

Journal of
**Public Health and
Epidemiology**

Volume 7 Number 4 April, 2015

ISSN 2141-2316



*Academic
Journals*

ABOUT JPHE

The **Journal of Public Health and Epidemiology (JPHE)** is published monthly (one volume per year) by Academic Journals.

Journal of Public Health and Epidemiology (JPHE) is an open access journal that provides rapid publication (monthly) of articles in all areas of the subject such as health observatory, biostatistics, occupational health, behavioral medicine etc. The Journal welcomes the submission of manuscripts that meet the general criteria of significance and scientific excellence. Papers will be published shortly after acceptance. All articles published in JPHE are peer-reviewed.

Submission of Manuscript

Submit manuscripts as e-mail attachment to the Editorial Office at: jphe@academicjournals.org. A manuscript number will be mailed to the corresponding author shortly after submission.

The Journal of Public Health and Epidemiology will only accept manuscripts submitted as e-mail attachments.

Please read the **Instructions for Authors** before submitting your manuscript. The manuscript files should be given the last name of the first author.

Editors

Professor Mostafa A. Abolfotouh

*Professor of Family & Community Medicine
Head of Medical Team - Biobanking Section.
King Abdullah International Medical Research
Center, King Saud Bin-Abdulaziz University for
Health Sciences, National Guard Health Affairs,
Saudi Arabia*

Editorial Board

Dr. Guolian Kang

*The University of Alabama at Birmingham/1665
University Blvd, Ryals 443
Guolian
USA*

Dr. Mohammed Danlami Salihu

*Public Health Department
Faculty of Veterinary Medicine
Usmanu Danfodiyo University, Sokoto.
Nigeria.*

Prof. Jahanfar Jahanban

*Oral Pathology Dept.Dental faculty of Tehran Islamic
Azad University/
Address:B 107 Pezeshkan-Farabi Build No 67 Javanshir
St. Hosseinabad Pasdaran St.Tehran
Iran*

Okonko, Iheanyi Omezuruike

*University of Ibadan, Ibadan, Nigeria
Nigeria*

Dr. Afroditi K Boutou

*Respiratory Failure Unit, Aristotle University of
Thessaloniki,"G. Papanikolaou", Hospital, 57010,
Exohi.
Greece*

Dr. Anil K. Philip

*Rajiv Academy for Pharmacy/ delhi-Mathura Highway,
NH#2, Mathura-281001, Uttar Pradesh, India
India*

Dr. Bijan Mohammad hosseini

*Ayatollah Kashani Social Security Hospital
P.O Box: 14515 - 799 Tehran - Iran
Iran*

Dr. Brajadulal Chattopadhyay

*Department of Physics, Jadavpur University, Kolkata-
700032, India
India*

Dr. Carlos H Orces

*Laredo Medical Center, 1700 East Saunders, Laredo
Texas 78041
USA*

Mrs Iscah A. Moth

*Ministry of Public Health and Sanitation
P.O. Box 1210-40100 Kisumu
Kenya*

Prof. Tariq Javed

*Department of Pathology, Faculty of Veterinary Science,
University of Agriculture, Faisalabad-38040.
Pakistan.*

Dr. María Elena Dávila L

*Universidad Centroccidental "Lisandro Alvarado".
School of Medicine/ School of Health Science . Av.
Andrés Bello C/ Av. Libertador. Barquisimeto, Lara,
Venezuela, SA*

Dr. Lay Ching Chai

*Centre of Excellence for Food Safety Research, Faculty of
Food Science and Technology, Universiti Putra Malaysia,
43400 UPM Serdang, Selangor,
Malaysia*

Dr. Liting Song

*Appointment pending, Public Health Agency of
Canada/Health Canada
809-50 Riddington Drive,
Toronto, ON M2K 2J8
Canada*

Dr. Joaquim Xavier Sousa Jr

*Laboratory Immunodermatology of Clinics Hospital -
Av Dr Eneas Carvalho Aguiar, 255 3th floor Room 3016
05403-000 Sao Paulo, Brazil
Brazil*

Dr. K.K.I.U. Arunakumara

*Institution/address - Dept. of Crop Science, Faculty of
Agriculture, University of Ruhuna, Mapalana,
Kamburupitiya, Sri Lanka
Sri Lanka*

Dr. Keya Chaudhuri

*Indian Institute of Chemical Biology
Raja S C Mullick Road, Kolkata-700032, India
India*

Belchiolina Beatriz Fonseca

*Universidade Federal de Uberlândia, Rua Ceará s/n,
bloco 2D. saça 43, Campus Umuarama, Uberlândia MG,
Brazil. Brazil*

Dr. Charles R. Doarn

*Associate Professor of Public Health and Biomedical
Engineering
Director, Telemedicine Program
Department of Public Health Sciences
University of Cincinnati
USA*

Instructions for Author

Electronic submission of manuscripts is strongly encouraged, provided that the text, tables, and figures are included in a single Microsoft Word file (preferably in Arial font).

The **cover letter** should include the corresponding author's full address and telephone/fax numbers and should be in an e-mail message sent to the Editor, with the file, whose name should begin with the first author's surname, as an attachment.

Article Types

Three types of manuscripts may be submitted:

Regular articles: These should describe new and carefully confirmed findings, and experimental procedures should be given in sufficient detail for others to verify the work. The length of a full paper should be the minimum required to describe and interpret the work clearly.

Short Communications: A Short Communication is suitable for recording the results of complete small investigations or giving details of new models or hypotheses, innovative methods, techniques or apparatus. The style of main sections need not conform to that of full-length papers. Short communications are 2 to 4 printed pages (about 6 to 12 manuscript pages) in length.

Reviews: Submissions of reviews and perspectives covering topics of current interest are welcome and encouraged. Reviews should be concise and no longer than 4-6 printed pages (about 12 to 18 manuscript pages). Reviews are also peer-reviewed.

Review Process

All manuscripts are reviewed by an editor and members of the Editorial Board or qualified outside reviewers. Authors cannot nominate reviewers. Only reviewers randomly selected from our database with specialization in the subject area will be contacted to evaluate the manuscripts. The process will be blind review.

Decisions will be made as rapidly as possible, and the journal strives to return reviewers' comments to authors as fast as possible. The editorial board will re-review manuscripts that are accepted pending revision. It is the goal of the JPHE to publish manuscripts within weeks after submission.

Regular articles

All portions of the manuscript must be typed double-spaced and all pages numbered starting from the title page.

The Title should be a brief phrase describing the contents of the paper. The Title Page should include the authors' full names and affiliations, the name of the corresponding author along with phone, fax and E-mail information. Present addresses of authors should appear as a footnote.

The Abstract should be informative and completely self-explanatory, briefly present the topic, state the scope of the experiments, indicate significant data, and point out major findings and conclusions. The Abstract should be 100 to 200 words in length.. Complete sentences, active verbs, and the third person should be used, and the abstract should be written in the past tense. Standard nomenclature should be used and abbreviations should be avoided. No literature should be cited.

Following the abstract, about 3 to 10 key words that will provide indexing references should be listed.

A list of non-standard **Abbreviations** should be added. In general, non-standard abbreviations should be used only when the full term is very long and used often. Each abbreviation should be spelled out and introduced in parentheses the first time it is used in the text. Only recommended SI units should be used. Authors should use the solidus presentation (mg/ml). Standard abbreviations (such as ATP and DNA) need not be defined.

The Introduction should provide a clear statement of the problem, the relevant literature on the subject, and the proposed approach or solution. It should be understandable to colleagues from a broad range of scientific disciplines.

Materials and methods should be complete enough to allow experiments to be reproduced. However, only truly new procedures should be described in detail; previously published procedures should be cited, and important modifications of published procedures should be mentioned briefly. Capitalize trade names and include the manufacturer's name and address. Subheadings should be used. Methods in general use need not be described in detail.

Results should be presented with clarity and precision.

The results should be written in the past tense when describing findings in the authors' experiments. Previously published findings should be written in the present tense. Results should be explained, but largely without referring to the literature. Discussion, speculation and detailed interpretation of data should not be included in the Results but should be put into the Discussion section.

The Discussion should interpret the findings in view of the results obtained in this and in past studies on this topic. State the conclusions in a few sentences at the end of the paper. The Results and Discussion sections can include subheadings, and when appropriate, both sections can be combined.

The Acknowledgments of people, grants, funds, etc should be brief.

Tables should be kept to a minimum and be designed to be as simple as possible. Tables are to be typed double-spaced throughout, including headings and footnotes. Each table should be on a separate page, numbered consecutively in Arabic numerals and supplied with a heading and a legend. Tables should be self-explanatory without reference to the text. The details of the methods used in the experiments should preferably be described in the legend instead of in the text. The same data should not be presented in both table and graph form or repeated in the text.

Figure legends should be typed in numerical order on a separate sheet. Graphics should be prepared using applications capable of generating high resolution GIF, TIFF, JPEG or Powerpoint before pasting in the Microsoft Word manuscript file. Tables should be prepared in Microsoft Word. Use Arabic numerals to designate figures and upper case letters for their parts (Figure 1). Begin each legend with a title and include sufficient description so that the figure is understandable without reading the text of the manuscript. Information given in legends should not be repeated in the text.

References: In the text, a reference identified by means of an author's name should be followed by the date of the reference in parentheses. When there are more than two authors, only the first author's name should be mentioned, followed by 'et al'. In the event that an author cited has had two or more works published during the same year, the reference, both in the text and in the reference list, should be identified by a lower case letter like 'a' and 'b' after the date to distinguish the works.

Examples:

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

1987a,b; Tijani, 1993,1995), (Kumasi et al., 2001)

References should be listed at the end of the paper in alphabetical order. Articles in preparation or articles submitted for publication, unpublished observations, personal communications, etc. should not be included in the reference list but should only be mentioned in the article text (e.g., A. Kingori, University of Nairobi, Kenya, personal communication). Journal names are abbreviated according to Chemical Abstracts. Authors are fully responsible for the accuracy of the references.

Examples:

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.

Short Communications

Short Communications are limited to a maximum of two figures and one table. They should present a complete study that is more limited in scope than is found in full-length papers. The items of manuscript preparation listed above apply to Short Communications with the following differences: (1) Abstracts are limited to 100 words; (2) instead of a separate Materials and Methods section, experimental procedures may be incorporated into Figure Legends and Table footnotes; (3) Results and Discussion should be combined into a single section. Proofs and Reprints: Electronic proofs will be sent (e-mail attachment) to the corresponding author as a PDF file. Page proofs are considered to be the final version of the manuscript. With the exception of typographical or minor clerical errors, no changes will be made in the manuscript at the proof stage.

Fees and Charges: Authors are required to pay a \$650 handling fee. Publication of an article in the Journal of Public Health and Epidemiology is not contingent upon the author's ability to pay the charges. Neither is acceptance to pay the handling fee a guarantee that the paper will be accepted for publication. Authors may still request (in advance) that the editorial office waive some of the handling fee under special circumstances.

Copyright: © 2015, Academic Journals.

All rights Reserved. In accessing this journal, you agree that you will access the contents for your own personal use but not for any commercial use. Any use and or copies of this Journal in whole or in part must include the customary bibliographic citation, including author attribution, date and article title.

Submission of a manuscript implies: that the work described has not been published before (except in the form of an abstract or as part of a published lecture, or thesis) that it is not under consideration for publication elsewhere; that if and when the manuscript is accepted for publication, the authors agree to automatic transfer of the copyright to the publisher.

Disclaimer of Warranties

In no event shall Academic Journals be liable for any special, incidental, indirect, or consequential damages of any kind arising out of or in connection with the use of the articles or other material derived from the JPHE, whether or not advised of the possibility of damage, and on any theory of liability.

This publication is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability, fitness for a particular purpose, or non-infringement. Descriptions of, or references to, products or publications does not imply endorsement of that product or publication. While every effort is made by Academic Journals to see that no inaccurate or misleading data, opinion or statements appear in this publication, they wish to make it clear that the data and opinions appearing in the articles and advertisements herein are the responsibility of the contributor or advertiser concerned. Academic Journals makes no warranty of any kind, either express or implied, regarding the quality, accuracy, availability, or validity of the data or information in this publication or of any other publication to which it may be linked.

ARTICLES

Research Articles

- Challenges of integrated disease surveillance response reporting among healthcare personnel in Mangu, Plateau State, Nigeria** 108
Luret Albert Lar, Tolulope Olumide Afolaranmi,
Yetunde Olubusayo Tagurum, Benjamin Uzochukwu and
Ayuba Ibrahim Zoakah
- Weight changes and dietary habits among breast feeding mothers** 114
Hadeel Fadhil Farhood
- Geographic variations in the predictors of asthma, wheeze, and dry nocturnal cough among adolescents from the United Arab Emirates** 122
Caroline Barakat-Haddad and Sheng Zhang
- Knowledge and misconception of young women toward sexual transmitted infection and condom use in Northern Ethiopia: Cross sectional study** 138
Girmatsion Fisseha
- Reproductive health needs and service utilization among youths in West Badewacho Woreda, Hadiya Zone, South Ethiopia** 145
Niguss Cherie, Gurmesa Tura and Aderajew, N Teklehaymanot

Full Length Research Paper

Challenges of integrated disease surveillance response reporting among healthcare personnel in Mangu, Plateau State, Nigeria

Luret Albert Lar^{1*}, Tolulope Olumide Afolaranmi¹, Yetunde Olubusayo Tagurum¹, Benjamin Uzochukwu² and Ayuba Ibrahim Zoakah¹

¹Department of Community Medicine, Faculty of Medical Sciences, University of Jos, P.M.B .2084, Jos, Plateau State, Nigeria.

²Department of Community Medicine, College of Medicine, University of Nigeria, Enugu Campus, Enugu State, Nigeria.

Accepted 6 March, 2015

Integrated disease surveillance and response comprises data collection, analysis, interpretation and feedback on communicable and non-communicable diseases like cholera and hypertension. It assists health workers detect and respond to these diseases. The regional office for Africa of the World Health Organization implemented it in 1998. Nigeria has embraced this strategy, but there are challenges regarding implementation. This interventional study determined challenges faced by healthcare workers on reporting these priority diseases. One hundred and eight respondents were recruited using multi-stage sampling. Pre-tested, interviewer-administered questionnaires and baseline data were collected on respondents' knowledge, practices and factors affecting the reporting. Training was given and post-intervention data collected. Data was analysed using Epi info and a p-value of ≤ 0.05 was statistically significant. Mean knowledge scores improved from 2.92 ± 1.72 to 4.61 ± 1.03 , post-intervention; those of practice increased from 1.90 ± 2.8 to 2.86 ± 3.4 . The availability of the forms for reporting was the most challenging factor among 30 (27.8%) respondents, pre-intervention. There were statistically significant associations with the availability of reporting forms ($p < 0.0001$), the receipt of commendation ($p < 0.0001$) and feedback ($p = 0.0007$), post-intervention. Though this strategy is not challenge free, training healthcare personnel can minimize challenges.

Key words: Setbacks, disease reporting, West Africa.

