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Examples:

Abayomi (2000), Agindotan et al. (2003), (Kelebeni,

1987a,b; Tijani, 1993,1995), (Kumasi et al., 2001)
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Chikere CB, Omoni VT and Chikere BO (2008). Distribution of potential nosocomial pathogens in a hospital environment. *Afr. J. Biotechnol.* 7: 3535-3539.

Moran GJ, Amii RN, Abrahamian FM, Talan DA (2005). Methicillinresistant *Staphylococcus aureus* in community-acquired skin infections. *Emerg. Infect. Dis.* 11: 928-930.

Pitout JDD, Church DL, Gregson DB, Chow BL, McCracken M, Mulvey M, Laupland KB (2007). Molecular epidemiology of CTXM-producing *Escherichia coli* in the Calgary Health Region: emergence of CTX-M-15-producing isolates. *Antimicrob. Agents Chemother.* 51: 1281-1286.

Pelczar JR, Harley JP, Klein DA (1993). *Microbiology: Concepts and Applications.* McGraw-Hill Inc., New York, pp. 591-603.

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Full Length Research Paper

A cross-sectional internet-based survey of influenza A (H1N1) pandemic: Risk perceptions, behavioural responses and vaccination practices at Lund University, Sweden

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The 2009 influenza A (H1N1) pandemic caused worldwide panic. Response to the pandemic varied widely between and within countries. The Swedish National Board of Health and Social Welfare responded by recommending vaccination of the entire population and a wide range of community mitigation measures. This study assessed the impact of the Swedish policy interventions. The study employed an internet-based questionnaire survey to collect data from master students on English programs at Lund University. The results show that majority of the respondents were aware of the pandemic and the Swedish government's recommended mitigation measures. The overall adoption of the recommended measures was low among the respondents. Vaccination uptake was 43.1%. The low uptake was attributed to vaccine safety concerns and low risk perceptions. Mitigation measures that were provided for free, and those that did not affect the daily routine received a high adoption compared to those that entailed spending money. The government's communication on influenza A (H1N1) was effective; however, some areas needed improvement to enhance adoption. It is imperative that communication about risk and benefits are communicated but with emphasis on the positive to avoid the dominance of the negative. In addition, group specific fora are necessary to address concerns.

Key words: Behaviour responses, influenza A (H1N1), pandemic, risk perceptions, vaccination practices.

INTRODUCTION

Influenza A (H1N1) can potentially cause indiscriminate pandemics (Dawood et al., 2009) that cannot be precisely predicted (Tsiodras et al., 2009; Balcan et al., 2009). For these reasons, it becomes difficult to determine which actions to take (Ong et al., 2009), which in turn, may lead to enormous challenges to the communities and the Healthcare systems. For example, in 1918 to 1919, the

influenza A (H1N1) in Spain was mild at its onset (Franco-Paredes et al., 2009); however, later on, its virulence increased which led to approximately 300 million cases and about 50 million deaths globally (Franco-Paredes et al., 2009; Schnitzler and Schnitzler, 2009). The 2009 influenza A (H1N1) pandemic was rapid in morbidity – it spread to four continents within a few weeks which prompted the World Health Organization (WHO) to declare it as an emerging global pandemic (WHO, 2010). This study was conducted at a time when influenza A (H1N1) had been declared a global pandemic and had already caused over 15,174 deaths globally

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(WHO, 2010). There were 11,000 laboratory confirmed cases and 27 deaths in Sweden (SMITTSKYDDSIINSTITUTET, 2010).

The Swedish National Board of Health and Welfare (*Socialstyrelsen*) responded to the 2009 influenza A (H1N1) pandemic by recommending vaccination of the entire population and also a wide range of community mitigation measures (Socialstyrelsen, 2009; Skåne Region, 2009). The vaccination process was conducted in a stepwise manner. It began with vaccinating the most vulnerable (e.g. pregnant women, children and those whose immunity were compromised because of other diseases such as diabetes, hypertension and obesity) and followed by vaccinating the rest of the population. The community mitigation measures included observance of sneeze/ cough etiquette, frequent hand washing, and social distancing (Socialstyrelsen, 2009; Skåne Region, 2009). The mass vaccination and community mitigation measures were aimed at preventing the spread of the disease as well as to reduce its impact.

The implementation process involved dissemination of information to the public through mass media, fliers, posters and direct letters to individuals (Skåne Region, 2009) on influenza A (H1N1). The disseminated information included the symptoms of the disease, vaccination, recommended community mitigation measures, and actions to take when one suspected that he/she had influenza A (H1N1) infection (Socialstyrelsen, 2009).

The strategies a country adopts in reducing risk (mitigation and preparedness), and for response and recovery from an eminent health disaster (e.g. a disease pandemic) should not start and end with the occurrence of that particular disaster, but it should be an on-going process. Thus, government should make advance plan on what steps to take in order to reduce the impact of any disaster before it occurs as well as during and after. This process is imperative in order to normalize the life of the community (Few and Matthies, 2006; Yesil, 2006; Abaya et al., 2009).

According to Franco-Paredes et al (2009), retrospective learning from earlier disease pandemics is important in enhancing a country's capacity for preparedness to mitigate, respond, and recover effectively from any future pandemics. Also, according to Yesil (2006), we could learn lessons from either the past events that occurred in the particular country or similar events that were experienced by other countries (Yesil, 2006). In this context, this study was therefore conducted with the aim of contributing to the development of strategies for the prevention and reduction of impact from epidemics. To achieve this aim, the study focused on the assessment of the impact of the Swedish government's policy interventions against the 2009 Influenza A (H1N1) pandemic using the case study of students on master's programs in English at Lund University. The specific research questions that were investigated are: 1) What is

the level of awareness and risk perceptions about the 2009 influenza A (H1N1) pandemic and the recommended government interventions?; 2) What are the main information sources on Influenza A (H1N1) and their effectiveness?; 3) What actions did the community take in efforts to adopt the recommended influenza A (H1N1) intervention measures?; 4) What are the general lessons learned that can be applied in similar study setting or elsewhere?

Lund University was chosen as a study site because it was one of the institutions that had comprehensively implemented the government's recommended interventions for the influenza A (H1N1). The university administration had sent out mails to students to raise awareness about the government's recommended interventions including vaccination and community mitigation strategies. The administration also provided regular liquid soap and hand sanitizers which were placed in all toilet facilities in the campus accompanied with posters recommending their usage as well as usage instructions. The posters and usage instructions from the university were written both in Swedish and English.

Study setting

Lund University is situated in the Skåne region in southern Sweden (Figure 1). The university was founded in 1666, it is the largest institution for higher education and research in Sweden with approximately 46000 students. It is constituted of eight faculties (that is, Faculty of Engineering, Faculty of Science, Faculty of Law, Faculty of Social Sciences, Faculty of Medicine, Faculty of Humanities and Theology, School of Economics and Management, Faculty of Fine and Performing arts). It also has a campus in Helsingborg, school of aviation, and many institutes as well as research centres. Students at Lund University on master's programs in English originate from different countries; hence, making it a unique environment to conduct this study (Lund University, 2011).

METHODS AND MATERIALS

This was a cross-sectional internet-based survey (February 28th to March 10th, 2010) conducted among students studying at the master's programs in English at Lund University.

As a first step, an internet web search through the official Lund University webpage was conducted. The aim of the web search was to: 1) build an inventory of all the faculties that offered master's programs in English; 2) identify the specific English master's programs in each of the faculties; and 3) identify the contact persons for each of the master's programs and their e-mail addresses for communication purposes.

From the web search, the faculties that were identified and selected for inclusion in this study were: Social Science, Medicine, Law, Engineering and Science. The selection of the faculties and



Figure 1. Map showing location of Lund University.

the master's programs in English was purposely conducted for two reasons: 1) to get a broad and cross-cutting representation and views from diverse academic fields particularly health, natural science, and social sciences; 2) to capture a diverse population of students from different countries, cultures and ethnicities (note that students in these programs were drawn from different countries). This process was undertaken in order to assess whether there were any similarities or differences in terms of responses to influenza A (H1N1) across different academic disciplines, nationalities or

cultures.

After the web search, identification of the faculties, specific master's programs and the contact persons and their e-mail addresses was completed, a communication to each identified program contact person was sent out. The sent out message introduced the survey and requested the designated contact person for permission to distribute the internet-based questionnaire to the students in the master's programs. Upon obtaining permission, 485 email requests with a link to the internet based questionnaires were

sent out to the students. This was achieved with the assistance of the program designated contact person. The e-mail to the students included introduction to the survey, a request to participate in the study, and a web link to the site of the internet-based questionnaires.

Ethical consideration

This study was conducted according to the Helsinki ethical principles of voluntary participation and informed consent for research on human subjects. Two introductory paragraphs on the first page of the survey questionnaire explained the purpose of the study, confidentiality, voluntary participation, anonymity, withdrawal, and consent to participate. Participants were free to withdraw from the study by clicking the button 'Exit this survey' that appeared on top of each page of the survey questionnaire.

A willing respondent completed the questionnaire on the site and then submitted it by clicking on the button "thank u 4 ur time." By clicking this button, responses were automatically submitted and compiled by Survey Monkey software ProPlan, a web-based survey solution accessible online at www.surveymonkey.com. Out of the 485 requests that were sent out, 130 (27%) successfully completed surveys were compiled.

Study tool

The questionnaire was made up of both closed and open-ended questions. The main themes that were covered in the questionnaire were: 1) respondent's demographic data; 2) awareness of the 2009 influenza A (H1N1) pandemic and recommended interventions; 3) sources from which respondents received information about influenza A (H1N1) and their effectiveness; and 4) respondents' risk perception to contracting influenza A (H1N1) and their adoption of the recommended intervention measures in order to prevent and reduce the disease impact.

Data analysis

The data was downloaded after completion of the survey and converted for application with Microsoft Office Excel 2007. The data in the excel file was then exported to Statistical Package for Social Science (SPSS) version 18- renamed PASW Statistics 18 for data editing and comparative analysis using descriptive statistics. Univariate associations using cross tabulations and binary logistic regressions with a 95% confidence interval were conducted to assess associations between different predictors, and outcome variables. A p-value of <0.05 was considered significant. Additionally, we analysed the data sets particularly the open ended data using content analysis. The data sets were carefully read, coded and analysed on the basis of the main themes.

RESULTS

Demographic characteristics

The respondents constituted of 46 males (35.7%) and 83 females (64.3%). The basic details about the respondents are shown in Table 1 and the respondent nationalities in Table 2. The highest number of responses was received from students at the Faculty of Social

Science, 62.5% (80). Majority of the respondents were between 25 to 28 years of age. Over 82% of the respondents were not employed. None of the respondents reported to have been infected with influenza A (H1N1) during the 2009 epidemic or during their lifetime.

Awareness of the 2009 influenza A (H1N1) pandemic and recommended interventions

Majority of the respondents (99%) were aware of the 2009 global outbreak of influenza A (H1N1) pandemic. They expressed that it was a highly contagious disease that could be transmitted easily from one person to another. Some of the pathways that the respondents mentioned were sneezing, nose picking, handshakes, and touching influenza A (H1N1) contaminated objects.

Over 90% of the respondents were aware of the recommended intervention by the Swedish government and the actions taken by the Lund University management to prevent and reduce the impact of influenza A (H1N1). Some of the interventions that were mentioned included efforts to disseminate influenza A (H1N1) information to the wide audience using the media, healthcare, leaflets and posters, purchasing and stockpiling of antiviral drugs, and provision of free influenza A (H1N1) vaccination to all willing residents. They also mentioned the recommended community influenza A (H1N1) mitigation measures (e.g. frequent hand washing with soap and application of hand sanitizers, use of clean tissues when coughing/ sneezing, and social distancing). The Lund University on the other hand implemented the government policy by purchasing and providing free liquid soap and hand sanitizers to all toilets in campus – these were accompanied with usage instructions. The University also disseminated the government's recommended interventions throughout the campus by use of posters and direct mails to students.

Sources from which respondents received information on influenza A (H1N1) pandemic

The sources from which the influenza A (H1N1) information was received by the respondents and their rated effectiveness¹ are shown in Figure 2. It could be depicted that there were many sources from which the respondents received information about influenza A (H1N1). However, internet, television, friends, posters and healthcare received higher scores in terms of their effectiveness. The least effective sources were radio and leaflets.

¹The rating is based on a scale of 1 to 5, where 1 is least effective and 5 most effective.

Table 1. Demographic characteristics of respondents.

Variables		No. of responses	N = 130 (%)
Sex	Male	46	35.7
	Female	83	64.3
Age	21-24	32	24.7
	25-28	60	46.5
	29-32	25	19.4
	33-36	6	4.7
	37 and above	6	4.7
Faculty	Law	9	7.0
	Medicine	24	18.7
	Science	7	5.5
	Engineering	8	6.3
Employment status	Social Science	80	62.5
	Yes	23	17.8
	No	106	82.2
	Period of stay in Sweden		
	Less than 6 months	12	9.4
	6 to 12 months	42	32.8
	12 months to 2 years	40	31.3
	2 to 3 years	3	2.3
	3 to 4 years	1	0.8
	4 years and above	30	23.4

Table 2. Nationalities of respondents (n = 130).

