be conducted for the successful deployment of the laboratory in an African context and more specifically in a rural setting.

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The Standard Patient of Big Data: the Trends of Content Analysis

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This study used Content Analysis Toolkit for Academic Research (CATAR) on standard patient from the Web of Knowledge database. The study collected 444 articles, analyzed with automatic context exploration for “Overview Analysis” and “Breakdown analysis”. The study showed the following: (1) the distribution of author’s topics: “medical education”, “patient simulation”, “clinical performance” and “communication”, (2) the distribution of WOK’s topics: “clinical skill”, “structural clinical examination”, and “communication”, (3) The productivity of country: USA (309 articles), Canada (38 articles), and Netherlands (12 articles), (4) The productivity of categories: institution, author, journal title, source, cited reference article, cited reference author. The study recommends that future sources of big data can be amplified, and increases the multiple indicators and standards for conducting cross-subject analysis, in order to understand the development trend of the various fields.

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