INTRODUCTION

Integrated Disease Surveillance and Response (IDSR), or public health surveillance can simply be defined as information that is gathered for action to be taken on it. (Mghamba et al., 2004). It involves an ongoing and

systematic collection, collation, analysis, interpretation and dissemination of the collected data. IDSR comprises of databases, personnel and materials that are organized to collect data which are utilized for informed decision

*Corresponding author. E-mail: luret_shown@yahoo.com.

Author(s) agree that this article remain permanently open access under the terms of the [Creative Commons Attribution License 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

making. (Nnebue et al., 2013). The collected data is used in disease detection, tracking, outbreak control and in allocating resources, appropriately. In resource-poor settings, it is a very pragmatic strategy. (Phalkey et al., 2013).

IDSR has evolved over the past decade and more since its adoption (Cash and Narasimhan, 2000). During the last 10 years, a lot of health, social, economic, technical and environmental changes have occurred in Africa. There has been mixed progress towards coordinated, integrated surveillance systems, but almost every country in the region has strengthened their capacity to respond to public health threats in time to avoid unnecessary illnesses, disabilities and deaths (Cash and Narasimhan, 2000). These have been achieved through investments in human and material resources. The guidelines have been revised from the previous edition in order to incorporate Non-Communicable Disease (NCD), threats hypertension, coronary heart disease and Diabetes Mellitus (DM), due to their increasing incidence (Centre for Disease Control (CDC), 2013). The adoption of the International Health Regulations (IHR, 2005), which is a legal document binding all World Health Organization (WHO) member states, preventing the spread of international diseases, without trade and traffic interference addresses the threat to international public health security caused by emerging and re-emerging diseases (Nigerian Academy of Science (NAS), 2010; WHO and CDC, 2010). It calls for strengthening surveillance and response through national health systems (NAS, 2010; WHO and CDC, 2010.)

Countries grappling with the challenges of Communicable Disease (CD) surveillance face multiple challenges with this strategy (Phalkey et al., 2013). Decision-makers do not have information to identify problems and needs, formulate evidence-based policies and programmes, and allocate scarce resources optimally. This is evidenced by a study conducted in Sabon Gari, Kaduna, North Western Nigeria, where focal persons were verbally mentioned by the health personnel in the facility, without visible records of their contact addresses (Abubakar et al., 2010).

Data are often not available in most developing countries, like Nigeria that have the greatest need, owing to under investment in the systems for their collection, analysis, dissemination and use. (Wagner et al., 2001). If and when data are available, they are often out of date, rendering trend assessment particularly difficult. This is in keeping with the study conducted in Sabon Gari, Kaduna State where there was missing, incomplete and untimely reporting of IDSR data. Furthermore, the need to collect data to be able to act still falls below expectations (Abubakar et al., 2010). The information data bases exist, but have revealed their limitations in helping to determine priorities, to carry out the mobilization of resources and early detection to enable the prevention and control of epidemics (Federal Ministry of Health (FMOH) Nigeria,

2006).

An assessment of IDSR implementation in Nigeria carried out in 2009 revealed that 68% of the health facilities surveyed had no case definitions for any of the 5 selected notifiable diseases, and health workers had not been trained on the clinical presentations of these diseases (Omozua et al., 2008). In the case of in-patients, discharge summaries are often not provided in patient case notes, therefore health information officers who compile routine notification reports have no means of determining the diagnostic category to which each patient belongs (Omozua et al., 2008). The district level is the focus for integrating surveillance functions because it is the first level in the health system with full-time staff dedicated to all aspects of public health such as monitoring health events in the community, mobilizing community action, encouraging national assistance and accessing regional resources to protect the district's health. The FMOH in Nigeria recognizes the need for the implementation of an IDSR system where personnel, materials and other resources could be used more effectively and efficiently. This will contribute to reduction of mortality, morbidity and disability from diseases through accurate, complete and timely information with regards to data gathering and transmission for effective prevention and control of CDs (WHO, 2004).

There are still gaps on indepth knowledge of the strategy among healthcare personnel, unavailability of the forms in most facilities, incomplete and timely reporting of the collected information by trained personnel and constant feedback from the focal persons to the various health facilities. Therefore, this study sought to identify the root causes of challenges with IDSR implementation. These gaps were highlighted by this study, emphasizing the need for retraining of relevant health personnel to address these observed gaps.

MATERIALS AND METHODS

Plateau State, located in North Central Nigeria has Jos as its capital city. Mangu, one of its seventeen Local Government Areas (LGAs) was the study area. Mangu LGA has a population of 295, 000 with a slightly higher female population of 149, 000 compared with 146, 000 males (Encyclopedia Britannica, 2013). It is bound to the North by Jos East LGA, Bauchi State to the South, by Qua'an Pan LGA, Shendam and Pankshin LGAs to the East and to the West by Barkin Ladi and Bokokos LGAs respectively (Encyclopedia Britannica, 2013). There are 94 health facilities out of which 6 are secondary health facilities and the rest (88) are Primary Health Care (PHC) facilities (Encyclopedia Britannica, 2013).

The current structure of IDSR is based on the 3 levels of government; Federal, State and Local levels (FMOH. 2005). Focal persons are designated at each level to collect data on IDSR from designated focal sites or facilities (both publically and privately owned) at the LGA level. They collate the results and forward them to the State Ministry of Health. They are responsible for providing feedback to the health facilities (Abubakar et al., 2013). The State Disease Surveillance and Notification Officer (DSNO), who is resident at the State Epidemiological units then compiles the information and forwards it to the Epidemiology unit of the FMOH,

Table 1. Socio-demographic characteristics of nursing mothers and their children.

| Characteristics | Frequency n=108 | Percentage (%) |
|----------------------------------|-----------------|----------------|
| Age group (years) | | |
| 28-37 | 46 | 42.6 |
| 38-47 | 43 | 40.0 |
| 48-57 | 19 | 18.0 |
| Sex | | |
| Female | 55 | 50.9 |
| Male | 53 | 49.1 |
| Highest educational level | | |
| Tertiary | 58 | 53.7 |
| Secondary | 50 | 46.3 |
| Occupation | | |
| *CHEW | 45 | 41.7 |
| Nurse | 16 | 14.8 |
| Lab scientist | 11 | 10.2 |
| **CHO | 10 | 9.3 |
| Lab technician | 8 | 7.4 |
| ***EHO | 8 | 7.4 |
| Midwife | 7 | 6.5 |
| Doctor | 3 | 2.8 |
| Working experience | | |
| (Years) | 51 | 47.2 |
| >10 | 42 | 38.9 |
| 5-10 <5 | 15 | 13.9 |

*Community Health Extension Worker, ** Community Health Officer, ***Environmental Health Officer.

following appropriate analysis and feedback to the health facilities, and planning appropriate strategies for disease control (Abubakar et al., 2013). The information may be forwarded to development partners.

This was a quasi-experimental study involving 108 health personnel of PHCs in Mangu LGA. They were selected using computer generated random numbers by Winpepi software, version 11.25. The ratio of the staff strengths of the public to private PHC centers in Mangu LGA was 4:1. Eighty four respondents were selected from the public health facility in Mangu LGA and 24 in the private facilities, based on this ratio. Ethical clearance was obtained from the Jos University Teaching Hospital (JUTH) Ethical Clearance Committee. Verbal and written permission was obtained from Chairmen and PHC Directors of both LGAs and verbal and informed consent was also gotten from all respondents, and they were given the opportunity to opt out of the study without any penalties.

Using pre-tested, structured, interviewer-administered questionnaires consisting of 4 sections; section A gathered information on respondents' demographic data, (such as age, sex

and years of working experience, among a few), section B on knowledge, (such as the definition of IDSR, diseases reported and who dose the reporting), section C on practices of IDSR reporting (such as whether they are involved in reporting and questions regarding their level of involvement) and section D on factors responsible for IDSR reporting, (such as training issues) baseline data was collected from the respondents. A checklist was also filled alongside the questionnaire. Using the checklist, it was observed whether or not forms were available, whether or not trained healthcare personnel were filling the forms and if they were correctly filled. Two Resident doctors of the Department of Community Medicine, Jos University Teaching Hospital and 5 staff of the LGA health department served as research assistants. They were given a one day training by the Principal Investigator (PI) in the LGA secretariats on the nature of the study and how to administer the questionnaires. A week after this, a two day training was given by the PI, assisted by the State Epidemiologist on theoretical and practical aspects of IDSR reporting. There was a monthly reinforcement of the lessons learnt by the research team who independently visited the PHC centres thrice during the study period. This served as supportive supervision. After three months, another assessment was carried out with the use of the same instrument. This time interval was given to allow time for the knowledge gained to be translated into practice.

Data generated at pre and post intervention were collated and analysed with EPI info version 3.5.3 statistical software. Quantitative data like knowledge and practice scores were presented as means and standard deviations. There were 6 questions regarding knowledge and 9 on practices of IDSR reporting and one mark was awarded for a correct answer, while zero was awarded for a wrong answer. The mean scores for both of these variables was analysed based on these totals.

The student t-test was used to assess differences in mean knowledge and practice scores at pre and post intervention. The Chi-square test was used to determine any association between knowledge, practices and factors affecting IDSR reporting in the study group. A confidence interval of 95% was used in this study and a p- value of ≤ 0.05 was considered statistically significant.

RESULTS

The mean age of respondents was 39.99 ± 6.78 years. Majority of the respondents; 55 (50.9%) were females and 58 (53.7%) of them had tertiary level of education. Forty five (41.7%) of them were Community Health Officers and minority; 3 (2.8%) of them were Doctors. Most of the respondents; 51 (47.25) of them had more than ten years working experience (Table 1). The presence of the IDSR forms was observed in 86 (97.7%) of the 88 facilities at post intervention. Trained personnel filled 56 (63.6%) of them (Table 2). Mean knowledge score of respondents in the intervention group increased from 2.92 out of a total of 6 at pre-intervention to 4.61 out of the same total after training. This difference was statistically significant with a p-value < 0.0001 (Table 3). There was no statistically significant differences in the mean practice scores at both pre and post intervention; $p=0.2482$. However, the increase was from 1.90 ± 2.8 to 2.86 ± 3.4 at post-intervention (Table 4). There were statistically significant associations with availability of the forms, commendations for filling them and feedback on them after the training. However, though it was easier to

Table 2. Observational checklist findings in the studied Primary Healthcare Centers.

| Observation | Pre-Intervention (n=88) | | Post-Intervention (n=88) | |
|------------------------------|-------------------------|----------------|--------------------------|----------------|
| | Frequency | Percentage (%) | Frequency | Percentage (%) |
| Presence of forms | 78 | 88.6 | 86 | 97.7 |
| Filling by trained personnel | 30 | 34.1 | 56 | 63.6 |
| Correct filling | 13 | 14.8 | 43 | 48.9 |
| Timely forwarding | 23 | 26.1 | 38 | 43.2 |
| Observed feedback | 18 | 20.4 | 43 | 48.9 |

Table 3. Mean knowledge score of integrated disease surveillance response reporting among the healthcare personnel.

| Parameter | Pre-intervention | Post-intervention |
|----------------------|--|--|
| | Mean \pm Std deviation (max score=6) | Mean \pm Std deviation (max score=6) |
| Mean knowledge score | 2.92 \pm 1.72 | 4.61 \pm 1.03 |
| Total | 108 | 108 |

t-test = 8.77; df = 1; p < 0.0001.

Table 4. Mean practice score of integrated disease surveillance response reporting among the respondents.

| Parameter | Pre- intervention | Post-intervention |
|---------------------|--|--|
| | Mean \pm Std deviation (max score=6) | Mean \pm Std deviation (max score=6) |
| Mean practice score | 1.90 \pm 2.8 | 2.86 \pm 3.4 |
| Total | 108 | 108 |

t-test = 1.16; df = 1; p = 0.2482.

fill and interpret the forms at post intervention, it was not statistically significant; p = 0.4240 (Table 5).

DISCUSSION

The presence of forms was observed in majority of the health facilities at both pre and post-intervention. This was similar to a Tanzanian study, where 19 (73%) health facilities had adequate supplies of forms (Nsubuga et al., 2002). This was contrary to the findings of a study conducted among key personnel in Sabon Gari LGA of Kaduna State, Nigeria, where there was no indicator available (Abubakar et al., 2013). In this study, the availability of the forms can be explained by the fact that they are generally made available in facilities for disease surveillance by the relevant authorities.

Correct and timely filling of the forms by trained health personnel, timely forwarding of the forms to the State Epidemiological unit and receipt of feedback from them was observed to have been less than half (50%) with an improvement above that in only the form filling by trained personnel at post-intervention. These findings were

similar to those of a systemic review conducted in the USA where lack of knowledge of which diseases to report, understanding of how to whom to report, an assumption that someone else will report the case, intentional failure to report to protect patient privacy and insufficient reward for reporting or penalty for not reporting were factors related to manpower and affecting IDSR reporting (Doyle et al., 2002).

The most important factor in any system is manpower, which must be adequate in quantity and competent in quality, which incorporates attitude and training issues. These findings were also similar to a study conducted in Mauritius where generalized shortage of staff contributed to poor compliance with the surveillance (Kintu et al., 2005). Several Nigerian studies also agreed with the findings of this study. In the study conducted among health workers on IDSR reporting in Yobe State, Nigeria, timeliness of reporting was 0% (Bawa et al., 2003). In another study conducted among health workers in the same State, 47 (85.5%) of the respondents that were aware of the reporting requirements listed lack of training on disease surveillance as one of the factors affecting disease reports (Bawa and Olumide, 2005). The training

Table 5. Factors relating to practices of integrated disease surveillance response reporting among the study group.

| Characteristics | Pre- intervention | | Post-intervention | | χ^2 | df | p-value |
|--------------------------------|-------------------|----------------|-------------------|----------------|----------|----|----------|
| | Frequency | Percentage (%) | Frequency | Percentage (%) | | | |
| Availability | (n=108) | | (n=108) | | | | |
| Yes | 30 | (27.8) | 65 | (60.2) | 23.02 | 1 | <0.0001 |
| No | 78 | (72.2) | 43 | (39.8) | | | |
| Easy to fill /interpret | (n=30) | | (n=65) | | | | |
| Yes | 21 | (70.0) | 40 | (59.7) | 0.64 | 1 | 0.4240 |
| No | 9 | (30.0) | 25 | (40.3) | | | |
| Commendation | (n=30) | | (n=65) | | | | |
| Yes | 29 | (96.7) | 45 | (67.7) | - | - | *<0.0001 |
| No | 1 | (3.3) | 20 | (32.3) | | | |
| Feedback | (n=30) | | (n=62) | | | | |
| Yes | 28 | (93.3) | 45 | (67.7) | - | - | *0.0007 |
| No | 2 | (6.7) | 20 | (32.3) | | | |

*Fisher's exact.

and retraining of health workers responsible for data generation, collection and forwarding in health facilities on disease notification, regular feedback on diseases reported and provision of forms were recommended in order to improve the disease surveillance system, as concluded by the study (Bawa and Olumide, 2005).