Nationality	No. of respondents	Respondents (%)	Nationality	No. of respondents	Respondents (%)
Albanian	1	0.8	Jordanian	1	0.8
American	4	3.1	Kenyan	1	0.8
Armenian	1	0.8	Korean	1	0.8
Australian	1	0.8	Lithuanian	3	2.3
Bangladesh	4	3.1	Malaysian	1	0.8
Belarusian	1	0.8	Mexican	2	2.3
Brazilian	1	0.8	Mexican/Swedish	1	0.8
Brazilian/Portugese	1	0.8	Nepali	1	1.5
British	4	3.1	New Zealand	1	0.8
Cameroonian	1	0.8	Nigerian	2	0.8
Canadian	5	3.8	Norwegian	1	0.8
Chilean	1	0.8	Pakistani	2	1.5
Chinese	6	4.6	Romanian	1	0.8
Danish	3	2.3	Russian Federation	2	1.5
Dutch	1	0.8	Scottish	1	0.8
Eritrean	1	0.8	Slovak	1	0.8
Ethiopian	2	1.5	South African	1	0.8
Georgian	2	1.5	Swedish-Argentinian	1	0.8
German	6	4.6	Swedish	23	17.7
Ghanian	1	0.8	Trinidadian	1	0.8

Table 2. Contd.

Latin American	1	0.8	Turkish	4	3.1
Icelandic	4	3.1	Ugandan	2	1.5
Indian	2	1.5	Ukrainian	4	3.1
Iranian	2	1.5	US and Australian	1	0.8
Iraqi	1	0.8	USA	6	4.6
IT	1	0.8	USA and South African	1	0.8
Italian	1	0.8	Vietnamese	1	0.8

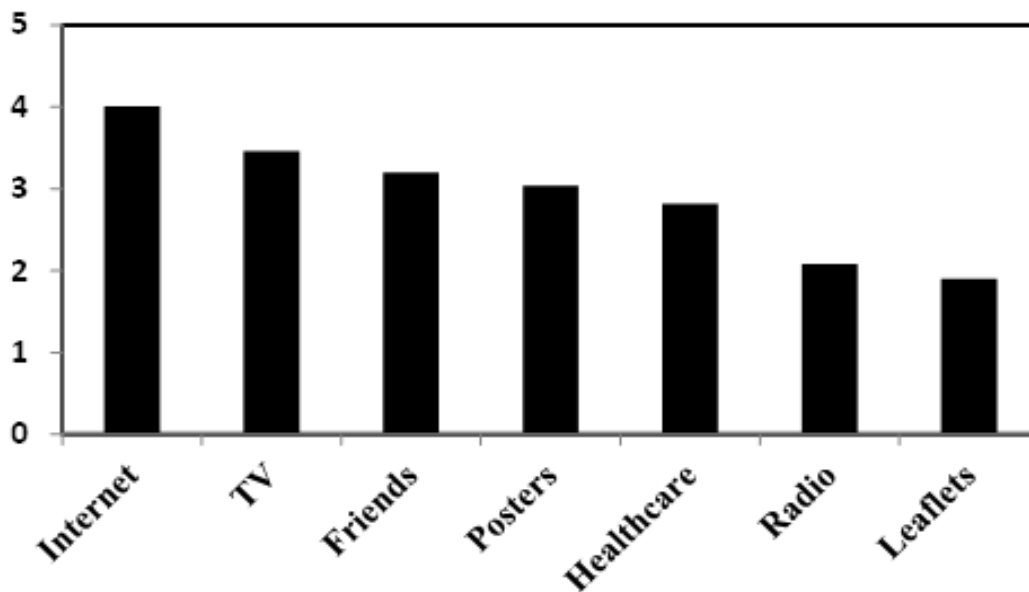


Figure 2. Rated averages for effectiveness of source of information on influenza A (H1N1) pandemic.

Respondents' risk perception and actions to adopt the recommended influenza A (H1N1) intervention measures

Respondent's perception to be at risk of contracting influenza A (H1N1)

Almost 67% of the respondents perceived themselves to be at high risk of contracting influenza A (H1N1) during the pandemic; whereas, the remaining 33% perceived they were at low risk of contracting the disease. Risk perception responses did not indicate any unique pattern between those who perceived themselves to be at risk or those who did not and their nationalities.

Vaccination against influenza A (H1N1)

Majority (95%) of the respondents were aware about the recommendation for all students and the public to be

vaccinated free of charge against influenza A (H1N1). In this category, 80% acknowledged having received an official letter from the healthcare centres inviting them for vaccination. The rest did not receive a letter or were not able to recall having received one. Surprisingly, only 43% of the respondents were vaccinated against influenza A (H1N1). Those who were vaccinated were motivated with the desire to protect self (87%), their family members, and friends (61%). Further, few respondents had vaccination because they received the invitation letter and some cited the influence of close friends. In comparing gender differences against vaccination uptake, it did not reveal any significant statistical association (OR 0.871, 95%CI 0.347 to 1.756, p-value = 0.550).

Respondents who were aware (56%) of the recommendation for vaccination but did not get vaccinated, gave varying reasons as shown in Figure 3. It can be depicted that the concern about adverse reaction, and perception of some respondents to be at low risk of

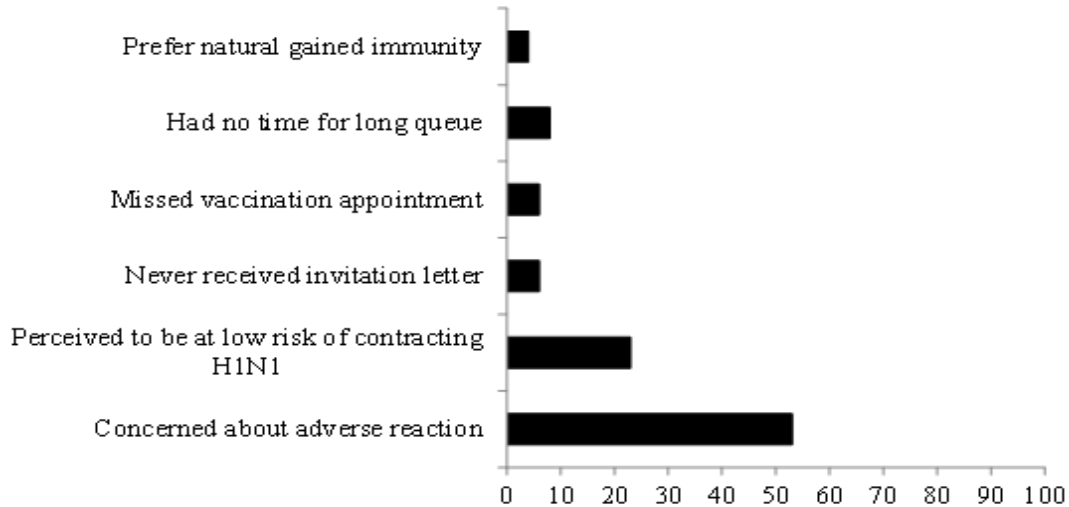


Figure 3. Reasons for not taking influenza A (H1N1) vaccine.



Figure 4. Illustrates reported behaviour changes by participants in response to the 2009 influenza A (H1N1) pandemic.

contracting the influenza A (H1N1) were the most important factors that contributed to low vaccine uptake. Others include: never received invitation letter, missed vaccination appointment, lack of time for queuing up and preference for natural immunity to vaccine-induced one.

Respondents’ behavioural changes adopted to recommended influenza A (H1N1) community mitigation measures

The respondents’ behavioural changes in response to the influenza A (H1N1) pandemic are shown in Figure 4. As shown, the respondents adopted diverse strategies. It is

worth noting that a respondent applied mixed strategies in adopting these recommended mitigating measures. Three main findings can be deduced from the figure. Firstly, it is shown that those strategies that involved the use of mitigation measure items that were provided free of charge such as usage of liquid soap and hand sanitizers at the faculties’ toilet facilities were the most popular and were adopted by over 80% of the respondents. Additionally, about 70% of the respondents washed their hands with soap and water more than usual. A logistic regression analysis comparing gender differences with the uptake of the mitigation measures revealed that female respondents were more likely to have washed their hands with soap and water more than

usual compared to their male counterparts (OR 2.421, 95%CI 1.026 to 5.715, p-value = 0.044).

Secondly, it is indicated that those mitigation strategies that entailed cost to the respondents (e.g. bought hand sanitizers for home use, increased cleaning and disinfection of surfaces, and use of clean tissue for sneezing and coughing) were less popular and adopted by less than 50% of the respondents. To reiterate, over 82% respondents were unemployed which may imply the affordability or purchasing power could be the main barrier. Meanwhile, female respondents were more likely to have used tissues while coughing or sneezing compared to the male respondents (OR 3.669, 95%CI 1.511 to 8.914, p-value = 0.004). Lastly, it is shown that the social distancing behavioural changes (e.g. keeping away from crowded places, and stopping handshakes with friends) were the least adopted.

Comparing risk perceptions with adoption of recommended interventions

A content analysis of the risk perception of responses did not indicate any unique pattern between those who perceived themselves to be at risk or those who did not, and their nationalities. Similarly, logistic regression analysis did not show significant statistical association between risk perceptions and vaccination uptake (aOR² 0.990, 95%CI 0.415 to 2.360, p-value 0.981). Meanwhile, risk perceptions were significantly associated with hand washing with soap and water more than usual. Respondents who reported low risk perceptions were less likely to have washed hands with soap and water more than usual (aOR 0.345 95%CI 0.135 to 0.885, P-value = 0.027).

DISCUSSION

The results reveal that the majority of the respondents were aware about the 2009 influenza A (H1N1) global pandemic, and the Swedish government's recommended mitigation measures. However, despite of the high level of awareness, the adoption of the recommended mitigation measures was found to be low. Firstly, majority of the respondents declined to be vaccinated against influenza A (H1N1). Secondly, the adoption of those community mitigation measures that entailed cost to the respondent was low compared to those provided free by the institution. The main reasons for the low adoption of the government's recommendations were found to be: 1) concern about vaccine safety; and 2) perception to be at low risk of contracting influenza A (H1N1). Extending from these findings, one question emerges: What lessons

can we learn to enable us to improve future mitigation strategies for pandemics?

The results have shown that over 90% of the respondents were aware of the global 2009 influenza A (H1N1) pandemic, and the Swedish government's recommendations for prevention and impact reduction. The respondents did not only show knowledge about the presence of the H1N1 pandemic but also knew the major disease transmission pathways (e.g. handshaking, sneezing, coughing and contaminated surfaces) – these are among other ways through which the virus is known to be transmitted (Aburto et al., 2010). They also mentioned the major interventions that were recommended by the Swedish government (e.g. vaccination of entire population, cough/sneeze etiquette, hand washing and social distancing) – these recommendations corroborated with some of those found at Swedish official site (Socialstyrelsen, 2009). Therefore, it can be concluded that the Swedish government's communication strategies on the 2009 influenza A (H1N1) pandemic was comprehensive and effective. However, there are a number of areas that need to be addressed to improve the impact of the interventions in relation to adoption of the recommendations. This is imperative in disease prevention and reduction of its health and associated socio-economic impacts on the community.

The concern about vaccine safety was found to be one of the important factors that contributed to low vaccine uptake among the respondents. The fears around vaccine safety and its probable adverse impacts could be attributed to the historical memory of the neurological problems that resulted from the use of whole-cell vaccination for influenza A (H1N1) in the U.S.A. in 1976 (Barry, 2005). According to Covello et al. (2001), issues with known victims from past experience are rarely accepted since their negative memory is often thought to pose greater risks than perceived benefits.

Therefore, when dealing with issues like influenza A (H1N1) vaccine, it is vital to provide sufficient information to the public not only on the positive benefits, but also on any potential negative impact. Furthermore, as per Covello et al. (2001), when a communication raises high concern, the arising issues must not be ignored, but should be addressed simultaneously to counter any negative outcome. To reiterate, our respondents' were aware about influenza A (H1N1) pandemic, transmission pathways, and major interventions for its mitigation and impact reduction. Moreover, risk perception did not show any statistical significant association when compared to vaccination uptake. Therefore, it seems that the issue of vaccine safety and its potential impact (both positive and negative) was given low priority.

Risk perception of influenza A (H1N1) was significantly associated with the Swedish government's recommended community mitigation measures particularly with frequent hand washing. This finding is in line with Rubin et al.

² aOR - Odds ratios adjusted for age and sex

(2009) and Jones and Salathé (2009) behavior adoption studies which found that influenza A (H1N1) risk perceptions mediated behavior change – individuals who perceived to be at high risk were more likely to adopt recommended behavior. Therefore, it is not surprising that the majority of the respondents who perceived themselves to be high risk were more likely to have adopted the mitigation measures such as hand washing with soap and water more than usual compared to those respondents who perceived to be of lower risk.