Feedback was also observed to be very poor in this study. This was not different from a study conducted in Riyadh among Physicians, where 46.7% never received any feedback, 4.5% always received feedback, 8.6% received it mostly, 24.1% received it sometimes and 16.1% rarely received feedback (Field Epidemiology Training Programme, 2007). With the majority not receiving feedback, motivation to put more effective efforts at ensuring timely and complete reporting of priority diseases and better control may not be possible. Another was conducted in 7 facilities in 3 selected LGAs in Kaduna State among the Medical Officers of Health, DSNOs and State Epidemiologist. Relevant findings to practices regarding IDSR and its reporting revealed that only 2 (13%) of the PHCs reported receiving feedback from their respective LGAs (Abubakar et al., 2013). The study therefore concluded the poor implementation of IDSR in Kaduna State, which is the general state of the country, as depicted by all these studies.

These observational results translated into inadequate practices in this study. Mean practice scores were not statistically significant. This was however not similar to findings in a quasi experimental study conducted in Lagos State, South Western Nigeria among DSNOs of the 20 LGAs, where the mean paired difference in score

of 33.3% (SD, 10.4) pre and post intervention was statistically significant $p < 0.0001$ (Adeoye et al., 2011).

Conclusion

In this study, there was a statistically significant increase in knowledge scores, at post-intervention. This finding was similar to that conducted among healthcare workers in private hospitals in Riyadh, Saudi Arabia where majority of them had more than 70% of the total score (> 26 out of 36), though not statistically significant (Field Epidemiology Training Programme, 2007). Globally, the awareness of healthcare workers on disease surveillance and reporting has improved. This is more marked at the district level and may be as a result of the fact that this surveillance system was initially established to strengthen the district level and inevitably the national level. However, this awareness may not necessarily be translated to an increase in knowledge. In another study carried out in Yobe State among 144 healthcare workers, the mean knowledge score was $0.85 \pm 8SD$ before the training intervention (Bawa et al., 2003). This was lower than the findings of this study, but similar in being both low at pre-intervention, prior to the training. Common to all these studies, is the poor knowledge on various aspects of IDSR knowledge. These findings were all similar to all the studies reviewed elsewhere in the world. The same conclusion of poor knowledge regarding the scheme and its practices will all affect appropriate practices and therefore the effective local,

regional and global control of these diseases.

Practices regarding IDSR reporting need to be strengthened by ensuring that trained health personnel correctly fill and compile the results at the facility level and send complete and timely reports. This should be implemented by the PHC Co-ordinators and DSNOs. The constant availability of IDSR forms in the facilities should be enforced and maintained by the LGA health department to ensure continuity of reporting and improve on the effectiveness of the system.

LIMITATION OF THE STUDY

The main limitation faced during the study period was the ongoing strike action health workers embarked upon during the study period in some parts of the State. More LGAs would have been included to have a better external validity of the study.

ACKNOWLEDGEMENT

The authors acknowledge the Local Government Health Department staff, LGA Chairman and all health personnel for the permission given to conduct this study, the participants are also appreciated for their zeal in being part of the study from the beginning to the end of the study.

Conflict of interest

The authors declare that they have no conflicts of interest.

REFERENCES

- Abubakar AA, Idris SH, Sabitu K, Shehu AU, Sambo MN (2010). Emergency preparedness and the capability to identify outbreaks: A case study of Sabon Gari Local Government Area, Kaduna State. *Ann. Niger. Med.* 4(1):21-27.
- Abubakar AA, Sambo MN, Idris SH, Sabitu K, Nguku P (2013). Assessment of Integrated Disease Surveillance and Response Strategy Implementation in Selected Local Government Areas of Kaduna State. *Ann. Niger. Med.* 7(1):14-9.
- Adeoye O, Aman-Oloniyo A, Nwaeke C, Mbata A, Oduneye A (2011). Impact of training on disease surveillance and notification officers in Nigeria. *Emerg. Health Threats J.* 4:11186
- Bawa SB, Olumide EA, Umar US (2003). Knowledge, Attitude and Practices of the Reporting of Notifiable Diseases Among Health Workers in Yobe State, Nigeria. *Afr. J. Med. Med. Sci.* 32(1):49-53.
- Bawa SB, Olumide EA (2005). The Effect of Training on the Reporting of Notifiable Diseases among Health Workers in Yobe State, Nigeria. *Niger. Postgrad. Med. J.* 12(1):1-5.
- Cash RA, Narasimhan V (2000). Impediments to Global Surveillance of Infectious Disease. *Bull. World Health Organ.* 78(11):1358-1367.
- Centre for Disease Control (2013). Global Health - Integrated Disease Surveillance and Response. Available at: <http://www.cdc.gov/globalhealth/healthprotection/ghsb/idsr/default.htm>
- Doyle TJ, Glynn MK, Groseclose SL (2002). Completeness of Notifiable Infectious Disease Reporting in the United States: An Analytical Literature Review. *Am. J. Epidemiology* 155(9):866-874.
- Encyclopedia Britannica (2013). Mangu. Available at: <http://en.britanica.org>
- Federal Ministry of Health (2005). National Health Policy on Integrated Disease Surveillance and Response pp. 7-8.
- Federal Ministry of Health, Nigeria (2006). National Health Management Information System (NHMIS). Revised policy document p 2.
- Field Epidemiology Training Programme (2007). Assessment of knowledge, attitudes and practices of physicians working at private dispensaries and hospitals in Riyadh City towards the surveillance system. *Saudi Epidemiol. Bull.* 14(2):16-21.
- Mghamba JM, Mboera LEG, Krekamoo W, Senkoro KP, Rumisha SF, Shayo E, Mmbuji P (2004). Challenges of implementing an integrated disease surveillance and response strategy using the current health management information system in Tanzania. *Tanzan. J Health Res.* 6(2):57-63.
- Kintu P, NanyunjaM, NzabanitaM, Magoola R (2005). Development of HMIS in poor countries, Uganda as a case study. *Health Policy Dev. J.* 3(1):46-53.
- Nigerian Academy of Science (2010). Integrated disease surveillance and response. stakeholders' awareness creation workshop, Abuja.
- Nnebue CC, Onwasigwe CN, Adogu POU, Onyeonoro UU (2013). Awareness and knowledge of disease surveillance and notification by Health-care workers and availability of facility records in Anambra State, Nigeria. *Niger. J. Clin. Pract.* 16(4):483-489.
- Nsubuga P, Eseko N, Tadesse W, Ndayimirije N, Stella C, McNabb S (2002). Structure and performance of infectious disease surveillance and response, United Republic of Tanzania. *Bull. World Health Organ.* 80(3):196-203.
- Omozua AE, Asuzu MC, Adebisi AO, Osungbade KO (2008). Factors that hinder private health institutions from participation in national health management information system. *J. Community Med. Prim. Health Care* 20(1):47.
- Phalkey RK, Yamamoto S, Awate P, Marx M (2013). Challenges with the implementation of an integrated disease surveillance and response (IDSR) system: Systematic review of the lessons learned. *Health Policy Plan.* 30(1):131-43.
- Wagner MM, Tsui FC, Espino JU (2001). The emerging science of very early detection of disease outbreaks. *J. Public Health Manag. Pract.* 7(6):51-59.
- World Health Organization and Center for Disease Control and Prevention (2010). Technical guidelines for integrated disease surveillance and response in the African Region p 5.
- World Health Organization (2004). A Toolkit on analyzing disrupted health sectors, module 2, making rough sense of shaky data pp 23-28.

Full Length Research Paper

Weight changes and dietary habits among breast feeding mothers

Hadeel Fadhil Farhood

Department of Family and Community Medicine, College of Medicine, Babylon University, Iraq.

Received 8 October, 2014; Accepted 23 February, 2015

Women are often advised that lactation accelerates loss of the excess weight gained during pregnancy, but the evidence underlying this advice is sparse and conflicting. The aim of this study is to show the relation of full breast feeding with mothers' weight change, and to assess traditional practices in Iraqi population during breast feeding period. Longitudinal study was conducted in Babylon governorate, Iraq, during the period of 1 September, 2013 to 30 February, 2014. The collected baseline data at the time of requirement was 6 weeks and 6 months after delivery. The study sample was divided into two groups: full breast feeding (FBF) and mixed feeding group (MF). The sample was convenient, while the questionnaires include socio-demographic factors, parity, gender of baby, type of delivery, history of previous infertility, birth space, pre-pregnancy body weight, and her weight at 6 months after delivery. The questionnaires also include dietary habit during full breast feeding that includes: use of herb remedies, favorite and food they avoided. Weight (kg) and Height (cm) were measured. 175 mothers participated in the study, and they were divided into 2 groups: FBF group and MF. Full breast feeding group were younger than mixed or non- full breast feeding group. 66% of FBF had history of normal vaginal delivery with significant difference between them regarding type of delivery, and 80% of FBF group had no history of infertility compare to 63% in MF group who had history of infertility with significant difference regarding history of infertility and birth interval between 2 groups. There was no significant difference regarding pre- pregnancy body mass index between the groups and the weight change from 6 weeks to 6 months. 39.3% of FBF group reported the use of herb remedies during breast feeding fully. The most common food item avoided during full breast feeding was onion and Dates was the most favorite food. This result provide further evidence that full breast feeding promotes greater weight loss than mixed feeding among mothers even in the early months after delivery.

Key words: Weight loss, dietary habits, breast feeding.

INTRODUCTION

Obesity is a major public health problem throughout the world, with increasing prevalence in women of childbearing age. More than one-third (age-adjusted 34.9%, crude 35.1%) of U.S. adults were obese in 2011

to 2012. In 2011 to 2012, the prevalence of obesity was higher among middle-aged adults (39.5%) than among younger (30.3%) or older (35.4%) adults. Among women, the prevalence of obesity did not differ between

E-mail: hadeelfadhil75@yahoo.com; Tel 009647802896426.

Author(s) agree that this article remain permanently open access under the terms of the [Creative Commons Attribution License 4.0 International License](http://creativecommons.org/licenses/by/4.0/)

those aged 40 to 59 and 60, and over 39.5% compared with 38.1%. The prevalence of obesity among younger women was lower than among either middle-aged or older women (Ogden et al., 2013).

Pregnancy and the postpartum period is a time of increased vulnerability to weight gain and body composition changes in women. Although, most women have a desire to return to their pre-pregnancy weight following childbirth, very few achieve this goal (Krummel, 2007). Furthermore, the excess weight gained in one pregnancy can have a cumulative effect on weight gain in subsequent pregnancies, thus amplifying the trajectory of weight gain and risk of obesity in a woman's lifetime (Gore et al., 2003).

It is not yet clear whether women who lactate lose the weight gained during pregnancy faster than their non-lactating counterparts. The available information comes from studies designed primarily to study the energy cost of human lactation or the relation between pregnancy-parity and the development of obesity (Walker, 1996). Few researchers have studied dietary behaviors among, exclusively breastfeeding (EB), mixed feeding (MF), or formula feeding (FF) (Rooney and Schauberg, 2002; Gunderson and Abrams, 2000). Although, BF is associated with health benefits for both mother and baby, its role in postpartum weight management remains unclear (Ip et al., 2007; Schwarz et al., 2009).

Attitudes and beliefs toward postpartum weight change have not been extensively explored, among either mothers or health professionals. Most nursing and nutrition textbooks claim that women return to their pre-pregnant weight between 6 weeks and 6 months after delivery. Practicing different beliefs and myths during puerperium has not been new in the obstetrics history. In 2007, Wang from China reported that almost 90% of postpartum women do not eat cold, hard, or sour food, 90% don't wash their hair or body at all and more than 70% women do not brush their teeth or wash their feet (Wang et al., 2007). Practices like these can have devastating effects on maternal health like increased susceptibility to anemia, hypocalcaemia and maternal infections. Traditional practices are very much prevalent in different societies (Jarrah and Bond, 2007). Knowledge about the prevailing myths will help to develop education programs targeted towards unusual dangerous practices.

The aim of this study, is to identify socio-demographic factors associated with the decision type of infants' feeding, the relation of full breast feeding with mothers' weight change and to assess traditional practices in Iraqi population during breast feeding period.

METHODOLOGY

Study design and participants

This was a longitudinal study conducted in Hilla city, Babylon governorate, Iraq, in outpatient referral center in Al- Hilla, and the convenient sample of the present study can represent the general

population of this city, during the period of 1 September, 2013 to 30 February, 2014. The collected baseline data at the time of requirement was 6 weeks and 6 months after delivery. 15 mothers out of 190 sample size mothers who met the inclusion criteria were excluded because of loss to follow up or incomplete or uncertain data, a total of 175 women participated in this study. This study was limited to two ends time period, from 6 weeks and 6 months after delivery (42 to 182 day).

Six weeks

This is the time when a mother comes out of the effects of pregnancy. During this time period, the mother has to return to pre pregnancy state and mothers who recover from surgical wounds of episiotomy or cesarean section.

Six months

Before the mother start weaning food that may affects the intensity of breast feeding to his or her baby, it is important to study the absolute effect of full breast feeding on change in mothers weight. However, because many participating mothers who were bottle feeding also breast feed, so when divided, the participated mothers had to change to full breast feeding and mixed feeding groups instead of a formula feeding group. The study sample was divided into two groups: (FBF) =full breast feeding or exclusive breast feeding (defined as the "infant receiving only breast milk; no other liquid or solid is fed) and (MF)= mixed feeding (infant receiving some breast milk and formula as well as some solids whatever the case may be). The reproductive period as reported by The Organisation for Economic Co-operation and Development (OECD) Family Database, 2012 (OECD - Social Policy Division - Directorate of Employment, Labour and Social Affairs), the mean age of mothers at first child's birth is defined as the average completed year of age of a woman when her first child is born. For a given calendar year, the mean age of women at first birth is calculated using the fertility rates for first births by age (in general, the reproductive period is between 15 and 49 years of age)

The sample was convenient for any woman present at the time of data collection, and who met the inclusion criteria for patients who were included in the study. The inclusion criteria were: age 18 to 49 years old; her infant age 6 months, single baby within birth weight ≥ 2.5 Kg, and not having any life threatening ill; not pregnant; non-smoker and not on medication which could affect their body weight such as steroid; sedentary or inactive; who agreed to participate in the study by verbal consent.