To improve adoption of any recommended pandemic mitigation measures, it is important that the message does not only reach the audience but rather efforts be made to ensure that the message is simple and clear for understanding (Mileti and Peek, 2000; Covello et al. 2001; Gilk, 2007). To ensure that the message is understandable, the benefits and any negative impacts that can be anticipated from each recommended mitigation measure must be made clear and explicit. The negative impact must not just be stated. Sufficient information to guide informed judgment such as whether the adverse impact are reversible, uncertain, long-term/short-term, life-threatening and others must also accompany the communication (Covello et al., 2001). Considering that negative information often has higher affinity for retention in the mind than the positive one (Maslow, 1970), the adverse effects must be stated in a manner that does not cause 'outrage' (Covello et al., 2001). Therefore, when communicating, there should be a clear balance between the positive and negative impact of any intervention. According to Wilson and Crouch (1987) as well as Fischhoff (1989), emphasizing the positive would help counter the possibility of the negative impact dominating the minds of the recipients of the message.

In addition to the information being understandable, many studies (Covello et al., 2001; Chess et al., 1995; Mileti and Peek, 2000; Gilk, 2007) emphasize that trust related to the information received by the recipients play a very important role in determining whether recommendations are adopted or not. Further, according to Chess et al. (1995) and Covello et al (2001), failing to acknowledge the negative impact and not disclosing useful information in time are among important factors that can adversely affect the trust that people will attach to the information. The US Environment Protection Agency (1990) has shown that person or institution through whom the message is communicated affects the trust people will bestow on the message. During the 2009 influenza A (H1N1) pandemic in Mexico, the government managed to gain public support and trust by using the Minister of Health in frequent live update about the pandemic. They also provided toll free telephone lines for inquiries on pressing issues or questions about influenza A (H1N1) from the public (Cordova-Villalobos et al., 2009). Making the update live as well as frequent, enabled the public to be informed about the progress. It

also enabled them to have similar source of information and therefore, they did not rely on rumors and speculation. Giving an opportunity for one-on-one toll free inquiry lines ensured that any issues that would have hampered public response were cleared.

Limitations

Our results may not be generalisable, given the low response rate. The method of data collection favored mostly those who had personal computers and access to internet. Public computers could only be used once – because the survey was designed to identify the IP address and consequently allowed only one survey to be administered per IP. In addition, we did not send out reminders which could have increased participation. Although, these restrictions were intended to avoid double responses, they most likely affected the response rate. Another limitation in our study is the possibility of recall bias since our participants were required to recall certain events. Nevertheless, we think this was minimal due to the fact that the study was conducted when the WHO pandemic alert was phase 6. Finally, we cannot completely rule out the possibility of self selection bias as having contributed to low response given the sensitivity of the pandemic during the study period.

Conclusions

It is concluded that the Swedish government's communication about the 2009 influenza A (H1N1) was comprehensive and effective. However, the adoption of the recommended strategies among our study participants was low – including both vaccine uptake and most of the other community mitigation measures. To improve the adoption of any future interventions for mitigating epidemics, it is important that several areas are addressed as mentioned subsequently. Balance positive benefits and any potential negative impacts for each recommended strategy. However, it will be advantageous to emphasize more on the positives to avoid negative dominance. Provide frequent small forums that are tailored to small groups where the public and health professionals can interact and share information. In the process, issues of public concern can be gathered and addressed in frequent live public update through a trusted institution or person.

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Full Length Research Paper

Socio-demographic correlates of sexual behaviours II: A cross sectional survey of adolescents in Imo State secondary schools

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The study was designed to determine the socio-demographic correlates of sexual behaviours of the adolescents in Imo State secondary schools. The objectives are to determine the influence of peer pressure on sexual behaviours of the adolescents, the levels of sexual behaviours of the adolescents with various ages at first sexual intercourse and the levels of the sexual behaviours of the older and younger adolescents in Imo State secondary schools. A cross sectional survey design was used and sample size was 3360 (2.2%) of 153,586 adolescents. A structured, validated and reliable questionnaire ($r = 0.79$) as well as focus group discussions were used as the instruments for data collection. Data analysis was done using mean, z-test and ANOVA statistics. The result showed that in Imo State secondary schools, peer pressure significantly influenced the sexual behaviours of the adolescents (Z-cal. 9.51, Z-tab. 1.96; $p < 0.05$). Various ages at first sexual intercourse significantly influenced their sexual behaviours (F-cal. 437.92, F-tab. 2.60; $p < 0.05$) and various age groups of the adolescents influenced the adolescents sexual behaviours significantly (Z-cal. 6.19, Z-tab. 1.96; $p < 0.05$). The older adolescents ($\mu = 1.49$) were more involved in sexual behaviours than the younger adolescents ($\mu = 1.40$). The study concluded that unrestricted and uncontrolled adolescents sexual behaviour may expose the adolescents to sexually transmitted infections/HIV/AIDS, unwanted pregnancies, illegal abortion and dropping out of school. Thus comprehensive sex education including assertiveness skill acquisition was recommended among others.

Key words: Socio-demographic, correlates, sexual, behaviour, adolescents.

INTRODUCTION

Adolescence is defined both in terms of age (spanning the ages of 10 to 19 years) and in terms of phase of life by special attributes. These attributes include rapid physical growth and development, physiological, social and psychological maturity, but not all at the same time (World Health Organization (WHO), 2003; Nwankwo and Nwoke, 2009); while correlate is a causal, complementary, parallel, or reciprocal relationship, especially a structural, functional or quality correspondence between

two comparable entities for example a correlation between drug abuse and crime. On the other hand, sexual behaviour is a form of physical intimacy that may be directed to reproduction (one possible goal of sexual intercourse), spiritual transcendence, and or the enjoyment of any activity involving sexual gratification. Sharma (2003) reported that adolescents practice a wide variety of sexual behaviours, having masturbation as the commonest manifestation. Mutual masturbation among same sex adolescents is also common. Sharma further noted that among the sexually active adolescents, one may observe that many have single partners; others have multiple partners at a time.

Adolescents' sexual activities were clearly not and

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never had been without risks (Watney, 1987; Nwankwo and Nwoke, 2009). These risks include but not limited to unplanned pregnancy, dropping out of school, unsafe abortion and sexually transmitted infections/HIV/AIDS, which are the major implications of sexual risk behaviours considering its grave consequences.

Socio-demographic correlates of sexual behaviours of adolescents are factors that influence the sexual behaviours of this group. This study considered three objectives, which are to determine the influence of peer pressure on sexual behaviours of the adolescents, to determine the levels of sexual behaviours of the adolescents with various ages at first sexual intercourse and to determine the levels of sexual behaviours of the older and younger adolescents in Imo State secondary schools. Several studies (Gage, 1998; Isarabhakdi, 2000; Kirby et al., 2005; UNESCAP, 2007; Bamidele et al., 2009), have reported that peer characteristics influence the sexual behaviours of the adolescents. If their peers have permissive values about sex, or are actually having sex, using condoms and other contraception, they are likely to have sex, use condom and other contraception. Werner-Wilson (2007) noted that generally, adolescent males and females reported similar perceptions of peer pressure, but males were more likely to submit to peer influence. Again, similarities of sexual behaviours occur via acquisition of friends who have similar sexual behaviours (Werner-Wilson, 2007).

In an adolescent health survey (Bearman and Bruckner, 1999) of students in grade seven through twelve in the United States, when factors of family structure, wealth, education and popularity were controlled, a female close group of friends had the most influence on timing of sexual debut. Adolescents whose friendship network included mostly low risk friends were half as likely to experience first intercourse as were adolescents whose close friends' network was composed mostly of high risk friends. In a National Survey of Teens (Kaiser Family Foundation/ YM Magazine, 1998), adolescents were asked why they had sex for the first time. Thirteen percent of young men aged 13 to 18, cited pressure from their friends compared to seven percent of young women. Eight percent of young women and one percent of young men cited pressure from a partner as a factor.

In another study of secondary school students in Benin City, Nigeria, Temin et al. (1999) noted that in some communities, people started having sexual intercourse at an early age. In this study, females started having sexual intercourse at younger age than males, while the commonly stated debut for females was 11 to 13 years, males were 14 to 15 years. The study concluded that those who started sexual intercourse at an earlier age were more involved in sexual activity than those who started at a later age. Thus, age as a factor was found to be of influence in the sexual behaviour of adolescents as they are more likely to have sex as they become older

(Kirby et al., 2005).

MATERIALS AND METHODS

A cross sectional survey design was used. The postgraduate board of studies ethical committee of the Nnamdi Azikiwe University, Awka, gave approval for the study. Consent was got from institutional heads (Principals of schools) and adolescents before the commencement of the study. The study population involved adolescents from 308 urban and rural areas of Imo State. These adolescents were accessed in Government owned secondary schools in these two areas comprising of a population of 153,586 students (Ministry of Education, 2005). The present study therefore required a 95% confidence level, to make a conservative estimate of adolescents' sexual behavior using age as a parameter. Using appropriate formula such as $[n = (Z\alpha/2)^2 \pi(1-\pi_0)] \div d^2$ or $Z\alpha/2 \div 4 d^2$, provided by Devore and Peck (1997), in this case for detecting: (a) a minimum change of 10% in sexual behavior among the adolescents by age (this was based on 50% global proportion of adolescents ever having sexual intercourse); (b) 5% level of significance; and (c) 80% power of statistical test. Thus, the minimum calculated sample size was at least 384 adolescents. However this was reviewed upwards to accommodate margins of sampling error (assumed $\pm 4\%$). Study sample consists of three thousand three hundred and sixty (3,360) adolescents (2.2%) drawn from the study population of 153,586 adolescents. Twenty eight (28) schools were randomly selected and 120 adolescents were proportionally sampled from each school. The instruments used were the validated questionnaire consisting of 27 items under two sections and four (4) focus group discussions. Each focus group was made of six to eight students of same sex at a time and information extracted from the students both consensus and divergent views were used in discussion. Section A of the questionnaire sought information on personal data of the adolescents and section B, sought information on sexual behaviours of the adolescents. The instrument was structured on weighted four point scale of Strongly Agree (SA) 4, Agree (A) 3, Disagree (DA) 2, and Strongly Disagree (SD) 1, with a decision mean of 2.50. Any mean below 2.50 is sexually inactive and mean 2.50 and above is sexually active.

There was a trial test of the instrument on 20 adolescents, 10 adolescents each from government owned urban and rural secondary schools in Owerri Zone. The selected secondary schools were noted and were not included in the main study. The Cronbach's Alpha reliability technique was adopted in testing the reliability of the instrument. The Cronbach's Coefficient Alpha of $r = 0.79$ was obtained, indicating that the instrument was reliable. The administration of the instrument lasted three months and data analysis done using 3260 validly returned copies of the questionnaire (return rate = 97%). Mean, z-test and ANOVA were used for analysis. For the FGDs, the issues canvassed focused on three main areas such as: adolescent sexual behavior in the last three months; influencing factors to sexual behavior and Understanding of its consequences.

RESULTS AND DISCUSSION

The results in Tables 1 and 2 show that adolescents who were influenced by peer pressure (yes) and those who were not influenced by peer pressure (no) in Imo State secondary schools respectively had average sexual behaviour of 1.88 and 1.66 on a 4-point scale. This shows

Table 1. The association between independent research variables and sexual behaviours practiced by the adolescents in Imo State secondary schools.

S/N	Variables	Group	Frequency	Mean	Level of sexual behaviours
1	Peer pressure influence	Yes	2200	1.88	Inactive
		No	1060	1.66	Inactive
2	Ages at first sexual intercourse	10-13 years	137	1.87	Inactive
		14-16 years	226	1.97	Inactive
		17-19 years	210	2.01	Inactive
		No experience	2687	1.36	
3	Age	10-14 years	969	1.40	Inactive
		15- 19 years	2291	1.49	Inactive

Table 2. Two sample Z-test for means of peer pressure in all classes.

Variable	Mean	Known variance	Observations	Z-cal	Z-tab	P (z<= z)
Yes	1.88	0.33	2200	9.51	1.96	0.0001
No	1.66	0.16	1060			

that in Imo State secondary schools, those adolescents who were influenced by their peers were more involved in sexual behaviour (mean = 1.88) than those who were not influenced (mean = 1.66) (z-calculated value for the two means = 10.52; $p < 0.05$). Earlier studies (Bearman and Bruckner, 1999; Kirby et al., 2005; Werner-Wilson, 2007; Bamidele et al., 2009) also confirmed influence of pressure from peers as terribly influencing adolescents' sexual behaviours.