The present study take the age of mothers from 18 years old for the calculation of body mass index for adults ≥ 18 years old, to exclude low birth weight baby (≤ 2500 g) and single baby not twin that may need special care that may affect the mothers' decision about type of feeding. Physical activity level was assessed based on the recommendations of the 2005 Dietary Guidelines for Americans (United States Department of Agriculture, 2005). A score for physical activity was derived by multiplying the number of days one exercised within a week by the duration of the activity. Sedentary or inactive was defined as having an activity score of 0 to 1.4, moderately active was 1.5 and 2.9 and very active was ≥ 3.0 (Jaglal et al., 1993). Patients who did not complete the questionnaire were uncertain about their pre-pregnancy weight. Some women completed their questionnaire through the telephone to be certain about their weight from their medical and gynecological report. All patients were informed of the purpose, requirement and procedures of the study. They were also informed that their participation in this study is voluntary and they have the right to withdraw at any time. A self-structured questionnaires sheet

Table 1. Frequency and association of type of feeding with socio-demographic characteristics (n=175).

| Variable | Fully breast feeding (FBF) | Mixed feeding (MF) | Total (%) | χ^2 | df | p-value |
|--------------------------|----------------------------|--------------------|-----------|----------|----|---------|
| Age groups | | | | | | |
| 18-30 | 41 (67) | 26 (23) | 67 (38) | - | - | - |
| >30 | 20 (33) | 88 (77) | 108 (62) | 33.16 | 1 | 0.001* |
| Total | 61 (100) | 114 (100) | 175 (100) | - | - | - |
| Residence | | | | | | |
| Urban | 26 (43) | 91 (80) | 117 (67) | - | - | - |
| Rural | 35 (57) | 23 (20) | 58 (33) | 24.8 | 1 | 0.001* |
| Total | 61 (100) | 114 (100) | 175 (100) | - | - | - |
| Occupation | | | | | | |
| Employed | 19 (31) | 59 (52) | 78 (45) | - | - | - |
| Housewife | 42 (69) | 55 (48) | 97 (55) | - | - | - |
| Total | 61 (100) | 114 (100) | 80 (100) | 6.83 | 1 | 0.01* |
| Educational level | | | | | | |
| Illiterate | 3 (6) | 17 (15) | 20 (11) | - | - | - |
| Primary | 16 (26) | 32 (28) | 48 (27) | - | - | - |
| Secondary | 32 (53) | 41 (36) | 73 (42) | 4.2 | 3 | 0.2 |
| Higher education | 9 (15) | 25 (21) | 34 (20) | - | - | - |
| Total | 61 (100) | 114 (100) | 175 (100) | - | - | - |

contains: socio-demographic factors (age, residence, employment, educational level, parity, gender of her baby, type of delivery, if any history of previous infertility before the last pregnancy, birth interval, pre-pregnancy body weight, and her weight at 6 weeks and 6 months after delivery).

The questionnaires also include dietary habit during full breast feeding (cause of choosing full breast feeding, use of herb remedies, used of vitamin and mineral supplement during full breast feeding, favorite food, food avoided and their causes). The measurements were weight (kg), height (cm), body mass index (BMI) (Weight (kg) /Height (m²)). This was measured according to the formula in which the weight was measured, in (kilogram) using the balanced digital scale for all subject (wearing light clothing) with an accepted error of 0.1 kg, height was measured (in meter) using a flexible tape measures to the nearest 0.5 cm with the patient standing without shoes, heels together and the head in the horizontal plane. BMI =30 or more (obese). Study questionnaires and measurement were assessed at each evaluation time point.

Ethical issue

The approval of Scientific Committee of Family and Community Department in Babylon Medical College, Babylon University, Iraq was gotten. The objectives and methods of this study were explained to all participants to gain their acceptance.

Data analysis

Recording information was checked for missing values and data entry errors. Statistical analysis was performed using Statistical Package for Social Science software (SPSS, version 17) and Microsoft office Excel 2010 was used for data processing and statistical analysis. Variables were described using frequency distribution and percentage for the patients according to their

characteristics and mean (\bar{x}); standard deviation (SD) for continuous variable. The Chi square test was used for the assessment of association between the variables studied. The p-value of less than 0.05 was significant statistically.

RESULTS

175 mothers who participated in this study were divided into 2 groups: 61 (35%) FBF and MF 114 (65%). The mean age \pm SD (years) for full breast feeding group is 32 ± 5.0 , and for mixed or non- fully breast feeding is 30 ± 4.2 . The mean self-reported pre-pregnancy weight \pm SD (Kg) for FBF is 60.5 ± 5.9 Kg and for MF 69.1 ± 4.2 Kg. The mean weight at 6 weeks after delivery \pm SD of FBF is 76.1 ± 2.1 , for MF 85 ± 3.2 and the mean weight at 6 months after delivery \pm SD of FBF is 69.5 ± 3.1 and for MF 76.6 ± 2.2

Table 1 shows the socio-demographic characteristics of respondents, FBF were younger than MF (67%) of which FBF were younger than 30 years old compared with 77% of MF aged more than 30 years old with statistical significant difference between 2 groups regarding age ($\chi^2 = 33.16$, df = 1, p-value = 0.000), and significant difference regarding residence ($\chi^2 = 24.8$, df = 1, p-value = 0.000), majority of MF live in urban area, 69% of FBF were housewife, 52% of MF employed outside their house with significant difference ($\chi^2 = 6.83$, df=1, p-value=0.01).

This study reported no significant difference regarding educational level between them ($\chi^2 = 4.2$, df = 3, p-value

Table 2. The maternal characteristics of the participants.

| Variable parity | Fully breast feeding (FBF) | Mixed feeding (MF) | Total (%) | χ^2 | df | p- value |
|-----------------------------------|-----------------------------------|---------------------------|------------------|----------------------------|-----------|-----------------|
| Primiparas | 34 (56) | 56 (49) | 90 (41.5) | - | - | - |
| Multiparas | 27 (44) | 58 (51) | 85 (48.5) | 0.69 | 1 | > 0.5 |
| Total | 61 (100) | 114 (100) | 175 (100) | - | - | - |
| Gender of baby | | | | | | |
| male | 40 (65) | 76 (67) | 116 (66) | 0.02 | 1 | > 0.5 |
| female | 21 (35) | 38 (33) | 59 (34) | - | - | - |
| Total | 61 (100) | 114 (100) | 175 (100) | - | - | - |
| Type of delivery | | | | | | |
| Normal vaginal | 40 (66) | 43 (38) | 83 (47) | - | - | - |
| Cesarean section | 21 (34) | 71 (62) | 92 (53) | 12.4 | 1 | 0.001* |
| Total | 61 (100) | 114 (100) | 80 (100) | - | - | - |
| History of infertility | | | | | | |
| Present | 12 (20) | 72 (63) | 84 (48) | 30.1 | 1 | 0.001* |
| Absent | 49 (80) | 42 (37) | 91 (52) | - | - | - |
| Total | 61 (100) | 114 (100) | 175 (100) | - | - | - |
| Birth interval | | | | | | |
| ≤ 2 years | 18 (30) | 59 (52) | 77 (44) | 7.98 | 1 | 0.01* |
| >2 years | 43 (70) | 55 (48) | 98 (56) | - | - | - |
| Total | 61 (100) | 114 (100) | 175 (100) | - | - | - |
| Pre-pregnancy BMI | | | | | | |
| <30 | 33 (54) | 64 (56) | 97 (55.5) | 0.06 | 1 | >0.05 |
| ≥30 | 28 (46) | 50 (34) | 78 (44.5) | - | - | - |
| Total | 61 (100) | 114 (100) | 175 (100) | - | - | - |
| Weight change (42-182days) | | | | | | |
| No change | 8 (13) | 20 (18) | 28 (16) | 16.8 | 2 | 0.001* |
| Lost weight | 39 (64) | 21 (19) | 60 (34) | - | - | - |
| Gain weight | 14 (23) | 73 (64) | 87 (50) | - | - | - |
| Total | 61 (100) | 114 (100) | 175 (100) | - | - | - |

= 0.2) (Table 1). Table 2 shows the maternal characteristics of the participants. No significant difference between the groups regarding parity and gender of the baby ($\chi^2=0.69$, $df=1$, $p\text{-value}>0.5$, $\chi^2 = 0.02$, $df = 1$, $p\text{-value} > 0.5$). 66% of FBF had history of normal vaginal delivery, 62% of MF had history of caesarian section with significant difference between them ($\chi^2 = 12.4$, $df = 1$, $p\text{-value} = 0.000$) and 80% of FBF had no history of infertility compare to 63% of MF who had history of infertility with significant difference ($\chi^2 = 30.1$, $df = 1$, $p\text{-value} = 0.000$) and with birth interval ($\chi^2 = 7.98$, $df = 1$, $p\text{-value} = 0.01$). There was no significant difference regarding pre- pregnancy BMI ($\chi^2 = 0.06$, $df = 1$, $p\text{-value} > 0.5$) were 44.5% of all the participant mother were obese BMI ≥ 30 . The weight change recorded

significant difference between two groups ($\chi^2 = 16.8$, $df = 2$, $p\text{-value} = 0.000$), the mean weight loss (10.5 ± 4.1 vs 4.3 ± 3.1) with significant difference ($t\text{-test} = 11.6$, $p\text{-value} < 0.05$) shown in Table 2.

Table 3 shows the dietary habit during full breast feeding, 69% of full breast feeding mothers take the decision of full breast feeding after being instructed by their family members (mother, grandmother, grandfather and husband). 39.3% of FBF reported use of herb remedies during her full breast feeding period and when the mother was asked about the source of recommendation for use of herb like Ginger, Hilba and Black Seed during breast feeding, 21% said they wanted it themselves, 67% from family members and 12% from health care workers (doctors, pharmacist and nurses).

Table 3. Dietary habits during full breast feeding.

| Dietary habits during fully breast feeding | Number | Percentage |
|---|--------|------------|
| Decision of fully breast feeding | | |
| Herself | 11 | 18 |
| Family | 42 | 69 |
| Health care worker | 8 | 13 |
| Total | 61 | 100 |
| Sources of recommendation use of herb remedies | | |
| Herself | 5 | 21 |
| Family and friend without medical background | 16 | 67 |
| Health care worker | 3 | 12 |
| Total | 24 | 100 |
| Currently taking vitamins and minerals | | |
| Yes | 12 | 20 |
| No | 49 | 80 |
| Total | 61 | 100 |
| Reasons for avoiding some food | | |
| Undesirable effect | 18 | 29.5 |
| Belief from family | 36 | 59 |
| No apparent reasons | 7 | 11.5 |
| Total | 61 | 100 |
| Reasons for favorite food | | |
| Desirable effect | 10 | 16 |
| Belief from family | 29 | 48 |
| Un apparent reason | 22 | 36 |
| Total | 61 | 100 |

All breast feeding mothers reported the same reason for using herb remedies which was aim to increase the amount of breast milk, and 80% of full breast feeding mothers did not take any vitamin and mineral. Avoiding food during full breast feeding, 18% reported the reason for avoiding some food was due to undesirable effect, belief from family was 59%, while 11.5% reported no apparent reasons (Table 3). The most common avoidance food item was onion and garlic (45%) (because they believe it will cause flatulence in their baby), 25% avoided spices (chili powder, black pepper) for the same reason, other foods they avoided are meat 35%, milk and dairy products 8%, bananas 15% , eggs 8%, citrus fruits 5%, canned fruit juice and soda 1% , coffee and tea 10%. Many mothers reported that they avoided more than one food items.

The favorite foods during breast feeding are favored dates (90%), dried fruits (43%), soft drink and water

(50%) and green tea (10%). The breast feeding mothers said Dates can increase the amount of milk especially during night breast feeding. When asked about the sources of such information: 48% belief came from family, while 36% said no apparent reason for preferring such food (Table 3).

DISCUSSION

During pregnancy, women gain total body weight and accrue body fat. These body composition changes often last into the postpartum period, and thus can create significant concern for mothers who are eager to return to their pre-pregnancy weight. With obesity currently regarded as a public health problem post pregnancy, a clearer understanding of the role of BF in post partum weight management is required. This study presented that mixed feeding mothers were older than full breast feeding mothers, this finding differ from what was observed in other studies (Laura et al., 2001; Irene et al., 2008).

This study reported significant difference between the two study groups regarding residence were 80% of MF mothers who lived in urban area were compared with 43% in FBF, and no significant difference was recorded regarding the work of mothers were 69% of FBF mothers were housewife, and 52% of MF mothers were employed. Work least compatible with child care had a negative effect on breast-feeding. The negative effect of mother's work on exclusive breast-feeding was observed in some working class mothers who in lived in urban residence (Ukwuani et al., 2001). Such finding in this study can be explain by most of the working class mothers who lived in urban area and spend 6 hours daily in their work that makes them to choose MF, while working class mothers in rural residence spend less time in their work, and most of the work they do is at home which makes them to have more time to practice full time breast feeding, and no significant association regarding the educational level (p-value 0.2).

This study disagrees with other studies that have shown maternal education to be more powerful than income or employment in predicting breastfeeding (Evers et al., 1998; Celi et al., 2005; Fein and Roe 1998). Having more formal education may help parents understand the health benefits of breastfeeding and may increase the likelihood of parents to search out information about health practices (van Rossem et al., 2009; Heck et al., 2006). Reasons for the association between breastfeeding and educational level are likely complex in Iraqis' community that may be associated with knowledge, attitudes, experiences and beliefs leading a woman to a particular infant feeding choice.

The significant association regarding type of delivery between 2 groups (p-value=0.000) (66%) of FBF had history of normal vaginal delivery compared with 38% of cesarean section and 62% of MF group cesarean section.

Women with vaginal delivery were more likely to initiate colostrum feeding as compared to operative delivery. This may be because there is delay in initiating breast feeding in cesarean women due to the effect of anesthesia, and pain and in some of Babylon society due to the believe that anesthesia can affect the baby breast milk. Relative to those who had delivered at home, and few women who delivered in the hospital started breastfeeding. More research is needed to elucidate this finding. But, in any case, hospitals should give optimal guidance to mothers on breastfeeding (van Rossem et al., 2009).

Sometime ago a question arose, does childbirth and lactation gender specific? Does it affect the decision on the type of feeding? This study also reported no significant difference regarding the gender of a baby (p -value > 0.05). It was never thought a mother would use gender inequality as a reason for a particular infant feeding choice, as breastfeeding may be associated with knowledge, attitudes, experiences and beliefs of a woman. Regarding the association between history of infertility and breast feeding, this results present significant difference between the study groups ($\chi^2=30.1$, $df= 1$, p -value 0.00). Breastfeeding challenges are more common in women who have experienced infertility. It's not clear exactly why that may be, but possible reasons include the higher risk of premature birth, or hormonal problems or women with history of infertility most commonly have elective caesarian section that make the mother after delivery, prefer formula or mixed feeding . Women may also tend to have less confidence in their body and themselves as mothers after infertility, which could lead to lack of confidence in breastfeeding. Lactation consultation before the mother gives birth might help to clear infertility-related hurdles. 56% of FBF women were primiparas compared with 44% of multiparas with no significant association between the study groups ($\chi^2=0.69$, $df=p$ -value >0.05).

Sometimes women who are nursing older babies or toddlers choose full breastfeeding. This study found significant difference regarding the birth interval between FBF and MF groups were 70% of FBF mothers reported birth interval ≥ 2 years compared with 48% in MF mothers. This study has also reported no significant differences between women who practice FBF and MF regarding pre-pregnancy BMI ($\chi^2=0.06$, $df=1$, p -value >0.05). Other studies, reported pre-pregnancy body mass index (kg/m^2) (22.5 ± 3.4) (Barennes et al., 2009) with significant difference between two groups regarding weight changes ($\chi^2=16.8$, $df=2$, p -value <0.001), 64% of FBF group lost weight during the study period compared with 19% in MF group, with significant difference of mean weight loss between. This finding has also been observed in other studies that reported a direct relationship between BF and weight change (Baker et al., 2008; Gould Rothberg et al., 2011; Gunderson et al., 2008; Martin et al., 2012; Nuss et al., 2006; To and Wong

2009). Other prospective studies that examined weight change reported no significant relationship between BF and weight change (Oken et al., 2007; Lyu et al., 2009; Ostbye et al., 2012; Walker et al., 2006; Hatsu et al., 2008; Ota et al., 2008; Wosje and Kalkwarf 2004). Other studies also reported no associations between BF and weight change which was observed, tended to have small sample sizes (60 participants) or short duration of follow-up (< 3 months) (Walker et al. 2006; Hatsu et al. 2008; Ota et al., 2008).