The results in Tables 1 and 3 show that adolescents in Imo State secondary schools whose ages at first sexual intercourse were 10 to 13 years, 14 to 16 years and 17 to 19 years respectively had average sexual behaviour of 1.87, 1.97 and 2.01, while those who had not been involved in sexual intercourse (that is, age at first intercourse = "no experience") had an average of 1.36. Thus adolescents of the study whose age at first sexual intercourse was 17 to 19 years (Mean = 2.01) had the highest level of sexual behaviour, followed by those whose age at first sexual intercourse was 14 to 16 years (mean = 1.97), while those whose age at first sexual intercourse was 10 to 13 years (mean = 1.87), had the lowest level of sexual behaviour among adolescents with various ages at first sexual intercourse in Imo State secondary schools.

Further analysis (F-statistic) on the data showed that there were significant differences among adolescents with different ages at first sexual intercourse in Imo State secondary schools in terms of their levels of sexual behaviours (F-cal = 436.15, F-tab = 2.60, $P < 0.05$). This study reveals that the adolescents in Imo State secondary schools get more involved in sexual behaviours as they advance in age which could be attributed to hormonal changes during adolescents' maturity and

their adventurous nature. It could also be due to family background or orientation. However, this particular finding was not exactly consistent with other studies as the adolescents from various places had little variations in regards to the age at first sexual intercourse and their levels of sexual behaviours which could be attributed to cultural differences as regards to sexual relationships or behaviours.

The results in Tables 1 and 4 show that among the sampled adolescents in Imo State secondary schools, the level of sexual behaviours of the older adolescents (15 to 19 years) with mean = 1.49 was greater than that of the younger adolescents (10 to 14 years), mean = 1.40. Further statistical analysis using z - statistic on the data showed that there was a significant difference between the sexual behaviours of the older adolescents (15 to 19 years) and the younger adolescents (10 to 14 years). In this study, the sexual behaviours of the older adolescents were greater than that of the younger adolescents because the adolescents tend to get more involved in sexual activities as they advance in age. This could probably be attributed to the influence of sexual hormones which are associated with maturity and influence the attraction of most adolescents to opposite sex. At this age, they are influenced by their peers, are more inquisitive and exploratory in nature. The present result is in line with the study carried out by Emmans (2004), where it was found that the reported sexual activity among 15 to 19 year old adolescent girls increased from 30% in 1971 to 50% in 1979. The author further reported that among the never married white teenagers in age group 15 to 19 years, statistics from 1971 indicated that 23% were sexually experienced, and this incidence increased to 42% in 1979. Much less was

Table 3. ANOVA procedure for various ages at first sexual intercourse in all classes.

Source	DF	Sum of squares	Mean square	F value	F tab	Pr > F
Age_1st_intercourse	3	170.1130880	56.7043627			
Error	3256	421.6049922	0.1294856	437.92	2.60	<0.0001
Corrected total	3259	591.7180802				

Table 4. Two sample Z-test for means of age groups in all classes.

Variable (Years)	Mean	Known variance	Observations N	Z-cal	Z-tab	P (z<= z)
10-14	1.40	0.1389	969			
15-19	1.4938	0.1971	2291	6.1934	1.9600	<0.0001

known about the sexual behaviour of younger adolescents in 10 to 14 year old range.

Focus group discussions (FGDs)

Four qualitative FGDs were conducted while the following three thematic areas were explored: Adolescent sexual behavior in the last three months; influencing factors to sexual behavior and understanding of its consequences. Study participants in each separate FGD group consisted of 6 to 8 adolescents of the same sex and age. Summary of results from the FGDs indicate that most adolescents have engaged in one form of sexual activity or the other which in most cases are considered risky. As one adolescent from FGD, Group 1 succinctly puts it thus:

“At advance age, you think you are missing out if you have not experienced sex for the first time. Your peers look at you as a social misfit and the tendency to experience sex for the first time comes up in order to belong”.

One can draw the conclusion that due to curiosity and adventurous nature of the older adolescents; they get more involved in sexual activities.

Further discussions with the adolescents reveal that the commonest source of information and influence is their peers. Similar studies done by Bearman and Bruckner (1999), Kirby et al. (2005), Werner-Wilson (2007) and Bamidele et al. (2009) also confirms this finding. Through information sharing, adolescents were aware of the dangers of getting pregnant and they also know that young people are not yet prepared to carry the stress of pregnancy.

However, the main response among adolescents to pregnancy outcome is to try to have an abortion, by whatever means. The expressions below help to illustrate the fear held by them.

“I will not want my parents to know that I am pregnant

coupled with the fact that I might be dismissed from school” (An Adolescent, FGD Group 2).

This fear drives them underground and limits their access to treatment and preventive services.

“Pregnancy in adolescents brings conflict between the parents and the girl. Parents mistreat girls who are pregnant, and the girl may feel bad and resort to abortion.

“I know some herbs people use for abortion. I can also visit a chemist shop and buy some drugs” (An adolescent, FGD Group 3).

Conclusion

Findings from the study revealed the sexual behaviours of the adolescents in Imo State secondary schools in relation to the influence of peer pressure, various ages at first sexual intercourse and various age groups (older and younger adolescents). Though the sexual behaviours of the adolescents in Imo State secondary schools were generally inactive, it is still a source of worry as the extent of their involvement in sexual activities does not augur well with their health considering the consequences (unplanned pregnancy, dropping out of school, unsafe abortion and sexually transmitted infections/HIV/AIDS). This hinges strongly on the fact that one deviant in sexual behaviour can affect the society within a short period. Comprehensive sex education (comprehensive sex education programme encourages abstinence, promotes the use of condom for those who are sexually active, encourages fewer sexual partners, avoidance of casual sex, identification and treatment of sexually transmitted infections as well as teaching of sexual assertiveness skills and empowering the adolescents educationally) is advocated for before the sexually active fall prey to consequences of premarital sexual behaviours. Also, reviews of health education programmes in several countries conclude that sex education does not encourage

early sexual activity, but can delay first sexual intercourse and leads to more responsible sexual behaviour (UNAIDS, 1997).

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Full Length Research Paper

Perception of female population health hazards associated with indoor air pollution in Karachi

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This study identified health hazards associated with indoor air pollution (IAP) in Karachi. The main purpose of the paper was to examine the extent to which female domestic cook experience health threats related with cooking environment, and to understand their perceptions of the link between IAP exposure and poor health outcomes. One hundred female domestic cook in Karachi City, Pakistan, were interviewed using a semi-structured questionnaire interview method; educational level, oven and fuel types were used as proxy determinants of class, based on educational level, respondents were categorized into three classes: illiterate, graduate and above, and in-between (from level one to level 12). It was found that the higher the educational level the respondents had, the more likely they were to be aware of health effects associated with IAP. The author drew a conclusion that respondents with minimum levels of education, using wood fired mud-ovens, were more likely to be exposed to IAP and, as a consequence, had greater health risks than other women.

Key words: Health hazards, indoor air pollution, women, Karachi.

INTRODUCTION

Indoor air pollution is a greater public health hazard in developing countries than malaria or lack of access to clean water and sanitation, resulting in a fatality every 20 s (Smith et al., 2005). Nonetheless, wood fires remain an important resource in food preparation. People in developing countries generally use both bio-mass fuels (such as animal dung, crop residues, wood) and fossil fuels (such as gas and kerosene). Approximately, half the world's population and up to 90% of rural households in developing countries rely on traditional bio-fuels for cooking and heating (WHO, 2000). The international energy agency (IEA) estimated that biomass accounted for approximately 14% of fuel energy consumption (IEA, 2002).

The smoke generating from biomass fuels contains a large number of pollutants that include carbon monoxide, benzopyrene and benzene, formaldehyde, nitrogen

dioxide, fine particles and sulphur dioxide (Bruce et al., 2000). Several studies have been conducted on households all over the world and reported that indoor air pollution level in homes is much higher than the limit set by the national standards, the U.S Environmental Protection Agency (EPA) and World Health Organization (WHO) (Ahsan and Afrin, 2007; Smith et al., 2000; WHO, 2007).

Recently, numerous studies have reported that these pollutants are dangerous for the cook and render indoor environment unlivable (Khushk et al., 2005; Mirza et al., 2008; Janjua, 2008; Akhtar et al., 2007; Khudadad and Shah, 2008; Duflo et al., 2007; Dona and Harding, 2005). They argue that exposure increases the risk of acute lower respiratory infections (ALRI) in children, chronic obstructive pulmonary disease (COPD) in adults and lung cancer in case of extensive coal use. In addition, evidence has now emerged showing a link of IAP with a number of other conditions, including asthma, cancer of the upper airway, cataracts, low birth weight, otitis media, prenatal mortality (stillbirth and deaths in the first week of

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life), and tuberculosis (WHO, 2007). IAP is one of the four most critical global environmental problems and might be responsible for nearly 4% of the global burden of disease (Smith, 2000; WHO, 2007).

As women are primary cooks and caregivers for children in nearly all cultures, they with their children are prone to receive the greatest exposure to the smoke from solid fuel combustion. This exposure ultimately leads to higher risks for women as well as children (Dasgupta et al., 2004a; Smith et al., 2005; WHO, 2007).

In Pakistan, biomass fuel users usually cook indoors, using open fires or poorly functioning stoves with inadequate ventilation facilities. Several researchers, Khushk et al. (2005), Mirza et al. (2008), Janjua (2008), Akhtar et al., (2007), Khudadad and Shah (2008), found a linkage between indoor smoke exposure and possible negative health effects on women and children.

World Bank estimated that IAP cause over 280,000 deaths a year and around 40 million cases of acute respiratory illnesses in Pakistan (World Bank Report, 2007).

According to the WHO estimates, the total number of deaths in Pakistan attributed to solid fuels is 70700, while the percentage of national burden of disease attributed to solid fuel use is 4.6%, as compared to less than 1% seen in the developed world (WHO, 2007). These figures put Pakistan among the 21 worst affected countries by IAP along with Afghanistan, Niger, Ethiopia and Rwanda, among others, according to WHO estimates (WHO, 2007).

In spite of the aforementioned truth, studies have not yet explored whether women in Pakistan had any understanding of health risks associated with indoor air pollution. It is more likely that majority of the women are unaware of these threats in their homes, just as millions of smokers were unaware of the hazards of tobacco until the 1960s (Donna and Harding, 2005). Accordingly, the aim of the present study was to examine the extent to which female domestic cooks experienced health problems linked with indoor cooking environment and to understand their knowledge about the relationship of IAP to various diseases.

MATERIALS AND METHODS

The study was undertaken using a survey method (face to face interview). The main reasons for following this method was that it allowed for the collection of data within a limited time framework, was relatively cost-effective and provided a minimal imposition on respondents' time compared with other methods. The primary data were collected using the semi-structured questionnaire interviews. A research team consisting of two principal investigator and two research assistants was formed. Initially a draft questionnaire was developed on issues such as socio-economic background of the respondents and the perception about the health hazards of IAP. The questionnaire used in this study had three parts. The first part asked some general questions, such as age, occupation, household size, income and marital status. The second part of the questionnaire incorporated questions on health issues, such as

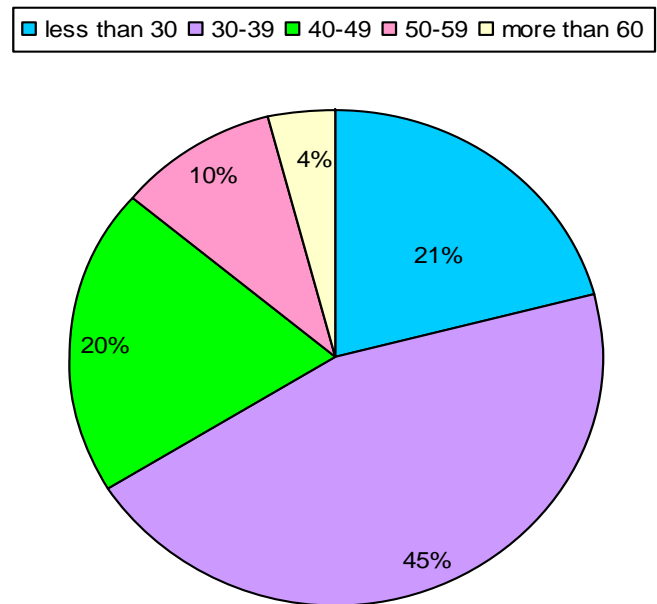


Figure 1. Respondent women according to the age group.

what types of health problems the respondents faced before, during and after cooking. In the last part of the questionnaire were questions about the effects of IAP on health. Several discussions were held among the researchers who found certain anomalies regarding ordering of the questions and then felt the necessity of adding few more questions with changes and adjustments in the questionnaire. With some addition and correction, the questionnaire was finalized for testing. Both open and close-ended questions were also incorporated in the questionnaire.

Field investigation was carried out during the year 2008. The site selected for this study was uptown area and were selected purposively based on different social backgrounds such as educational, households, and income levels. 100 female cooks were interviewed. It is worthwhile to mention here that they all gave responses voluntarily. The underlying reason for doing this was to examine variation among female cooks from diverse socio-economic backgrounds in terms of the perception of the health hazards of IAP. Frequency distribution figures with percentage are provided to describe responses. All kinds of data processing activities were done manually.