In Iraq, there is change in eating habits during the breastfeeding period in women. The present study reported the dietary habit during full breast feeding. 69% of women who adopted full breastfeeding were based on the advice of their family compared with 19% who were advised by the health workers. The use of herbal remedies is very common among our community in Hilla city, Babylon governorate, Iraq. The study reveals that herbal products are popular as a result of a widespread belief that the preparations are natural and therefore safe. This study found that only 39% of FBF group use herbal products (Ginger, Hillba, Black seed) and 12% had a recommendation and consultation from a pharmacist, physician or nurses, and 67% of them from family and friends who had no medical background prior to the use of herbal products. It is quite possible that herbal remedies help increase milk supply. The powerful effect of family on feeding habits during breast feeding lead to increase awareness for nutritional education to all family members (husband, mother, sister and traditional birth attendants) (Bozin et al., 2008).

Ginger appears to be safe when used in food preparation, but it is advisable to avoid using large amounts as there is not enough information available about the safety of ginger while breastfeeding. Garlic may change the smell of breast milk and affect the baby. There is no information on the safety of garlic supplements in breastfeeding. Fish oil and Raspberry leaf supplements are likely to be safe for use while breastfeeding at the recommended doses. Raspberry leaf supplements should be avoided while breast feeding because there is limited safety information about it. 80% of FBF mothers do not take vitamin and mineral supplements, so it is important for nutritional educators to let the breast feeding mothers know the importance of vitamin and minerals during breast feeding. There is probably no other time in a woman's life when her nutritional intake is as important as when she is breastfeeding her baby. In addition to eating a sufficient number calories from a well-balanced diet, taking a high quality vitamin/mineral supplement can help a nursing mom guard her health so that she can produce quality breast milk for as long as she desires to breastfeed her baby. Virtually all medical professionals agree that good nutrition during pregnancy and lactation is vitally important for the health of the mother and the growth and development of her offspring. For this reason, pregnant

women and nursing moms are encouraged to eat a nutritious well-balanced diet.

In addition, pregnant women are routinely directed by health care professionals to take a multivitamin (prenatal) supplement to “ensure” adequate intake of nutrients (Haggerty, 2011; Ziesel, 2009; Picciano and McGuire, 2009). Postpartum maternal food restrictions (‘food avoidances’) are common practices, which may have important health consequences in reducing the nutritional content of breast milk. Avoiding of food during pregnancy and after delivery is common in other traditional cultures, and may substantially affect daily intakes of energy, protein and basic nutrients (Santos-Torres and Vasquez-Garibay, 2003). 59% of FBF mothers reported avoiding of some food items mostly because of believe from family members. Most food items reported to be avoided were: (45%) Onion and Garlic, they believe it causes flatulence that may spread to their baby; (35%) meat, causes constipation and worm; (25%) spices (chili powder, black pepper), causes flatulence. Some FBF women avoid banana, citrus foods, canned fruit juices and soda, and even coffee and tea from their diet. Women who were avoiding banana linked it to constipation and cough, canned fruits juices and soda to cough, coffee and tea to anemia, eggs were reported to increase vaginal secretions and worms. Milk and milk products were linked to cause constipation and sputum along with wound infection. 90% of the breast feeding mothers favorite food was Dates due to the believe that it increases the amount of breast milk, 43% of them liked dried fruits because it increases the amount of breast milk, 50% of them take soft drink and water because it improves mouth dryness and also prevent constipation, while 48% of their choices came from family members.

Health care messages have been fruitful in bringing a positive change in lifestyles. Many harmful practices during puerperium have been reported in literature and authors recommend the need of health education in this aspect (Ozsoy and Katabi, 2008; Geçkil et al., 2009; Kulakac et al., 2007).

Health care administrators have been using nutritional programs to bring a social change in behaviors and attitude of individuals, families and community. The programs should be simple and build in a way that it increases the interest and understandability to be effective in bringing a social change. Thus, carefully selected topics in area of need and then properly designed intervention programs in the form of health education can be considered as an effective tool in improving the health status of communities.

Conclusion

This result provide further evidence that full breastfeeding promotes greater weight loss than mixed feeding among mothers even in the early months after delivery. This suggests that there is need to encourage mothers to

practice full breastfeeding as a means of overweight and obesity prevention. Health education programs can successfully change the views about dietary components which can bring a healthy change in dietary habits of women.

ACKNOWLEDGEMENTS

Authors are grateful to the breast feeding mothers and their relative who participated in this study, together with the rest of our research assistant’s staff who diligently assisted in the recruitment and data collection.

Conflicts of interest

The authors declare that they have no conflicts of interest.

REFERENCES

- Baker JL, Gamborg M, Heitmann BL, Lissner L, Sorensen TI, Rasmussen KM (2008). Breastfeeding reduces postpartum weight retention. *Am. J. Clin. Nutr.* 88:1543-1551.
- Barennes H, Simmala C, Odermatt P, Thaybouavone T, Vallee J, Martinez-Ussel B, Newton P, Strobel M (2009). Postpartum traditions and nutrition practices among urban Lao women and their infants in Vientiane, Lao PDR. *Eur. J. Clin. Nutr.* 63(3):323-331.
- Bozin B, Mimica-Dukic N, Bogavac M, Suvajdzic L, Simin N, Samojlik I, Couladis M (2008). Chemical composition, antioxidant and antibacterial properties of *Achillea collina* Becker ex Heimerl sl and *A. pannonica* Scheele essential oils. *Molecules* 13(9):2058-2068.
- Celi AC, Rich-Edwards JW, Richardson MK, Kleinman KP, Gillman M (2005). Immigration, race/ethnicity, and social and economic factors as predictors of breastfeeding initiation. *Arch. Pediatr. Adolesc. Med.* 159:255–60.
- Evers S, Doran L, Schellenberg K (1998). Influences on breastfeeding rates in low income communities in Ontario. *Can J. Public Health* 89:203-7.
- Fein SB, Roe B (1998). The effect of work status on initiation and duration of breast-feeding. *Am. J. Public Health* 88:1042-6.
- Geçkil E, Sahin T, Ege E (2009). Traditional postpartum practices 265 of women and infants and the factors influencing such practices in South Eastern Turkey. *Midwifery* 25(1):62-71.
- Gore SA, Brown DM, West DS (2003). The role of postpartum weight retention in obesity among women: a review of the evidence. *Ann. Behav. Med.* 26(2):149-159.
- Gould Rothberg B, Magriples U, Kershaw T, Rising SS, Ickovics JR (2011). Gestational weight gain and subsequent postpartum weight loss among young, low-income ,ethnic minority women. *Am. J. Obstet. Gynecol.* 204:e1-e11.
- Gunderson EP, Abrams B (2000). Epidemiology of gestational weight gain and body weight changes after pregnancy. *Epidemiol. Rev.* 22:261-74
- Gunderson EP, Rifas-Shiman SL, Oken E, Rich-Edwards JW, Kleinman KP, Taveras EM, Gillman MW (2008). Associations of fewer hours of sleep at 6 months postpartum with substantial weight retention at 1 year postpartum. *Am. J. Epidemiol.* 167(2):178-187
- Haggerty LL (2011). Maternal supplementation for prevention and treatment of vitamin D deficiency in exclusively breastfed infants. *Breastfeed Med.* 6(3):137-44.
- Hatsu IE, McDougald DM, Anderson AK (2008). Effect of infant feeding on maternal bodycomposition. *Int Breastfeed J* 3:18.
- Hatsu IE, McDougald DM, Anderson AK (2008). Effect of infant feeding on maternal bodycomposition. *Int. Breastfeed. J.* 3(18):107.

- Heck KE, Braveman P, Cubbin C, Chávez GF, Kiely JL (2006). Socio-economic status and breastfeeding initiation among California mothers. *Public Health Rep.* 121(1):51.
- Ip S, Chung M, Raman G, Chew P, Magula N, DeVine D, Trikalinos T, Lau J (2007). Breastfeeding and maternal and infant health outcomes in developed countries. *Evid. Rep. Technol. Assess.* 153:1-186.
- Jaglal SB, Kreiger N, Darlington G (1993). Past and recent physical activity and risk of hip fracture. *Am. J. Epidemiol.* 138(2):107-118.
- Jarrah S, Bond AE (2007). Jordanian women's postpartum beliefs: an exploratory study. *Int. J. Nurs. Pract.* 13(5):289-295.
- Krummel DA (2007). Postpartum weight control: a vicious cycle. *J. Am. Diet Assoc.* 107(1):37-39
- Kulakac O, Oncel S, Meydanlioglu A, Muslu L (2007). The opinions of employed mothers about their own nutrition during lactation: a questionnaire survey. *Int. J. Nurs. Stud.* 44(4):589-600.
- Lyu LC, Lo CC, Chen HF, Wang CY, Liu DM (2009). A prospective study of dietary intakes and influential factors from pregnancy to postpartum on maternal weight retention in Taipei, Taiwan. *Br. J. Nutr.* 102:1828-1837.
- Martin JE, Hure AJ, Macdonald-Wicks L, Smith R, Collins CE (2012). Predictors of post-partum weight retention in a prospective longitudinal study. *Mater. Child Nutr.* 10(4):496-509.
- Nuss H, Clarke K, Klohe-Lehman D, Freeland-Graves J (2006). Influence of nutrition attitudes and motivators of eating on postpartum weight status in low-income new mothers. *J. Am. Diet. Assoc.* 106:1774-1782.
- Ogden CL, Carroll MD, Kit BK, Flegal KM (2013). Prevalence of Obesity Among Adults: United States, 2011–2012. NCHS Data Brief, No 131. Hyattsville, MD: National Center for Health Statistics. Available at: <http://www.cdc.gov/nchs/data/databriefs/db131.htm>
- Oken E, Taveras EM, Popoola FA, Rich-Edwards JW, Gillman MW (2007). Television walking and diet. Associations with postpartum weight retention. *Am. J. Prev. Med.* 32:305-311.
- Ostbye T, Peterson BL, Krause KM, Swamy GK, Lovelady CA (2012). Predictors of postpartum weight change among overweight and obese women: results from the Active Mothers' Postpartum Study. *J. Womens Health* 21(2):215-222.
- Ota E, Haruna M, Matsuzaki M, Honda Y, Sasaki S, Yeo S, Murashima S (2008). Comparison of body fat mass changes during the third trimester and at one month postpartum between lactating and non-lactating Japanese women. *Biosci. Trends* 2(5):200-205.
- Ota E¹, Haruna M, Matsuzaki M, Honda Y, Sasaki S, Yeo S, Murashima S (2008). Comparison of body fat mass changes during the third trimester and at one month postpartum between lactating and non-lactating Japanese women. *Biosci Trends* 2:200-205.
- Ozsoy SA, Katabi V (2008). A comparison of traditional practices used in pregnancy, labour and the postpartum period among women in Turkey and Iran. *Midwifery* 24(3):291-300.
- Picciano MF, McGuire MK (2009). Use of dietary supplements by pregnant and lactating women in North America. *Am. J. Clin. Nutr.* 89(suppl):663S-7S
- Rooney BL, Schauberg CW (2002). Excess pregnancy weight gain and long-term obesity: one decade later. *Obstet. Gynecol.* 100:245-52.
- Santos-Torres MI, Vasquez-Garibay E (2003). Food taboos among nursing mothers of Mexico. *J. Health Popul. Nutr.* 21:142-149.
- Schwarz EB, Ray RM, Stuebe AM, Allison MA, Ness RB, Freiberg MS, Cauley JA (2009). Duration of lactation and risk factors for maternal cardiovascular disease. *Obstet. Gynecol.* 113(5):974-982.
- To W, Wong M (2009). Body fat composition and weight changes during pregnancy and 6 to 8 months postpartum in primiparous and multiparous women. *Aust. New Z J. Obstet. Gynecol.* 49(1):34-38.
- Ukwuani FA, Suchindran CM, Cornwell GT (2001). Influences of mother's work, childhood place of residence, and exposure to media on breast-feeding patterns: experience of Nigeria and Uganda. *Soc. Biol.* 48(1-2):1-20.
- United States Department of Agriculture (2005). Dietary guidelines for Americans pp 30-33.
- van Rossem L, Oenema A, Steegers EA, Moll HA, Jaddoe VW, Hofman A, Mackenbach JP, Raat H (2009). Are starting and continuing breastfeeding related to educational background? The generation R study. *Pediatrics* 123(6):e1017-e1027.
- Walker LO (1996). Predictors of weight gain at 6 and 18 months after childbirth: a pilot study. *J. Obstet. Gynecol. Neonatal. Nurs.* 25(1):39-48.
- Walker LO, Sterling BS, Kim M, Arheart KL, Timmerman GM (2006). Trajectory of weight changes in the first 6 weeks postpartum. *J. Obstet. Gynecol. Neonatal Nurs* 35:472-481.
- Walker LO, Sterling BS, Kim M, Arheart KL, Timmerman GM (2006). Trajectory of weight changes in the first 6 weeks postpartum. *J. Obstet. Gynecol. Neonatal. Nurs.* 35:472-481.
- Wang XL, Wang Y, Zhou SZ, Wang J, Wang JL (2007). Puerperal practice pattern in a rural area of north China. *Beijing Da Xue Xue Bao* 39(2):140-4.
- Wosje K, Kalkwarf H (2004). Lactation, weaning and calcium supplementation effects on body composition in the postpartum period. *Am. J. Clin. Nutr.* 80:423-429.
- Ziesel SH (2009). Is maternal diet supplementation beneficial? Optimal development of infant depends on mother's diet. *Am. J. Clin. Nutr.* 89:685S-7S.

Full Length Research Paper

Geographic variations in the predictors of asthma, wheeze, and dry nocturnal cough among adolescents from the United Arab Emirates

Caroline Barakat-Haddad^{1*} and Sheng Zhang²

¹Faculty of Health Sciences, University of Ontario Institute of Technology, 2000 Simcoe Street North, Oshawa, Canada.

²University of Toronto Scarborough, 1265 Military Trail, Toronto, Canada.

Accepted 25 February, 2015

This study aims to determine the prevalence of asthma, wheeze and dry nocturnal cough, and also to assess predictors of these health outcomes among adolescents from nine different geographic regions in the United Arab Emirates (UAE). Guided by the population health framework, analysis focused on responses to select items from a survey that was administered on 6,363 UAE adolescents. Frequency analyses determined the prevalence of health outcomes and explanatory variables. Bivariate analyses assessed associations between each outcome and all explanatory variables. Logistic regression models were used to identify significant predictors of asthma, wheeze, and dry nocturnal cough for each geographic region. The prevalence of asthma, wheeze and dry nocturnal cough ranged from 7.0 to 16.9%, 9.3 to 14.8% and 30.4 to 48.2%, respectively. Associations between health outcomes and explanatory variables vary across regions. Results of multivariate regression modeling identified significant predictors of the respiratory conditions, which varied across regions. The prevalence proportions of respiratory symptoms, and particularly dry nocturnal cough, are relatively high in the UAE. Predictors of respiratory health in the UAE differ across regions and may be closely tied to the regional physical and social environments, which are linked to individual behaviors and lifestyles.

Key words: Air quality, respiratory health, asthma, health determinants, adolescents, population health, United Arab Emirates.

INTRODUCTION

Respiratory diseases are among the leading causes of death worldwide (World Health Organization, 2015). This is concerning given that many chronic respiratory conditions that affect millions of people worldwide are preventable (Lopez, 2006; Masoli et al., 2004). Research documents that chronic respiratory conditions are also associated with poor health status and greater work disability (Eisner, 2001). Preventable chronic respiratory

conditions include chronic obstructive pulmonary disease (COPD) and asthma (World Health Organization website). COPD is used to describe chronic lung diseases that cause limitations in lung airflow such as chronic bronchitis or emphysema. In 2012, COPD was the third leading cause of global deaths, accounting for 3.1 million deaths (World Health Organization, 2015). Asthma is the most common non-communicable disease

*Corresponding author. E-mail: caroline.barakat-haddad@uoit.ca.

Author(s) agree that this article remain permanently open access under the terms of the [Creative Commons Attribution License 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

among children, characterized by recurrent attacks of breathlessness and wheezing (Islam et al., 2007; World Health Organization, 2003).

Asthma is usually triggered from inflammation of the airway that tightens the surrounding muscle, narrowing or restricting airflow. Persistent respiratory symptoms are generally used to suggest the presence of acute respiratory conditions. For example, recurrent symptoms of wheezing, cough, difficulty breathing, and chest tightness may be signals of asthma presence in children (Lai et al., 2009; Chung and Pavord, 2008). An estimated 235 million people across the globe suffer from asthma (World Health Organization Fact Sheet 307, 2013). The fundamental causes of asthma are not completely understood. Current evidence suggests that the strongest risk factors for developing asthma are genetic predisposition and environmental exposures to inhaled pollutants that interfere with the airways (World Health Organization Fact Sheet 307, 2013). Moreover, research findings suggest that asthma diagnosis is a significant risk factor for COPD raising the level of risk by a factor of 12 (Silva et al., 2004). Therefore, identifying significant predictors of asthma and respiratory symptoms such as wheeze and dry nocturnal cough is a preliminary step for prevention, which has the potential to decrease the global mortality and morbidity burden of respiratory diseases.

The population health framework can be a useful tool for examining disease health determinants (Evans and Stoddart, 1990). The framework highlights ways in which different types of factors and forces interact to impact different conceptualizations of health. Possible health determinants relate to the physical environment, social environment, biology or genetic endowment, individual responses or behaviors to a particular disease, accessibility to healthcare, well-being, and prosperity. In relation to asthma and respiratory symptoms, several physical environmental factors have been shown to strongly correlate to these health outcomes; these include exposures to allergens, air pollutants, and other environmental chemicals (Kelly and Fussell, 2011). For instance, low levels of air quality due to traffic pollution or high ozone levels have been associated with both asthma development and increased asthma severity (Esposito et al., 2014; NRDC, 2014). In addition, asthma is associated with exposure to indoor allergens including dust mites, cockroaches, animal dander and mold (Bush, 2008; Arshad, 2009). There is also strong evidence linking parental smoking with asthma in children (Pattenden, 2006; Cook and Strachan, 1999).

Research suggests that the social environment, such as socioeconomic status, also plays a role in increasing the risk for developing respiratory conditions (Gorman and Asaithambi, 2008). For instance, significant associations were documented between low education and each diagnosis with asthma and wheeze (Arif et al., 2003; Litonjua et al., 1999). Furthermore, research documents show negative associations between income

and asthma prevalence (Gwynn, 2004; Rona, 2000). In relation to biology, sex and ethnic variations in respiratory health are most commonly studied by researchers. Although, most research documents show higher prevalence rates of asthma and wheeze among male children compared to female children (Wieringa et al., 1999), there appears to be an increase in susceptibility for asthma in 'post-pubescent' girls and women (Balzano et al., 2008). Ethnic variations in asthma diagnosis have been reported in various countries. For example, in the US, asthma rates are higher among Native Americans (11.6%) and African Americans (9.4%), followed by Caucasians (7.6%), Hispanics (5.0%), Asians (2.9%), and Hawaiian Pacific Islanders (1.3%) (Gorman et al., 2008; CDC, 2004). Individual behavior choices are also important in determining respiratory health, influencing the risk of developing asthma and respiratory conditions. Indeed, research show significant associations between tobacco use and asthma diagnosis (Al-Sheyab et al., 2014; Mcleish and Zvolensky, 2010).

Health determinants that relate to many diseases are place-specific. This is particularly true for asthma and respiratory conditions, which are influenced by regional physical and social factors such as geographic features, anthropogenic activities that occur in particular places, and exposures to risk factors. Situated in the Arabian Gulf peninsula, the United Arab Emirates (UAE) is a federation that is undergoing fast-paced development characterized by heavy construction, demographic shifts, and changes to the social and physical landscapes. It consists of seven Emirates: Abu Dhabi, Dubai, Sharjah, Ajman, Umm al-Quain (UAQ), Ras al-Khaimah (RAK), and Fujairah (Figure 1). The Emirate of Abu Dhabi accounts for 87 percent of the geographic area and consists of three geographical regions. Abu Dhabi City is the largest by area and relies largely on oil production (UAE Ministry of Environment, 2005). The Western region of Abu Dhabi exhibits mixed development dependent on agriculture and industry, while Al-Ain in Abu Dhabi has many oases and parks. The second largest emirate, the Emirate of Dubai, is located in emirate's northern coastline. Unlike Abu Dhabi city, Dubai is a growing metropolis with main revenues coming from tourism, real estate and financial services. Sharjah relies on tourism largely due to its rich and cultural place in the Arab region. Ajman experienced development in the construction industry, but remains less populous than Dubai and Sharjah. UAQ relies on agriculture, fisheries and tourism, while RAK and Fujairah are dependent on the industrial sector and agriculture respectively.

Although, economic growth and development in the UAE have improved the living conditions of its people, they may also have increased respiratory health risk levels (Khondker, 2009). For example, studies have suggested that air pollutants in Sharjah include carcinogens and are at concentrations similar to or exceeding those in Beijing and Mexico City (The National,

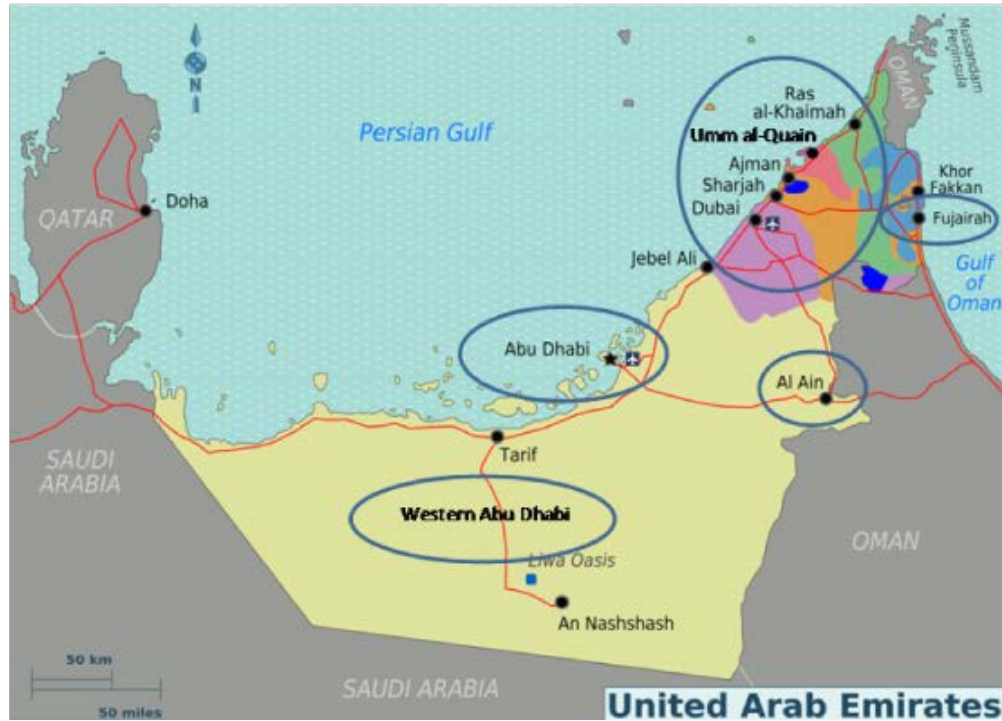


Figure 1. Map of the United Arab Emirates showing nine geographic regions. Source: http://en.wikipedia.org/wiki/United_Arab_Emirates#mediaviewer/File:UAE_Regions_map.png.

2014). In fact, research suggests that many pollutants in the UAE may be at levels above the standards (The National, 2014). These findings couple with research and other documents reports high prevalence rates of asthma and cardiovascular diseases, which are the leading causes of overall death in the UAE (Al-Maskari et al., 2000).

Adolescence is an important time period in a person's lifestyle, where exposures that impact respiratory health range from those that are related to the physical and social environments, to those result from individual choices and behaviors. Furthermore, behavioral factors that impact health during adolescents tend to remain and solidify in adulthood, while at the same time, health outcomes that affect respiratory health in adolescence may lead to longer-term new health outcomes. Very few studies have explored the prevalence and risk factors of respiratory conditions among adolescents in the UAE or neighboring countries. Implementation of the International Study of Asthma and Atopy in Children (ISAAC) in countries neighboring the UAE, suggest that the prevalence of asthma among adolescents is between 5 to 10%, of wheeze between 6 to 11%, and below 20% for dry nocturnal cough (ISAAC, 1998; Pearce et al., 2007). Results from worldwide implementation of the ISAAC questionnaire on adolescents reveal geographic variations in the prevalence of asthma ranging between 4.4 and 25.9%, of wheeze past 12 months ranging

between 6.0 and 29.9%, and between 12.2 and 33.7% for night cough within the past 12 months. The total global prevalence of these three outcomes is 11.3%, 13.8 and 22.3% respectively (ISAAC, 1998). Barakat-Haddad et al. (2014), embarked on a research project that examined the respiratory health profile among adolescents from the UAE and the possible link with air quality, at the national scale. Results suggest that the prevalence of chronic bronchitis, emphysema, asthma, wheeze, and dry cough among UAE adolescents is 1.8, 0.5, 12.3, 12.2 and 34.8% respectively (paper submitted). While the prevalence of wheeze appears to be below the global prevalence, both the prevalence of asthma and dry cough are relatively higher. Results of this recent study also suggest that significant predictors of respiratory health among adolescents from the UAE include outdoor and indoor air quality, as well as behavioral factors related to smoking and drug use.

While these results were novel, variations in the physical and social landscapes of geographic regions within the UAE suggest that analysis at a regional scale can better inform prevention efforts, by focusing on assessing regional predictors of respiratory health. To that extent, and guided by the population health framework, this research addresses three main objectives: to determine the prevalence of asthma, wheeze, and dry nocturnal cough among adolescents from each of nine different regions in the UAE; to examine

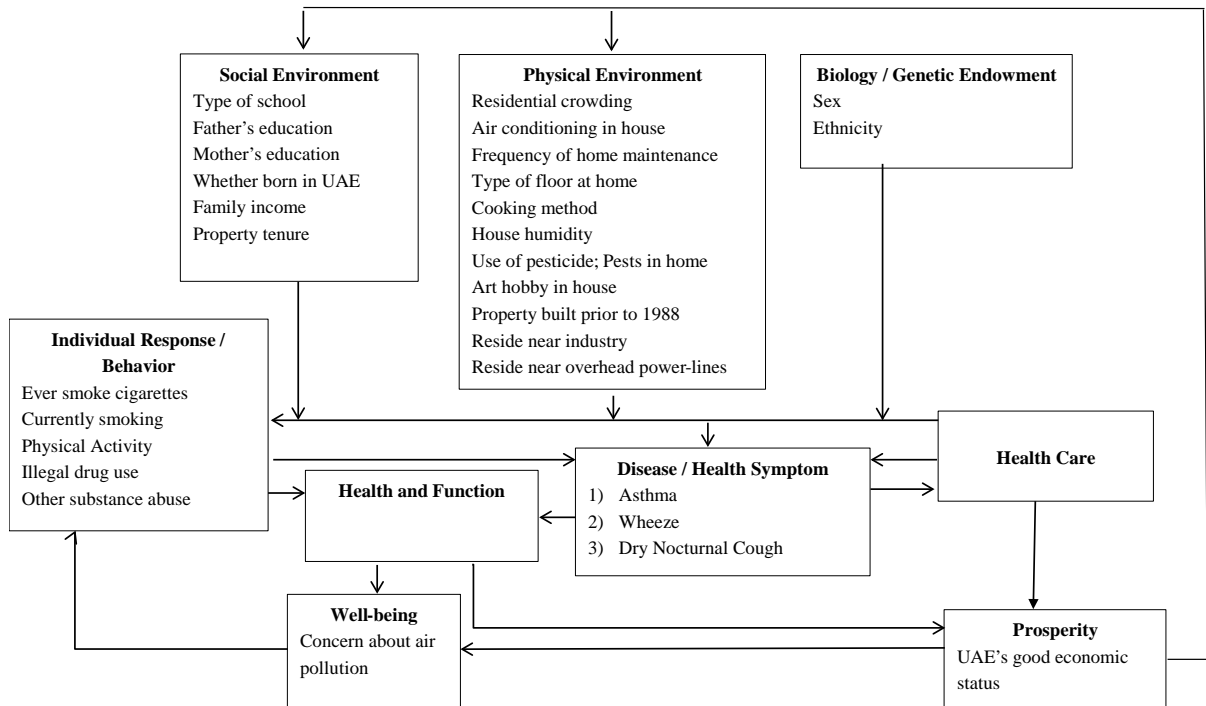


Figure 2. Application of the population health framework to examine factors that impact (indicated with an arrow) respiratory health among UAE adolescents.

associations between respiratory health and each of social and physical factors in relation to the nine different regions in the UAE; to assess differences in the predictors of each asthma, wheeze and dry nocturnal cough among the UAE adolescent population in relation to the nine geographic regions in the UAE.

METHODOLOGY

Data source

The National Study of Population Health in the UAE (NSPHUAE) (2007 to 2009) research program consisted of developing and administering a cross-sectional survey on 6,363 adolescents age between 13 and 20 years, and who attend schools in nine different geographic regions in the UAE; that is Abu Dhabi city, Al Ain (Abu Dhabi), Western region (Abu Dhabi), Ajman, Dubai, UAQ, RAK, Sharjah, Fujairah (Figure 1). Survey details are described in Barakat-Haddad (2013). Guided by the population health framework, this research utilizes data from the NSPHUAE that relates to health measures, demographics, lifestyle, residential and neighborhood characteristics (Figure 2).

Outcome variables

Outcome variables were based on responses to three items adopted from the ISAAC. Participants were asked if they were ever diagnosed with asthma by a doctor or health care professional, if they experienced wheezing or whistling in the chest in the last 12 months, and if they had a dry cough at night, apart from a cough associated with a cold or chest infection in the last 12 months.