RESULTS

Data on socio-economics characteristics of the respondent women's are presented in Figures 1 to 5.

Figure 1 presents the percentage of the respondents according to the age limit in year. Approximately 80% of the respondent women were aged between 30 and more than 60 years, of these a large number (45%) belongs to 30 to 39 years age group.

Figure 2 presents the percentage of the respondent women according to the level of education, 51% of the respondents had no education, whereas 19% of the respondents were educated up to secondary school certificate (level 10) and from the remaining 30%

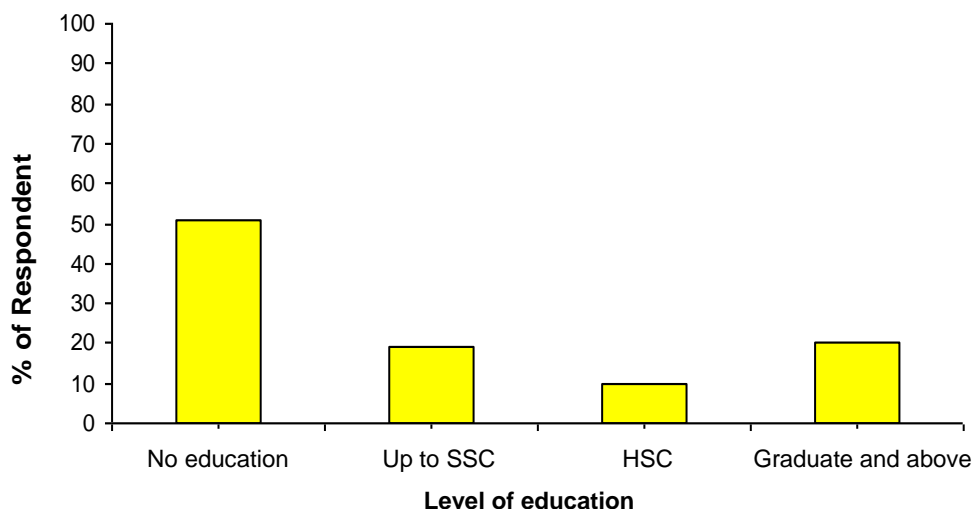


Figure 2. Level of education of the respondent women.

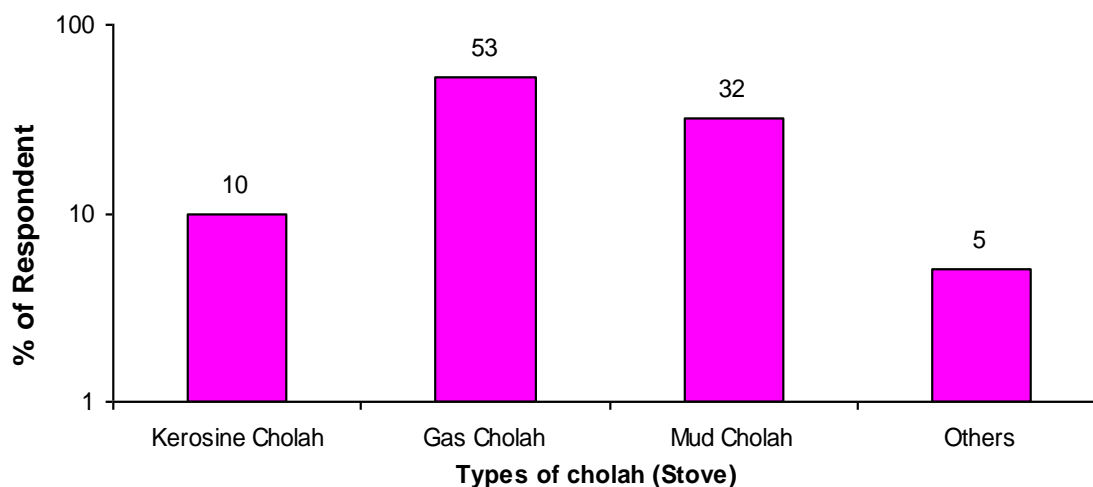


Figure 3. Types of cholah (stove) used by the respondent women.

respondents, 10% were educated up to higher secondary school certificate (level 12) and 20% were graduate and above.

Figure 3 presents the percentage of the respondents according to the use of types of stoves, a significant number of women (53%) that were questioned used gas stoves, followed by mud oven 32% (the surrounding of the oven are covered by mud/clay), the remaining 15% use kerosene stoves and others.

Figure 4 presents the percentage of the respondents according to the use of types of fuels, approximately 22% of the respondents women used wood, 53% used gas, 10% cow dung, 10% kerosene and the remaining 5% other sources.

Figure 5 presents the percentage of the respondent women according to the time spent in the kitchen, as half of the respondent women (51%) daily spent more than 5 h

in the kitchen.

Figure 6 presents the types of stoves used by the respondent women according to the Level of Education. It was found that 10% respondent women used kerosene stove (Figure 3), of these 7% users were illiterate and the remaining 3% respondents were in between 10 to 12 level of education. In terms of gas oven total users were 53% (Figure 3), of these 13% were illiterate, 20% in between and 20% were up to graduate level of education. Total mud oven users were 32%, from which 27% were illiterate and 5% were in between level of education and from the remaining 5% respondents, 4% were illiterate and 1% was in between 10 to 12 level of education.

Figure 7 represents the percentage of respondent women using different types of fuel according to the level of education. It revealed that from 51% illiterate respondent women (Figure 2), 17% used wood, 10% cow

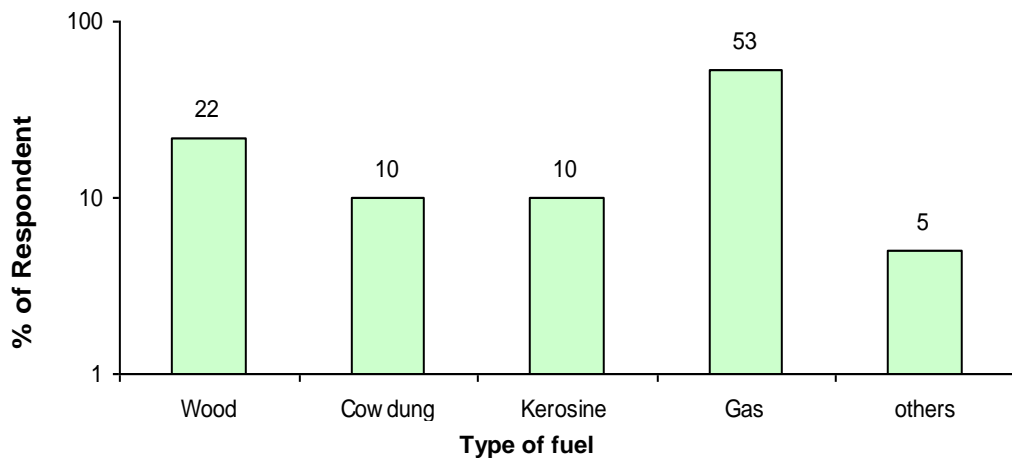


Figure 4. Types of fuel used by the respondent women.

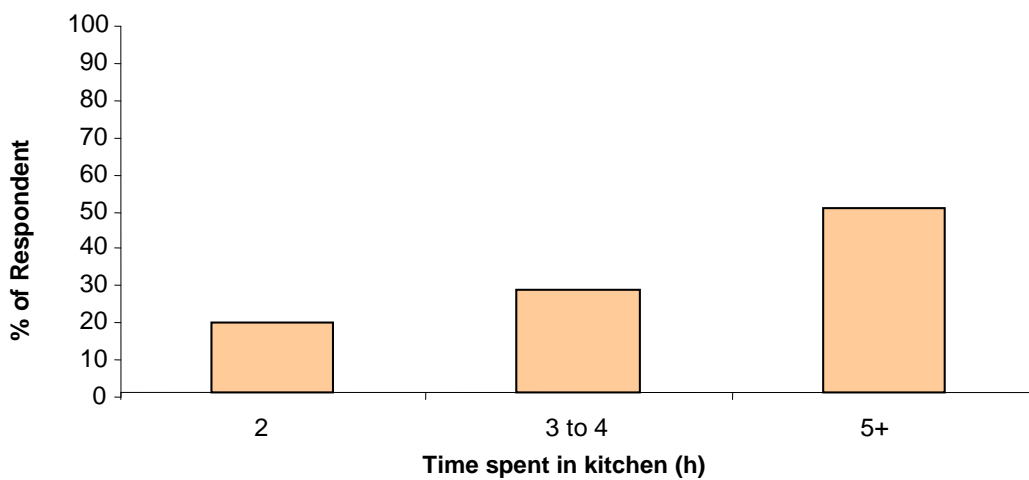


Figure 5. Time spent in the kitchen by the respondent women.

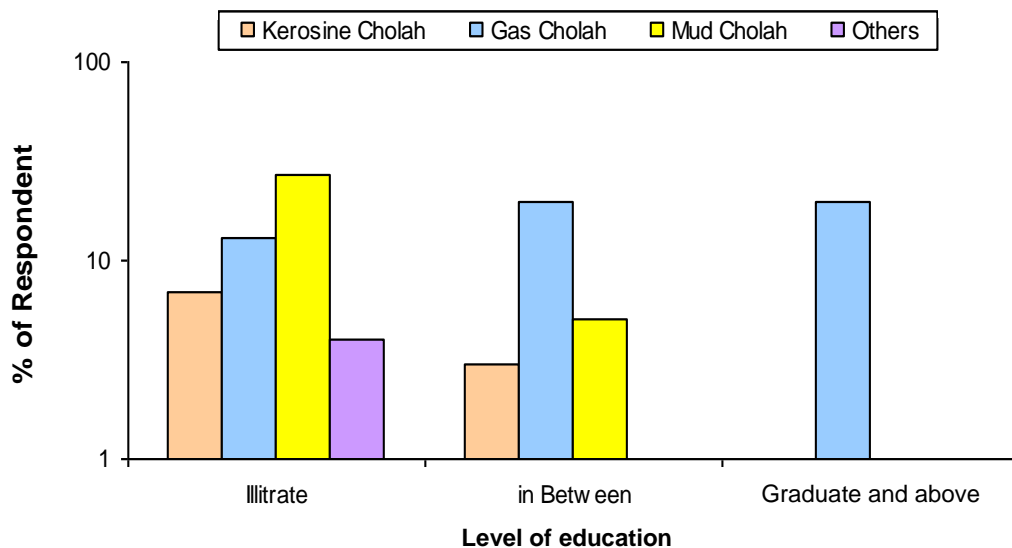


Figure 6. Types of stoves used by the respondent women according to the level of education.

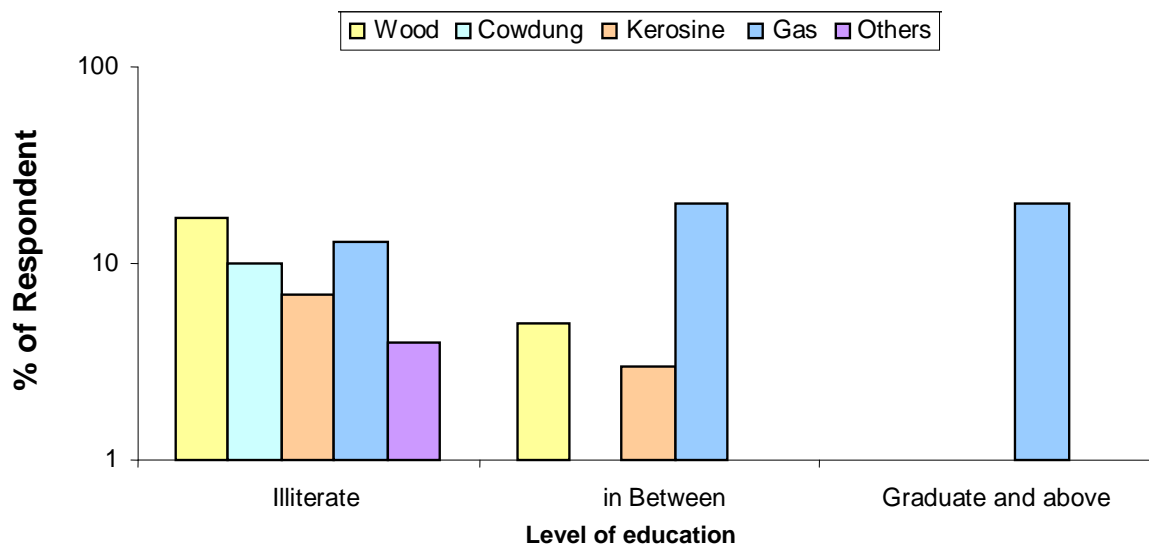


Figure 7. Types of fuel used by the respondent women according to the level of education.