Explanatory variables

Guided by the population health framework, the physical environment was characterized using variables that relate to indoor and outdoor air quality (Figure 2). These include responses to questions on whether the residence has air conditioning, how often the residence is maintained, the type of flooring in the main living area of the residence, the type of cooking method, whether the residence feels humid, whether the residence is subject to regular use of pesticides or insecticides, whether there are pests seen in the past 12 months, whether anyone in the participants' household does arts, crafts, ceramics, stained glass work or similar hobbies on a regular basis, whether the property of residence was built prior to 1988. These variables are known to influence indoor air quality due to the presence of possible toxins such as dust of silica and lead, and would further increase the risks of respiratory symptoms. Factors influencing outdoor air quality include whether participants reside near industrial plants, gas stations, dumpsites, or construction sites; whether participants reside near overhead power lines or plants; and residential crowding. The latter was calculated using the ratio for the number of individuals who reside in the household over the number of bedrooms in the residence.

Variables related to the social environment include type of school attended, father's education, mother's education, whether the participant was born in the UAE, monthly family income and residential property tenure. Variables related to biology or genetic endowment includes sex and ethnicity. The latter was classified on the basis of similar cultures, traditions, ancestral linkages or geographical origins. Data related to individual responses and behaviors include ever smoking cigarettes or any form of tobacco such as shisha or midwakh, and whether it was on an occasionally or daily basis for the past 30 days. Participants were categorized as current smokers if they reported occasional or daily use of at least one form of tobacco in the past 30 days. This categorization is

Table 1. Socioeconomic and behavioral profiles of study participants (n=6,363).

| Variable | Classification | Abu Dhabi (n = 1451, %) | | Al-Ain (n = 1175, %) | | Western (n = 377, %) | | Ajman (n = 264, %) | | Dubai (n = 589, %) | | UAQ (n = 147, %) | | RAK (n = 671, %) | | Sharjah (n=1168, %) | | Fujairah (n=521, %) | |
|--------------------------------|----------------|----------------------------|-------|-------------------------|-------|-------------------------|-------|-----------------------|-------|-----------------------|-------|---------------------|-------|---------------------|-------|------------------------|-------|------------------------|-------|
| | | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F |
| | | n=554 | n=897 | n=617 | n=558 | n=233 | n=143 | n=99 | n=163 | n=333 | n=256 | n=15 | n=132 | n=315 | n=356 | n=490 | n=678 | n=198 | n=322 |
| School | Public | 57.2 | 48.9 | 59.6 | 86.0 | 44.2 | 62.2 | 100 | 48.5 | 91.9 | 49.2 | 0.0 | 84.1 | 72.7 | 64.6 | 48.6 | 41.0 | 85.4 | 69.9 |
| | Private | 42.8 | 51.1 | 40.4 | 14.0 | 55.8 | 37.8 | 0 | 51.5 | 8.1 | 50.8 | 100 | 15.9 | 27.3 | 35.4 | 51.4 | 59.0 | 14.6 | 30.1 |
| UAE born | Yes | 28.2 | 50.2 | 39.2 | 62.4 | 28.9 | 53.6 | 48.0 | 69.8 | 51.2 | 44.1 | 6.7 | 66.4 | 63.6 | 61.6 | 52.0 | 56.7 | 66.5 | 68.6 |
| | No | 71.8 | 49.8 | 60.8 | 37.6 | 71.1 | 46.4 | 52.0 | 30.2 | 48.8 | 55.9 | 93.3 | 33.6 | 36.4 | 38.4 | 48.0 | 43.3 | 33.5 | 31.4 |
| Father high school | Yes | 69.4 | 73.8 | 59.6 | 46.4 | 69.1 | 50.0 | 47.8 | 60.9 | 44.4 | 54.8 | 46.2 | 34.6 | 37.7 | 43.8 | 60.5 | 70.1 | 46.0 | 46.5 |
| | No | 30.6 | 26.2 | 40.4 | 52.6 | 30.9 | 50.0 | 52.2 | 39.1 | 55.6 | 45.2 | 53.8 | 65.4 | 62.3 | 56.2 | 39.5 | 29.97 | 54.0 | 53.5 |
| Mother high school | Yes | 55.4 | 58.2 | 47.1 | 36.2 | 60.3 | 41.0 | 39.5 | 45.2 | 38.8 | 46.7 | 46.2 | 29.1 | 32.5 | 40.7 | 59.5 | 64.3 | 46.0 | 46.5 |
| | No | 44.6 | 41.8 | 52.9 | 63.8 | 39.7 | 59.0 | 60.5 | 54.8 | 61.2 | 53.3 | 53.8 | 70.9 | 67.5 | 59.3 | 40.5 | 35.7 | 54.0 | 53.5 |
| Income divided | <\$4084 | 69.0 | 59.6 | 80.8 | 74.4 | 75.4 | 85.0 | 88.4 | 92.7 | 83.2 | 77.3 | 90.9 | 79.0 | 79.1 | 77.3 | 69.4 | 72.8 | 70.8 | 78.8 |
| | ≥\$4084 | 31.0 | 40.4 | 19.2 | 25.6 | 24.6 | 15.0 | 11.6 | 7.3 | 16.8 | 22.7 | 9.1 | 21.0 | 20.9 | 22.7 | 30.6 | 27.2 | 29.2 | 21.2 |
| Residence tenure | Own | 27.7 | 41.5 | 41.7 | 64.8 | 34.8 | 55.1 | 48.4 | 28.1 | 55.3 | 51.5 | 50.0 | 72.2 | 75.8 | 72.9 | 58.9 | 40.0 | 73.5 | 70.4 |
| | Rent | 72.3 | 58.5 | 58.3 | 35.2 | 65.2 | 44.9 | 51.6 | 71.9 | 44.7 | 48.5 | 50.0 | 27.8 | 24.2 | 27.1 | 41.1 | 60.0 | 26.5 | 29.6 |
| Ever smoke | Yes | 34.2 | 9.6 | 28.1 | 4.5 | 31.9 | 1.4 | 27.4 | 11.8 | 24.4 | 5.5 | 60.0 | 0.8 | 16.7 | 1.8 | 34.2 | 8.7 | 27.2 | 9.9 |
| | No | 65.8 | 90.4 | 71.9 | 95.5 | 68.1 | 98.6 | 72.6 | 88.2 | 75.6 | 94.5 | 40.0 | 99.2 | 83.3 | 98.2 | 65.8 | 91.3 | 72.8 | 90.1 |
| Current smoking | Yes | 29.5 | 6.4 | 22.4 | 2.6 | 30.5 | 3.1 | 25.8 | 12.6 | 20.7 | 4.7 | 50.0 | 2.6 | 13.6 | 3.2 | 27.1 | 6.6 | 20.6 | 7.8 |
| | No | 70.5 | 93.6 | 77.6 | 97.4 | 79.5 | 96.9 | 74.2 | 87.4 | 79.3 | 95.3 | 50.0 | 97.4 | 86.4 | 96.8 | 72.9 | 93.4 | 79.4 | 92.2 |
| Physical activity | Yes | 98.1 | 95.6 | 98.7 | 97.0 | 97.9 | 96.8 | 97.9 | 90.7 | 97.6 | 96.4 | 100 | 85.4 | 98.0 | 93.8 | 97.5 | 97.2 | 99.0 | 91.7 |
| | No | 1.9 | 4.4 | 1.3 | 3.0 | 2.1 | 3.2 | 2.1 | 9.3 | 2.4 | 3.6 | 0.0 | 14.6 | 2.0 | 6.2 | 2.5 | 2.8 | 1.0 | 8.3 |
| Ever used drugs | Yes | 2.1 | 0.6 | 0.7 | 0 | 3.1 | 0 | 6.3 | 0.8 | 2.8 | 0.8 | 13.3 | 0.0 | 3.8 | 0.6 | 3.8 | 1.0 | 3.1 | 1.0 |
| | No | 97.9 | 99.4 | 99.3 | 100 | 96.9 | 100 | 93.7 | 99.2 | 97.2 | 99.2 | 86.7 | 100 | 96.2 | 99.4 | 96.2 | 99.0 | 96.9 | 99.0 |
| Ever used unconventional drugs | Yes | 17.9 | 40.3 | 21.2 | 29.9 | 18.5 | 30.7 | 15.5 | 36.2 | 18.7 | 39.0 | 50.0 | 59.0 | 17.9 | 31.3 | 24.8 | 42.4 | 17.6 | 37.0 |
| | No | 82.1 | 59.7 | 78.8 | 70.1 | 81.5 | 69.3 | 84.5 | 63.8 | 81.3 | 61.0 | 50.0 | 41.0 | 82.1 | 68.7 | 75.2 | 57.6 | 82.4 | 63.0 |

b. Residential, environmental and psychological profiles of study participants (n=6,363).

| Variable | Classification | Abu Dhabi (n = 1451, %) | | Al-Ain (n = 1175, %) | | Western (n = 377, %) | | Ajman (n = 264, %) | | Dubai (n = 589, %) | | UAQ (n = 147, %) | | RAK (n = 671, %) | | Sharjah (n=1168, %) | | Fujairah (n=521, %) | |
|----------------------------------|----------------|----------------------------|-------|-------------------------|-------|-------------------------|-------|-----------------------|-------|-----------------------|-------|---------------------|-------|---------------------|-------|------------------------|-------|------------------------|-------|
| | | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F |
| | | n=554 | n=897 | n=617 | n=558 | n=233 | n=143 | n=99 | n=163 | n=333 | n=256 | n=15 | n=132 | n=315 | n=356 | n=490 | n=678 | n=198 | n=322 |
| Res air condition | Yes | 98.0 | 99.1 | 98.8 | 98.7 | 99.6 | 99.3 | 97.9 | 97.7 | 99.4 | 100 | 100 | 98.2 | 98.9 | 100 | 98.7 | 99.4 | 98.2 | 99.6 |
| | No | 2.0 | 0.9 | 1.2 | 1.3 | 1.4 | 0.7 | 2.1 | 2.3 | 0.6 | 0 | 0.0 | 1.8 | 1.1 | 0.0 | 1.3 | 0.6 | 1.8 | 0.4 |
| Residential maintenance | Yearly | 24.8 | 32.3 | 27.8 | 26.3 | 34.2 | 27.2 | 27.9 | 29.5 | 33.5 | 28.9 | 27.3 | 17.0 | 23.9 | 27.0 | 24.9 | 26.4 | 29.6 | 22.4 |
| | needed | 64.8 | 64.6 | 66.1 | 67.6 | 58.9 | 64.0 | 65.1 | 64.3 | 58.3 | 66.2 | 72.7 | 74.5 | 67.8 | 70.2 | 65.6 | 67.0 | 59.2 | 72.0 |
| | Rarely | 10.4 | 3.1 | 6.2 | 6.1 | 6.9 | 8.8 | 7.0 | 6.2 | 8.3 | 4.9 | 0.0 | 8.5 | 8.3 | 2.8 | 9.5 | 6.6 | 11.3 | 5.6 |
| Flooring in the main living area | carpet | 25.3 | 19.3 | 23.1 | 17.6 | 17.7 | 25.0 | 14.9 | 10.1 | 12.3 | 19.9 | 54.5 | 19.2 | 11.6 | 14.6 | 9.9 | 11.0 | 15.7 | 17.9 |
| | tiles | 56.4 | 67.3 | 58.7 | 66.6 | 55.8 | 44.1 | 64.9 | 74.4 | 67.8 | 70.3 | 45.5 | 58.7 | 67.6 | 76.5 | 77.3 | 81.0 | 66.7 | 65.3 |
| | Wooden | 1.9 | 1.6 | 0.9 | 0.6 | 5.6 | 2.2 | 1.1 | 0.0 | 0.3 | 1.6 | 0.0 | 0.0 | 1.2 | 0.3 | 1.1 | 0.8 | 0.6 | 0 |
| Cooking method | rugs | 16.4 | 11.9 | 17.3 | 16.4 | 20.9 | 28.7 | 19.1 | 15.5 | 19.5 | 8.1 | 0.0 | 22.1 | 19.7 | 8.6 | 11.8 | 7.2 | 17.0 | 16.7 |
| | Electric | 7.1 | 7.0 | 2.5 | 3.3 | 6.9 | 3.6 | 1.1 | 0.8 | 4.2 | 2.0 | 15.4 | 1.8 | 1.5 | 1.5 | 6.1 | 3.6 | 2.5 | 0.4 |
| | Gas | 92.3 | 92.9 | 97.1 | 96.5 | 91.3 | 96.4 | 98.9 | 99.2 | 95.1 | 97.2 | 84.6 | 98.2 | 97.0 | 97.9 | 93.1 | 95.3 | 96.9 | 98.8 |
| Residential humidity | Microwave | 0.6 | 0.1 | 0.4 | 0.2 | 1.8 | 0.0 | 0.0 | 0.0 | 0.7 | 0.8 | 0.0 | 0.0 | 1.5 | 0.6 | 0.8 | 1.1 | 0.6 | 0.8 |
| | Yes | 16.5 | 19.2 | 9.6 | 8.3 | 15.1 | 20.6 | 31.4 | 25.2 | 23.8 | 13.3 | 25.0 | 17.2 | 27.7 | 23.8 | 20.9 | 17.7 | 23.8 | 23.0 |
| | No | 83.5 | 80. | 90.4 | 91.7 | 84.9 | 79.4 | 68.6 | 74.8 | 76.2 | 86.7 | 75.0 | 82.8 | 72.3 | 76.2 | 79.1 | 82.3 | 76.2 | 77.0 |

Table 1. Cont'd.