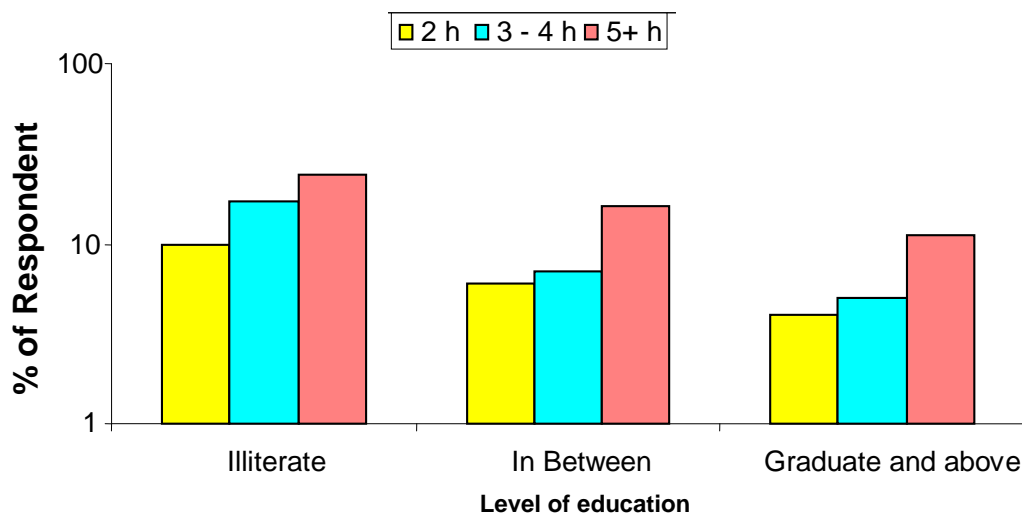


Figure 8. Time spent by the respondent women in the kitchen according to the level of education.

dung, 7% kerosene, 13% gas as source of fuel, whereas 4% used other sourced (Burshine gas, electricity). In between level of education (level 10 to 12) from 29% respondent (Figure 2), 5% used wood, 3% kerosene, 23% gas as source of fuel and 1% only used other sources of fuel; whereas, the entire graduate level respondent used gas as a source of fuel.

Figure 8 shows the time spent by the respondent women in the kitchen according to the level of education for 2 h, 3 to 4 h and 5 h timing. The trend for all timings shows that illiterate > in between > graduate and above level of respondents women.

Figure 9 demonstrates the respondents' opinion about the cooking related physical problems. 31% of the

respondents experienced asthma out of which 16% were illiterate, 10% in between and 5% were graduated and above level of education. In more than half of the respondents, 59% experienced breathing problems and 58% eye irritation, the majority of the respondents with breathing problems and eye irritation problems were illiterate.

Figure 10 presents the awareness of the respondents about the linkage between exposure to IAP and various diseases. Most of the respondents mentioned that pulmonary diseases (49%), TB (58%), asthma (53%), lungs cancer (44%), eye problem (67%), burning during cooking (70%), and cardiac (52%) could be the result of IAP. Most of the respondents acknowledging the link

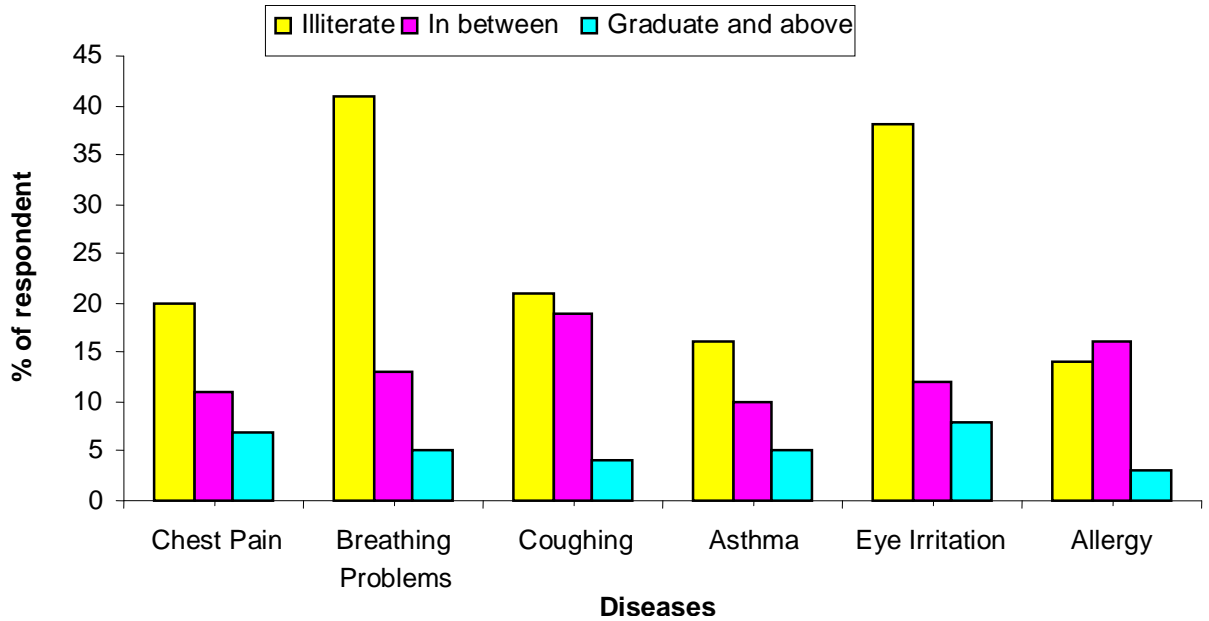


Figure 9. Opinion of the respondents' women to various diseases.

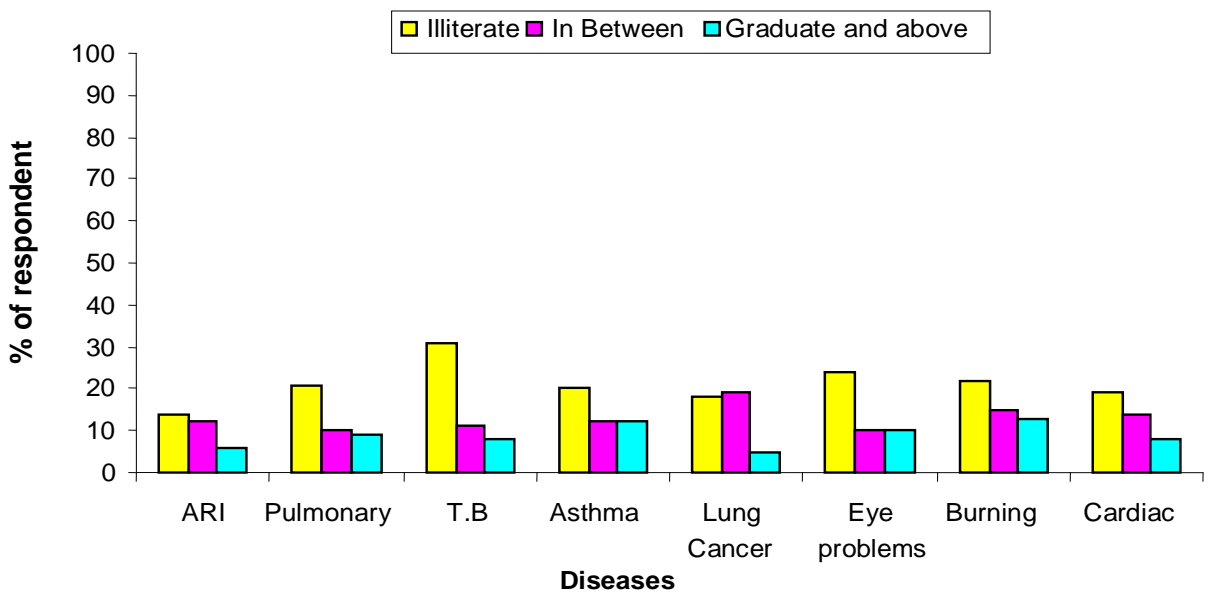


Figure 10. Awareness of the respondent women to various diseases.

between IAP and various diseases were illiterate.

DISCUSSION

Biomass fuel use generates high indoor air pollution

Per capita energy consumption, an indicator of the physical quality of life is very low in Pakistan. Only 20% use natural gas for cooking, whereas more than 80% of

households depend on unsustainable supply of biomass fuels for cooking. The share of fuel wood as cooking fuel is 68.83%, kerosene oil 3.72%, others 7.25% and natural gas only 20.2% [www.census.gov.pk]. In this study about 32 and 53% of the female participants used mud cholah and gas stoves for cooking purpose, respectively. These findings contradict with national statistics which reports that 42% urban households use open-fire stoves and 58% gas stoves, and the share of fuel wood as cooking fuel is 31.98%, kerosene oil 7.06%, others 2.82% and

natural gas 58.14% [www.census.gov.pk].

One of the reasons for using wood and cow dung is that they are locally available and / or cheaper compared with other fuels. Women from poor families collect fuels at the expense of their opportunity costs. Furthermore, gas cylinder is very costly as compared with natural gas supply. This high cost restricts poor households from using environment friendly fuels.

IAP and risk to health hazards

IAP, from both biomass and fossil fuels, affects the health of people, particularly women and children, who usually spend their major time of day in their kitchen. The fact that IAP causes many health problems is well known in the literature. As mentioned earlier, many health problems could arise from the result of exposure to IAP. From the present study, 44% of the respondents had cough, while 59% breathing problems. More than half of the respondents (58%) which experienced eye irritation were also found. In addition, the respondents identified IAP as one of the possible causes of these diseases. Moreover, Janjua (2008), Akhtar et al. (2007) and Khudadad and Shah (2008) show that the women of developing countries are likely to exhibit greater symptoms of respiratory illness as they have more attachment to the kitchen.

Poor women are more vulnerable

Women are responsible for the preparation of domestic foods in every culture of developing countries and spend a large portion of their daily life in the kitchen. As a result, women are more likely to be affected by the smoke generated from the use of un-processed fuels in indoor environment than their male counterparts. For example, several researchers came to the conclusion that females were affected by asthma, blindness, chronic obstructive pulmonary disease (COPD), lung cancer, and tuberculosis from IAP. However, all females in Pakistan are not affected in the same manner (Tobassum, 2007; Dasgupta et al., 2004; Smith et al., 2000, 2005). It has been found that around half of the respondents (51%) do not have any level of education which is similar to national data [www.census.gov.pk/level of education]; and of most of the women studied, 32% used mud cholah with wood and cow dung. All these variables, cited thus far, indicate the social condition of the respondents. In this study most of respondents were poor and there was a link between health problems resulting from exposure to IAP and poverty. For instance, most of the respondents with physical troubles had less than 10 level of education. Moreover, as of Smith et al. (2000) indeed women in households using biomass fuels were found to be 3 times more likely to have tuberculosis than women

in households using cleaner fuels, even after correction for a range of socioeconomic factors. Dasgupta et al. (2004a) indicated the same scenario: that the poorest, least educated households have twice the pollution level as compared with high-income households with highly educated adults. In addition, as it has also been found in the study, poor women are less aware about the health effects of IAP. More than half of the illiterate respondents do not have knowledge on this connection.

Conclusion

Women's health issues in Pakistan have for long been neglected, though their contribution in cooking and domestic care is immense. Both biomass and fossil fuels generate smoke that pollutes the indoor environment. The polluted air inside the kitchen might cause many health problems for women who spend a large part of their day devoted to food preparation duties. It has been found higher educational level and ability to use refined fuels was associated with respondents having less identifiable health problems and greater awareness about the health impacts of IAP. Female domestic cook with minimum levels of or no education and using mud-oven are more likely than other women to have health risks associated with exposure to IAP. No clear-cut relationship between IAP and health hazards can be drawn without scientific investigation.

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Full Length Research Paper

Different types of aero-allergens causing nasobronchial allergy in District Kupwara of Jammu and Kashmir State -India

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Nasobronchial allergy is one important type of respiratory disorder. Aero allergens like pollen, dust, fungus, dander and many others play important role in nasobronchial allergies particularly in asthma and rhinitis. The prevalence of nasobronchial allergy among populations all over the world has been increasing rapidly. The role of different inhalant allergens in nasobronchial allergy varies with environmental conditions, type of allergen and degree of exposure. The awareness on the prevalence of allergens and seasonal variations is essential for better diagnosis and immunotherapy. The present study was aimed to assess the prevalence of fungal, pollen and dust allergens by intradermal skin test in nasobronchial allergic patients in district Kupwara of Jammu and Kashmir State.

Key words: Allergens, nasobronchial allergy, intradermal skin test, immunoglobulin-E.

INTRODUCTION

Asthma is a chronic lung disease that leads to inflammation and restricts the airway passage. Asthma is on the rise worldwide including developing countries like India. More than 30% of the world's population is suffering from different allergic disease. In India alone, roughly 15% of the people suffer from asthma and 20% from allergic rhinitis. India has huge diversity in the flora and fauna of different regions as it is a climatically diverse country. For efficient diagnosis and treatment, it is beneficial to know the prevalence and seasonal variations of allergens of the district kupwara. Asthma and allergic rhinitis are often named as atopic diseases as they develop Immunoglobulin-E antibodies in response to various types of allergens. The atopic nature of these diseases can be detected by high levels of total serum IgE and positive response of intradermal skin test. If the levels of total serum IgE and specific IgE is normal they are termed as non atopic and non allergic. However,

the atopic nature of asthma and allergic rhinitis is not yet understood clearly.

MATERIALS AND METHODS

Subjects

The study was carried out among 257 patients of either sex suspected to have asthma and allergic rhinitis and attending the Allergy clinic Department of Immunology and Molecular Medicine, S.K. Institute of Medical Sciences, Srinagar. Children, pregnant ladies and lactating women were excluded from the study. A questionnaire was given to all patients in order to obtain data on family history and complaints. All the patients were subjected to physical examination, clinical examination, total serum IgE and chest X-Ray.

Intradermal skin test

Intradermal skin test for 13 fungal allergens, 12 pollens and 7 dust allergens was performed. Allergens were acquired from Curewel India Limited (New Delhi, India). Allergens were given a concentration of 1: 500 dilutions. With the help of tuberculin syringe

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0.01 to 0.02 cc. of the antigen was taken and intradermally injected into the patient. Histamine phosphate and buffer saline were used as positive and negative controls, respectively. Skin test response was noted after 20 min.

Total serum IgE by ELISA

Patient serum total IgE levels were measured by ELISA test using General Biologicals Corp, Taiwan. The cut off value for IgE levels was 325 IU/ml (Madhuri et al., 1992).

RESULTS

Of the 257 patients 124 were females and 133 were male patients with a mean age group of 34.27 years. Out of 257 patients, 47.5% was asthmatics, 12.5% was rhinitis and 40% was asthma with rhinitis and 32% patients had family history of allergy. Among these 234 patients, 26.9% had breathlessness, 46.5% had sneezing, 44.87% had nose block and 42.7% had rhinophoea (Few patients had more than one symptom).

A group of different fungal, Pollen and dust allergens were taken for intradermal skin test. Among fungal group, prevalence of *Aspergillus flavus* is the highest followed by *Curvaria*, *Trichoderma*, *Nigrospora*, *Rhizopus* and *Alternaria* (Table 1). The other group allergens were pollen, predominant pollen allergen in asthma and rhinitis observed in the present study by intra dermal skin test was *Cynodon dactylon* followed by *Poa pretences*, *Rumex acetosa*, *Morus alba*, *Plantago lanceolata* (Table 2). Third group allergens used for IDST were dust allergens. Among different dust allergens studied in nasobronchial allergy patients, rice grain dust had more prevalence followed by Wheat grain dust, house dust and paper dust (Table 3). According to the information given by the patients, 3% of the patients suffer in summer, 5% suffer only in rains, and 7% only in winter, 12% in rains as well as, in winter and 73% suffer with symptoms throughout the year (Figure1). 37% of patients were positive to more than 5 fungal allergens, 28% were positive to more than 5 pollen allergens and 9% were positive to more than 5 dust allergens. As far as total serum IgE concern, 55% of the patients suffering with symptoms had ≥ 325 IU/ml and 45% of patients had ≤ 325 IU/ml of serum IgE values. It has been observed that patients allergic to more than 5 allergens had elevated levels of total serum IgE values.

DISCUSSION

There is a huge variation in predominance of allergens from region to region in allergic disorders with the fact that there are topographical variations in nature. In our present study, intradermal skin test showed *A. flavus* was the most predominant allergen among fungal group in asthma and rhinitis as 66.23% showed positivity to *A.*

flavus. The study conducted in 1982 on allergens in nasobronchial allergy from the same centre, *Candida albicans* was found as the most predominant fungal allergen (Raja et al., 1985). In 1980's from different parts of India reported *Curvularia*, *Aspergillus versicolor*, *Alternaria*, *Aspergillus niger*, *Phoma* (Anand,1984) and *Mucor* (Shah and Merchant, 1983) were the most allergic fungal species in nasobronchial allergy. The second predominant fungal allergen in asthma and rhinitis observed was *curvaria* (60.25%) followed by *Trichoderma* (57.26%), *Nigrospora* (38.46%), *Rhizopus* (36.75%) and *Alternaris* (28.20%). Comparison with others works with respect to fungal allergens in nasobronchial allergy, allergens such as *A. Flavus*, *Curvaria* and *Alternaria* were found to be common allergens (Agashe, 2003; Singh et al., 1980). In our present study, *Trichoderma* has gained momentum as allergen in asthma and rhinitis which was hardly observed in others study. In 2009, a study from Lucknow, UP observed that *Aspergillus fumigates* followed by *A. flavus*, *Alternaria teneis* and *Fusar allergodani* were most offending fungal allergens in nasobronchial allergies (Prasad et al., 2009).

Among pollen allergens studied, *C. dactylon* found as potent allergen causing asthma and rhinitis in Kupwara region and 30.70% of patients showed positivity. The next predominant pollen allergen was *P. Pretences* followed by *Rumex acetosa*, *Morus alba*, *Plantago lanceolata*. Other pollen allergens in nasobronchial allergies reported from different parts of India were *Amaranthus spinosus*, *Argemone mexicana*, *adhatoda vasica*, *Alanus nitida*, *Cocos*, *Carica*, *Cendrus*, *Parthmium*, *Holoptelea*, *Sorghum vulgare*, *Pennisetum*, *Artemisia* and *Ricinus communis* (Agnihotri, 1971; Singh, 2002; Shivpuri, 1980). The next allergen group was dusts; the common dust allergens observed in our study was Rice grain dust (28.20%), and Wheat grain dust (27.35%), and House dust (25.20%), Paper dust (18.80%) and Cotton dust (13.67%). Acharya (1980) reported among dust allergens in nasobronchial allergy house dust followed by wheat dust, cotton dust and paper dust were common in Andhra Pradesh (Acharya, 1980). It was also found by various studies that House dust, wheat dust, paper dust, cotton dust acted as predominant allergens in respiratory disorders (Duc et al., 1986).

From these studies, one can clearly observe the variations in allergens causing nasobronchial allergies. The main basis for this may be due to the climatic variations, Industrialization, environmental pollution and change in life style.

High number of patients were suffering with symptoms of asthma and rhinitis throughout the year where as low number suffer in summer. However, the number of patients that suffered in winter and rains was on the average (Figure 1). An explanation offering this may be due to fungal species as omnipresent in nature. However, the concentration of fungal spores in air changes with temperature, humidity, rainfall, wind-velocity and the vegetation of the province. As far as pollen allergen is

Table 1. Intra dermal skin test response to fungal allergens.

S/N	Fungal allergens	No. of positive patients	Percentage
1	Aspergillus flavus	155	66.23
2	Curvularia	141	60.25
3	Trichoderma	134	57.26
4	Nigrospora	90	38.46
5	Rhizopus	86	36.75
6	Alternaria	66	28.20
7	Helminthosporium	63	26.92
8	Aspergillus fumigatus	55	23.50
9	Mucor mucedo	52	22.22
10	Fisarium solonll	48	20.5
11	Cladosporium	45	19.2
12	Candida albicans	29	12.39
13	Aspergillus niger	8	3.4

Table 2. Intra dermal skin test response to pollen allergens.

S/N	Pollen allergens	No. of positive patients	Percentage (%)
1.	<i>Cynodon dactylon</i>	78	30.35
2.	<i>Poa pretences</i>	65	25.29
3.	<i>Rumex acetosa</i>	49	19.06
4.	<i>Morus alba</i>	42	16.34
5.	<i>Plantago lanceolata</i>	38	14.78
6.	<i>Robinia acetosa</i>	35	13.61
7.	<i>Abies pindrow</i>	28	10.89
8.	<i>Platanus orientalis</i>	22	8.56
9.	<i>Pinus halepensis</i>	18	7.0
10.	<i>Pinus roxburghii</i>	15	5.83
11.	<i>Chenopodium album</i>	12	4.66
12.	<i>Cedrus deodara</i>	8	3.11

Table 3. Intra dermal skin test response to dust allergens.

S/N	Fungal allergens	No. of positive patients	Percentage (%)
1	Rice grain dust	66	28.20
2	Wheat grain dust	64	27.35
3	House dust	59	25.20
4	Paper dust	44	18.80
5	Cotton dust	32	13.67
6	Wheat thrashing dust	25	10.68
7	Straw dust	22	5.12

concerned, during rains they may get settled down in the atmosphere due to mugginess, it may be one of the reasons for less number of patients suffering in summer with symptoms. However, it strongly depends on the type of pollen and vegetation of the plant.

Low levels of IgE in other patients may not indicate the absence of allergy; it may not associate with atopic sensitization. However, in our present study high number of patients showed total serum IgE level ≥ 325 IU/ml suggesting atopic nature of the disease. However, for

Percentage of seasonal sufferers in nasobronchial allergy

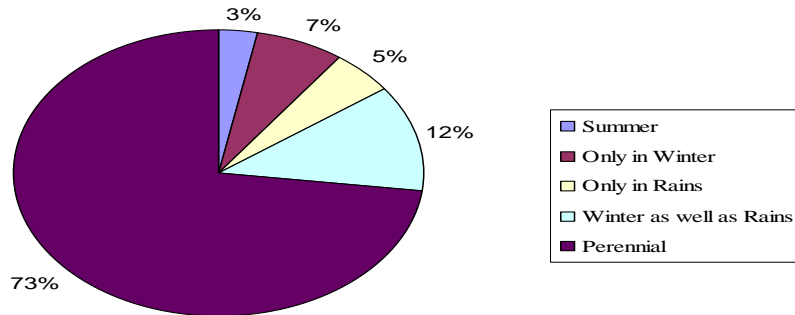


Figure1. Percentage of seasonal sufferers in nasobronchial allergy' and oblige.

better diagnosis and immunotherapy treatment, intradermal skin test with specific IgE levels may be fruitful. More and more studies from different places is to be conducted to specify the prevalent allergens in allergic diseases as there is a variation in allergens from region to region.

Conclusion

The common inhalant allergens in nasobronchial allergy in Kupwara region was assessed and compared with other studies. It was found that there is a variation in prevalence of allergens. The atopic nature of asthma and rhinitis in 55% of patients was observed by total serum IgE levels. The seasonal variations of allergy were found to be minimal. Due to the difference in prevalent allergens from place to place, it is strongly recommended to carry further studies from time to time for better outcome.

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Full Length Research Paper

Examining the nutritional knowledge of nurses: A theoretical perspective

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Nurses have a fundamental responsibility of promoting good health and educating the patients they care for. This research explores nurses' general knowledge about nutrition and whether the knowledge they have acquired is used in caring for their patients. The MEDLINE and the OVID database were searched for papers relating to the topic from 1990 to 2010 using "nurses and knowledge", "nurses" "nurses and nutrition" at different times during the search. Additional searches used the CINAHL and EMBASE databases, which brought out results that facilitated the organization of the literature review. The inclusion criteria were studies that specify nutritional knowledge of nurses and the exclusion criteria were studies that investigated other nurse's clinical knowledge. Fifteen studies that conform to the review criteria were identified. The results indicate that nurses have inadequate nutritional knowledge particularly in relation to when assessing the nutritional status of health care consumers.

Key words: Nurses, nutrition, knowledge.

INTRODUCTION

This study appraises the literature in the area of nutritional knowledge of nurses, which is cited as a fundamental component of nursing educational curriculum that is usually incorporated into their school programmes (La Trobe University, 2003). Schaller and James (2005) claimed that the majority of nurses still in school are only tutored about clinical nutrition from the perspective of health in general; that is, health promotion and prevention. Wynder and Andres (1994) stated that nutrition is a major manageable risk factor that could impact on a patient's wellbeing; a crucial role in health promotion and eradication of disease. Despite the availability of dieticians to counsel patients' on the necessary diet for healthy living, nurses are also expected to provide adequate nutrition education to patients and be familiar with the consequences associated with poor nutrition (Lindseth, 1990; Wilt et al., 1990; Gibbons et al., 2000). Schaller and James (2005) also believe that being aware of the essential dietary

components is one of the most crucial trainings student nurses should undergo. However, Harminder and Sihgh (2006) reported that nurses have inadequate knowledge of nutrition and are not concerned about evaluating patients' nutritional status. There was an exceptional interest in this area since no specific paper had reported a review of the nutritional knowledge of nurses. This review demonstrates the depth of research that has been done in the area of nurses' nutritional knowledge in various health institutions around the globe. It focused mainly on quantitative research which involves the use of various nutritional knowledge questionnaires. The primary objective of this study is to draw a general conclusion on the level at which the nurses understand the term nutrition.

The aim of this study is to examine nurses' general knowledge about nutrition and whether the knowledge they have acquired is used in their care for patients.

LITERATURE REVIEW

Nutrition is considered to be the bedrock of wellbeing and prevention of ill-health in the society (Schneeman, 1996),

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and is an essential factor in promoting the health of the public. It is referred to as the key condition for proper growth, infection control, and attainment of quality life (Brogden, 2004). Amarantos et al. (2001) stated that nutrition could be defined within the medical concept by taking into account the patient's dietary, biochemical and medical signs. It was established by Amarantos et al. (2001) that the dietary intake of a patient can be associated with their sensory, emotional and societal facet of life. Blades (2000) confirmed that satisfactory nutrition is not all about healthy food, but is more associated with the psychological wellbeing of the patient in question. This was supported by Potter (2008) who declared that adequate nutrition is a foundation of excellent recuperation from sickness.

It was recommended by Wynder and Andres (1994) that since nutrition is the key to the health of the populace; it is of great importance for all health care providers to understand how dietary intake could impact on patients' wellbeing. Hunt et al. (1995) suggested that nutrition psychotherapy should be a fundamental component of health care tradition, as it has been shown that educating patients on different aspects of nutrition is a means of reducing the cost of the management of ill-health as well as engaging in the promotion of good health. Worsley (2002) suggested that knowledge is needed to turn around people's ways and action, and is very important in influencing dietary behaviour. Nutrition education was claimed to influence dietary habit in reducing the intake of cholesterol and fatty food (Levy et al., 1993), buying nourishing and healthy food choices (Turrell and Kavanagh, 2006), increasing the intake of fruit and vegetables (Van et al., 2008; Ball et al., 2006), and weight reduction (Klohe-lehman et al., 2006).

Among health care consumers, the prevalence of nutrition related ailments of obesity and cardiovascular disease has increased for almost a decade affecting the quality of the patient's life making them less productive for the rest of their life (Park et al., 2008). The prevention of dietary related ailments involves modification of one's way of life through changes in choice and quantity of food consumed. However, patients that are affected tend not to adhere to the dietary advice in most developed countries (Graham et al., 2007). In some cases, patients that are suffering from ill-health due to poor dietary control often lack sufficient knowledge about the diet they are required to eat and are not getting accurate nutrition education from nurses and other health care workers (Waśkiewicz et al., 2008).

Schaller and James (2005) have stated that maintaining a high quality dietary intake is fundamental for optimum wellbeing, while good dietary intake is a very crucial factor in promoting good health and disease eradication (Mowe et al., 2008). However, while acquiring facts about nutrition is very important, knowledge alone is not adequate for dietary transformation (Hendrie et al., 2008).

One important way in which the health care workers knowledge and practice are influenced is through their learning programme (Morison et al., 2010). This establishes the proficiency, outlook and information they require to maintain their position as an expert in their field (Morison et al., 2010).

This literature review presents a mainstay structure, and it contains literature that encompasses the subject of nutritional knowledge of nurses. The literature review will affirm that the nutritional knowledge of nurses' in relation to people's health is both a health and health promotion issue and will create more awareness of the essence of good nutrition in health care practice.

METHODOLOGY

According to Grant (2004), achieving a wealth of appropriate literature for a study requires going through several databases. Following the guiding principle laid down by Haynes et al. (2005) and Shaw et al. (2004), the MEDLINE and the OVID database were searched for papers related to the topic from 1990 to 2010 using keywords "nurses and knowledge", "nurses" "nurses and nutrition" at different times during the search. Additional searches used the CINAHL and EMBASE databases, which brought out results that facilitated the organization of the literature review.

The inclusion criteria for study design and study samples were used. This includes studies that specify nutritional knowledge of nurses, while the exclusion criteria were studies that investigated other nurse's clinical knowledge, the review focused on data from quantitative and qualitative design studies. Participants include graduate nurses, geriatric nurses and registered nurses.

Most of the articles that did not meet the inclusion criteria through viewing their title and abstract were discarded. 15 full text copies of papers were evaluated separately to ascertain that they meet the inclusion criteria.

Nutrition education and training among nurses

Nutrition matters have been given greater improvement currently through several promotions carried out by the Royal College of Nursing (2006) and the age concern which are titled "Nutrition Now" (2006) and "Hungry to be heard" (2006) respectively (cited in Morison et al., 2010). The accountability of nurses for nutritional care relates to all sick individuals no matter their age (Morison et al., 2010). The nursing and midwifery council (NMC) acknowledges that it is the duty of the nurses to ensure hospitalized patients eat a well-nourished diet (NMC, 2007). This obligation also encompasses nutrition screening, scrutinizing patient nutritional status, supporting the patient when eating and ensuring meals are completed, recognizing patient needing diet modification, and directing other health care practitioners to patients' nutritional care (RCP, 2002).

The Nursing and Midwifery Council (NMC) has also created an 'Essential Skills Clusters' (2007) which harmonize some of the NMC expected outcomes and competencies based on the standards of proficiency for pre-registration nursing education (Morison, 2010). This standard of proficiency includes the expectation that recently qualified registered nurses understand the importance of the management of the dietary and fluid intake of patients through the thorough assessment and examination of the patient. This should lead to the creation of a valuable care plan which includes the establishment of suitable environment for liquid and food intake, ensuring that those patients that needed other forms of feeding aside from feeding orally are adequately taken care of and finally

giving concern and proper provision to cater for patient that can take fluid independently (Morison, 2010).

It was declared by the European Nutrition for Health Alliance (ENHA) (2006) that it is important for all health care practitioners to become sensitive and responsive to the pervasive increase in the rate of malnutrition and ensure that they are well informed about how to combat it through its recognition and avoidance. They also confirmed that health care experts require extensive training to gain more knowledge on how to evaluate the nutritional status of patient put in their care and that bodies in charge of professional training should ensure they undertake good programme development to disseminate nutrition education for health care experts (ENHA, 2006; p. 8). Johnston et al. (2008; p. 217) discovered there is inadequate nutrition education, reduced time of lectures delivery and insufficient topics covered in the undergraduate module of student nurses taught in the United Kingdom because more precedence is placed on topics other than nutrition. In order to ensure health care, practitioners are effectively trained to dissipate the knowledge acquired judiciously, it is necessary to augment the depth and priority given to nutrition in the nursing curriculum and appraisal (Morison et al., 2010).

Description of studies

In total, fifteen studies were identified, which were all hospital based. Overall, most of the studies targeted nurses at their place of work. Only one out of the fifteen studies used the qualitative mode of data collection, while the remaining fourteen used different type of nutrition knowledge questionnaire to arrive at their result.

RESULTS

Palmer (1998) states that since the curriculum of nurses have been deprived of adequate nutrition courses, nurses may be unaware of the important role they can play in ensuring that patients receive adequate nutrition rather than delegating this task to nursing assistants. Wilt et al. (1990) reported in their study of registered nurses that there were insufficient nutritional knowledge scores of some basic chronic diseases affecting patients in hospitals. Lindseth (1990) identified that the general knowledge score of nutrition among some samples of rural nurses in North Dakota was low with an average of about 65%. The samples of this study drawn from care homes, community health agencies and hospitals, revealed that the community health nursing staff scored the highest in their nutrition knowledge compared to the medical hospital nursing staff. In another study featuring 71 geriatric nurses, Lindseth concluded there was significant difference among nurses knowledge of nutrition in most of the nutrition areas examined, showing that nurses need adequate knowledge of nutrition when taking care of their patients (Lindseth, 1994). In a study of 129 graduating nurses of over 25 years of age that had worked over 10 years in their profession, it was revealed that few numbers of nurses have had the opportunity to attend a nutrition oriented continuing education program since they started their profession (Lindseth, 1997). Starnek et al. (1997) established in a study involving 95 nurses that the training of nurses in lifelong care services

for nutrition of the elderly was insufficient and suggested more attention be given to improving nurses' knowledge about older persons' nutritional needs. Taylor and Baker (1997) in a study involving 27 nurses concluded their nutritional knowledge was very low compared to the results derived from other studies and suggested a nutrition education update course to cater for the deficient area.

A qualitative study carried out on seven internal medicine nurses in Australia showed that several nurses lack the comprehensive knowledge required to give proper nutritional care to the health care consumers in their custody (Kowanko et al., 1999). They identified there is inadequate basic nutritional knowledge relating to under-nutrition and over-nutrition among the acute nursing staff and concluded that although nurses consider nutritional care of patient to be of paramount importance, they still find it very difficult to place it at the forefront of any care they provide for the patients under their supervision due to time limitation and multiple tasks to complete. They suggested that sufficient knowledge about nutrition must be incorporated into the training of nurses for optimum care delivery (Kowanko et al., 1999).

Warber et al. (2000) in their study of 200 nurse experts concluded that the basic knowledge of nutrition that nurses are supposed to display is deficient. This was supported in another study carried out on 44 geriatric nurses, which gave an outcome of a reduced nutrition knowledge score of 65% (Crogan et al., 2001). This reflected the fact that a small number of nurses have had the privilege to receive adequate training in nutrition since they graduated from their nursing institution (Crogan et al., 2001). The ability of nurses' nutritional awareness in tackling protein energy malnutrition (PEM) among residents in care homes was also demonstrated in this study. They discovered that nurses lack skills as to how residents' diet is being handled and they suggested that an educational seminar provision to all nurses can help to deal with the issue (Crogan et al., 2001). A related result was also gathered from a survey carried out on 103 practice nurses in a regional hospital in Australia where the mean nutritional knowledge score attained was 60.2%, showing that qualified and skilled nurses that have been in practice for several years scored higher compared to the rest of the nurses with lower qualification and new to the profession (Schaller and James, 2005).

A survey carried out by Mowe et al. (2008) on 4512 healthcare professionals found that an inadequate nutritional knowledge among health professionals could lead to bad nutritional practice resulting in delay of patient discharge from hospital. This finding was supported by Kim and Choue (2009) where they demonstrated in their study involving 283 nursing participants that nurses have inadequate nutritional knowledge particularly in relation to assessing the nutritional status of health care consumers when using a standardized questionnaire. A study carried out by Endevelt et al. (2009) on 600 nursing staff

confirmed nurses that had a university qualification have an enhanced outlook about the nutrition of the elderly than the other registered nurses, and that nutritional knowledge was associated with age. This indicates that as the nurses grow older in their profession their knowledge about nutrition diminishes if proper programmes for skills development are not put in place.

A related study conducted by Park et al. (2010) with questionnaires containing 42 diet related questions, administered to a total of 506 nurses in three different health institutions in Seoul exposed the fact that nurses' knowledge of nutrition was not as good as those described in some developed countries in relation to cardiovascular disease (CVD) and overweight. Even though the nurses were conscious of the benefits of some food nutrients, they lacked some basic knowledge about specific diets that protect humans against cardiovascular disease (Park et al., 2010). An obstacle to successful dietary care for patients is an inadequate knowledge of nutrition among all nurses and other health care staff (Morison et al., 2010). Park et al. (2010) states that nurses are known to have close relationship with hospitalized patients, and this ideally places them to advise patients on the best dietary option.

Use of nutritional knowledge by nurses in practice

McWhirter and Pennington (1994) and Coxall et al. (2008) reported that inadequate dietary status of patients could be due to limited expertise in the detection of health care consumers at risk of under-nutrition. Haward (2001) and Lennard-Jones et al. (1995) stated that assessing the nutritional status of patients was not considered as essential by nurses, with little effort being made in checking the dietary status of patients. Davison and Staples (1996) confirmed that nurses often over or underrate the dietary requirement of their patients. It is important for nurses to acquire necessary nutrition education and have a genuine dietary need of the patients they care for, so malnutrition can be overcome and good nutritional status of patients can be achieved (Cooke, 1995; Kowanko, 1997).

DISCUSSION

Health promotion theory has changed from the usual health education concept (Pender, 1996) to a wider environmental, inexpensive, and supportive measure of promoting the health of the public (Whitehead, 2006). On the other hand, many studies relating to nursing are still directed towards participants' way of life and behavioural change (Kim et al., 2003; McCabe et al., 2005; Pender, 2005).

Although, these studies shared collective objectives, their differences in the area of sample sizes and the instrument used in their data collection precluded the

opportunity to generalize the result. Most studies were conducted in US and the small number of studies on this area of research restricts the generalizability of the findings.

Conclusion

The literature review demonstrated the depth of research that has been done on various aspects of the nutritional knowledge of nurses on health care consumers. The review showed that there was still little research done on this topic in the United Kingdom. It shows that there is still a lot of effort needed to update the general knowledge of nurses in nutrition. This is important to ensure optimum care is delivered and that the patient and their relatives are comfortable with the kind of nutritional care received from their health care provider. This study also shows there is need to be a reevaluation of the curriculum used for nurses in various institutions of higher learning so as to close the gap that might be affecting the nurses' knowledge about nutrition of the patient they take care.

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A large, detailed image of a mosquito is centered in the background of the page. The mosquito is shown from a top-down perspective, with its long legs and wings clearly visible. The background is a light, slightly textured grey.

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