| | | | | | | | | | | | | | | | | | | | |
|----------------------------------|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Use of pesticides in home | Yes | 56.9 | 62.8 | 68.7 | 76.3 | 61.9 | 62.3 | 64.0 | 68.3 | 73.9 | 56.2 | 23.1 | 76.9 | 66.4 | 70.1 | 54.2 | 55.3 | 73.2 | 73.4 |
| | Sometimes | 9.6 | 10.2 | 4.5 | 2.5 | 7.9 | 16.2 | 0.0 | 2.4 | 2.5 | 13.2 | 15.4 | 5.8 | 3.5 | 3.8 | 12.8 | 13.4 | 2.7 | 3.2 |
| | No | 33.5 | 26.9 | 26.8 | 21.2 | 30.2 | 21.5 | 36.0 | 29.3 | 23.6 | 30.6 | 61.5 | 17.3 | 30.1 | 26.1 | 33.0 | 31.3 | 24.2 | 23.4 |
| Art hobby in house | Yes | 19.7 | 19.4 | 17.8 | 16.4 | 18.1 | 21.3 | 15.1 | 12.6 | 13.4 | 25.8 | 41.7 | 18.7 | 15.1 | 17.1 | 25.3 | 26.3 | 15.2 | 13.9 |
| | No | 80.3 | 80.6 | 82.2 | 83.6 | 81.9 | 78.7 | 84.9 | 87.4 | 86.6 | 74.2 | 58.3 | 81.3 | 84.9 | 82.9 | 74.7 | 73.7 | 84.8 | 86.1 |
| Pests in residence | Yes | 16.5 | 16.1 | 15.6 | 14.3 | 13.6 | 8.0 | 16.3 | 13.4 | 16.0 | 17.5 | 0.0 | 21.3 | 20.5 | 15.8 | 12.7 | 14.7 | 21.3 | 19.6 |
| | Sometimes | 34.4 | 38.9 | 48.2 | 47.2 | 45.3 | 47.4 | 45.7 | 36.2 | 48.5 | 38.6 | 30.8 | 49.1 | 50.6 | 53.4 | 39.9 | 35.5 | 50.3 | 54.9 |
| | No | 49.1 | 45.0 | 36.2 | 38.5 | 41.1 | 44.5 | 38.0 | 50.4 | 35.5 | 43.9 | 69.2 | 29.6 | 29.0 | 30.7 | 47.4 | 49.8 | 28.4 | 25.5 |
| Reside near industrial plant | Yes | 11.5 | 13.4 | 6.9 | 9.2 | 25.7 | 26.1 | 16.7 | 21.3 | 19.9 | 20.1 | 0.0 | 18.0 | 31.5 | 13.0 | 16.4 | 15.7 | 21.1 | 10.7 |
| | No | 88.5 | 86.6 | 93.1 | 90.8 | 74.3 | 73.9 | 83.3 | 78.7 | 80.1 | 79.9 | 100 | 82.0 | 68.5 | 87.0 | 83.6 | 84.3 | 78.9 | 89.3 |
| Reside near overhead power lines | Yes | 9.4 | 6.3 | 14.4 | 8.9 | 16.6 | 11.4 | 12.9 | 11.4 | 14.3 | 8.8 | 0 | 18.7 | 20.2 | 11.7 | 11.8 | 8.2 | 24.7 | 10.8 |
| | No | 90.6 | 93.7 | 85.6 | 91.1 | 83.4 | 88.6 | 87.1 | 88.6 | 85.7 | 91.2 | 100 | 81.3 | 79.8 | 88.3 | 88.2 | 91.8 | 75.3 | 89.2 |
| | Extreme | 16.9 | 13.7 | 13.7 | 13.4 | 12.5 | 16.4 | 22.0 | 17.3 | 11.5 | 19.0 | 15.4 | 23.1 | 28.4 | 21.1 | 19.3 | 17.4 | 25.0 | 15.7 |
| Concern about air pollution | Moderate | 24.5 | 28.4 | 24.4 | 24.1 | 28.2 | 35.0 | 26.4 | 28.3 | 28.0 | 30.8 | 7.7 | 35.2 | 22.8 | 25.8 | 22.9 | 25.9 | 26.2 | 24.5 |
| | Slight | 29.4 | 14.5 | 21.8 | 24.1 | 23.1 | 21.4 | 19.8 | 23.6 | 26.4 | 26.3 | 38.5 | 24.1 | 24.3 | 24.5 | 25.3 | 28.6 | 23.8 | 26.1 |
| | Not at all | 29.2 | 33.3 | 40.1 | 38.5 | 36.1 | 27.1 | 31.9 | 30.7 | 34.1 | 23.9 | 38.5 | 17.6 | 24.6 | 28.6 | 32.5 | 28.0 | 25.0 | 33.7 |

consistent with WHO guidelines. The participants were asked series of questions: whether they participated in any number of physical activities in the past 12 months. Other variables include responses to questions on whether participants ever used illegal drugs such as marijuana, hashish, or cocaine; and whether they ever purposely smelled gasoline fumes, glue, correctors, car exhaust, or burning black ants. Reports suggest that UAE adolescents tend to purposely smelled gasoline fumes, glue, correctors, car exhaust, or burning black ants for recreational purpose, the latter are described as 'other substance abuse' throughout this paper, and are common knowledge among the UAE adolescent population. Well-being is characterized using responses to whether participants are concerned about air pollution in their neighborhood. Living conditions in the UAE are characterized by good health coverage and relative prosperity and hence these domains were not included in the analysis.

Statistical analysis

Data were analyzed using statistical package for social sciences (SPSSv20) using descriptive statistics for all outcome and explanatory variables. To address the second research goal, the Chi-square statistic was used for bivariate analyses that assessed associations between

each outcome and all explanatory variables for each of the nine geographic regions. After discovering the correlation between outcome variables and explanatory variables, all variables that were significant in the bivariate analyses were entered into logistic regression models in order to identify significant predictors of respiratory conditions and symptoms. For each of the health outcomes, multivariate analysis was performed in order to identify significant predictor of those specific health outcomes in relation to each geographic region. Logistic regression was used by entering all explanatory variables that were significant in the bivariate analyses for each of the geographic regions separately. For each of the modeled outcomes, direct entry of explanatory variables was conducted using a significance level of $p \leq 0.05$.

RESULTS

This paper is based on responses from 6,363 adolescents with a mean age of 16 years old, which is a representative sample for our study. Majority of participants reside in Abu Dhabi city ($n=1451$, 22.8%), Al Ain ($n=1175$, 18.5%), and Sharjah ($n=1168$, 18.4%). Table 1a summarizes

the socio-demographic and behavioral profiles, whereas Table 1b includes residential, environmental, and psychosocial profiles of the study participants. Overall, 50% of participants in this study are of local national origin and 45% of participants are male. These results suggest that our sample is representative of the UAE population for this age category. For all regions except Sharjah, a higher proportion of participant attend public school. A higher proportion of participants across nine regions report a family annual income less than AED15,000 dirhams (\$4,087US) compared to a family annual income of at least AED15,000 dirhams. For all nine regions, males have a higher prevalence of current smoking, ever smoke, physical activities, and drug use whereas female participants have a higher prevalence of other substance abuse (Table 1a).

In relation to the physical environment, for all nine regions, a higher proportion of participants have air conditioning in their home, maintain their residence as needed, use ceramic tiles as floors

in main living areas and cook with gas (Table 1b). Except for UAQ, the majority of participants report that they have seen pests at home in the past 12 months, as well as regular use of pesticides or insecticides. Compared to other regions, more participants from the western region of Abu Dhabi report living near industrial plant, gas stations, dumpsites, or construction sites.

In terms of our second research goal, we found that explanatory variables differ in the association with outcome variables within different regions. Variability in the prevalence of respiratory outcomes is apparent with the prevalence of asthma, wheeze, and dry nocturnal cough ranging from 7.0 to 16.9%, 9.3 to 14.8% and 30.4 to 48.2% respectively. For the Western region, Dubai, and Sharjah, bivariate analyses suggest that asthma is significantly associated with the type of school attended and whether participants were born in the UAE. Smoking emerges as a significant variable for most geographic regions except for Ajman, UAQ, and Fujairah. A number of significant associations are found between proxies of indoor air quality, as well as outdoor air quality, and asthma for all nine regions except UAQ and Fujairah (Table 2).

For wheeze in the last 12 months, smoking and other substance abuse are significantly associated with wheeze across all geographic regions except Dubai (Table 3). Residing near industry is associated with wheeze in Dubai and Sharjah, whereas residing near over-head power plants, type of school attended, and whether born in UAE are associated with wheeze in Abu Dhabi. Sex and other substance abuse are significantly associated with dry nocturnal cough in Abu Dhabi, Al-Ain, Sharjah and Fujairah. Proxies of indoor air quality are associated with cough, and residing near overhead power-lines associated with dry nocturnal cough in the Western regions of Abu Dhabi and Sharjah (Table 4).

Age, ethnicity, residential crowding, and whether the property of residence was built prior to 1988, are not statistically significant with any respiratory conditions in any regions and therefore are excluded from this paper. After assessing bivariate associations, results of multivariate regression modeling suggested that predictors of respiratory health outcomes vary across regions. Table 5 shows that among demographic factors, sex is a significant predictor of asthma in Abu Dhabi, while the type of school attended is a significant predictor of asthma in RAK and Sharjah, and born in the UAE significantly predicts asthma in Al-Ain and Dubai. Ever smoking is a predictor of asthma in Sharjah, and those who rarely maintain their house are twice more likely to develop asthma compared to those who maintain their house as needed. In RAK, people who tend to use electricity or microwave as their cooking methods, and those who feel that their house is humid, are more likely to develop asthma. Having someone in the household who is regularly involved in arts, crafts, ceramics, stained glass work and similar hobby work is a predictor of

asthma in Ajman. Lastly, residing near industrial plant, gas station, dumpsite, or construction sites is a predictor of asthma in Abu Dhabi.

The type of school attended is a significant predictor of wheeze in Abu Dhabi, with those who attend private school are more likely to experience wheeze than students who attend public schools (Table 6). Current smoking is a significant predictor of wheeze in the Western region, while other substance abuse is a significant predictor in UAQ and Fujairah. Ever smoking is a significant predictor of wheeze in Abu Dhabi, Al-Ain, Sharjah and Fujairah. Having someone in the household who is regularly involved in arts, crafts, ceramics, stained glass work and similar hobby work are predictors of wheeze in Abu Dhabi. Lastly, participants who reside near an industrial plant in Dubai or Sharjah, and those who reside near an overhead power-line in Abu Dhabi are more likely to experience wheeze in the past 12 months. Extreme concern over air pollution is a significant predictor of wheeze in RAK.

Being female and being born in the UAE are predictors of dry nocturnal cough in Al-Ain (Table 7). Other substance abuse is a consistent predictor of experiencing dry nocturnal cough across different regions including Al-Ain, Western, RAK, Sharjah and Fujairah. Ever smoking is a predictor of dry nocturnal cough in Dubai. In terms of proxies of indoor air quality, results suggest that those who maintain their house yearly are more likely to experience cough than those who maintain it when needed, in the Western region. Participants who use gas as their main cooking method at home are less likely to experience cough in the past 12 months. The presence of home pests is a predictor of cough in Western and Sharjah region. Lastly, residing near industrial plants, gas station, dumpsite, or construction sites is a predictor of cough in the Western and Sharjah region (Table 7).

DISCUSSION

Variations in the prevalence of asthma and wheeze in the nine regions in the UAE are in accordance with global estimates (7 to 16.9% versus 11.3 and 9.3% to 14.8% versus 13.8% respectively), while the prevalence of dry nocturnal cough in the UAE is much higher (30.4 to 48.2% versus 22.3%) (UAE Ministry of Environment, 2005)

Our results suggest that physical environments in the UAE play a role in the prevalence of respiratory health for UAE adolescents. Residing in proximity to industrial plants, gas station, dumpsite, or construction sites, as well as residing in proximity to overhead power-lines are associated with the respiratory health of adolescents in at least one region in the UAE. This is not surprising given that air quality has been linked to respiratory health (World Health Organization Fact sheet 307; Kelly and Fussell, 2011; Esposito et al., 2014). For instance, adolescents from RAK and Fujairah are less likely to

Table 2. Profile of study participants that were ever diagnosed with asthma (n=776).

| Variable classification (n, %) | | Abu Dhabi (244, 16.9) | Al-Ain (131, 11.2) | Western (47, 12.7) | Ajman (30, 11.4) | Dubai (72, 12.2) | UAQ (16, 10.9) | RAK (47, 7.0) | Sharjah (141, 12.1) | Fujairah (48, 9.3) |
|---|-------------|--------------------------|-----------------------|-----------------------|---------------------|---------------------|-------------------|------------------|------------------------|-----------------------|
| Sex | Female | **133 (14.8) | 60 (10.8) | 15 (10.6) | *13 (8.0) | 24 (9.4) | 15 (11.4) | 24 (6.7) | 73 (10.8) | 30 (9.4) |
| | Male | 111 (20.2) | 71 (11.5) | 32 (14.0) | 17 (17.2) | 48 (14.4) | 1 (6.7) | 23 (7.4) | 68 (14.0) | 18 (9.2) |
| School | Public | 139 (18.4) | 102 (12.1) | *31 (16.4) | 24 (13.3) | **63 (14.6) | 12 (10.8) | *41 (9.0) | ***83 (16.1) | 41 (10.5) |
| | Private | 105 (15.2) | 29 (8.9) | 16 (8.8) | 6 (7.1) | 9 (5.8) | 4 (11.1) | 6 (2.8) | 58 (9.0) | 7 (5.6) |
| UAE born | Yes | 109 (18.3) | *77 (13.5) | *25 (18.4) | 14 (13.9) | *43 (15.4) | 8 (9.1) | 35 (8.7) | *75 (14.1) | 38 (11.0) |
| | No | 131 (15.7) | 50 (8.8) | 20 (9.0) | 15 (9.5) | 28 (9.3) | 8 (13.8) | 12 (4.9) | 61 (10.1) | 10 (6.1) |
| Father completed HS | Yes | 149 (17.1) | 52 (11.0) | 22 (10.8) | 12 (9.8) | 23 (8.9) | 8 (19.0) | 13 (5.7) | 57 (10.2) | 17 (9.5) |
| | No | 50 (14.9) | 41 (9.9) | 19 (15.2) | 14 (14.4) | 39 (14.6) | 8 (10.7) | 22 (6.7) | 37 (13.0) | 19 (9.0) |
| Mother completed HS | Yes | 115 (16.7) | 39 (10.5) | 19 (10.7) | 12 (13.0) | 21 (9.4) | 5 (13.2) | 12 (5.7) | 53 (10.1) | 19 (11.0) |
| | No | 82 (15.9) | 54 (10.3) | 25 (15.8) | 13 (10.7) | 44 (14.4) | 11 (12.9) | 26 (7.3) | 42 (13.3) | 17 (7.7) |
| Income divided (AED)\$ | <\$4084 | 96 (16.9) | 51 (10.3) | 22 (10.2) | 18 (11.9) | 37 (10.9) | 9 (12.2) | 23 (6.5) | 42 (9.3) | 20 (8.9) |
| | >\$4084 | 62 (18.8) | 16 (11.3) | 7 (12.5) | 3 (18.8) | 8 (9.9) | 1 (5.6) | 7 (7.1) | 20 (11.0) | 8 (11.4) |
| House ownership | Own | 73 (16.0) | 51 (10.6) | *23 (16.4) | 9 (10.8) | 36 (12.5) | 12 (14.3) | 38 (8.8) | 51 (12.2) | 28 (9.6) |
| | Rent | 137 (17.1) | 48 (11.2) | 16 (8.6) | 19 (13.6) | 28 (11.2) | 2 (5.6) | 8 (5.3) | 45 (9.8) | 8 (7.8) |
| Ever smoke cigarettes | Yes | ***66 (24.3) | 22 (11.8) | 11 (14.9) | 23 (12.0) | 17 (18.1) | 0 (0.0) | *8 (14.0) | ***42 (19.0) | 7 (8.5) |
| | No | 175 (15.2) | 104 (11.2) | 36 (12.4) | 4 (9.5) | 54 (11.1) | 15 (11.4) | 38 (6.5) | 96 (10.4) | 38 (9.0) |
| Current smoking | Yes | *48 (23.0) | *14 (10.2) | *9 (14.5) | 2 (5.1) | *14 (18.4) | 0 (0.0) | 5 (10.0) | 28 (16.6) | 5 (8.3) |
| | No | 184 (15.9) | 102 (11.2) | 31 (12.0) | 19 (10.6) | 50 (10.7) | 14 (11.6) | 40 (4.2) | 104 (11.3) | 39 (9.3) |
| Physical activity | Yes | 228 (16.6) | 125 (11.2) | 33 (10.9) | 29 (12.0) | 60 (11.3) | 14 (11.1) | 44 (7.1) | 132 (11.9) | 46 (9.6) |
| | No | 10 (20.4) | 5 (20.8) | 0 (0.0) | 1 (5.9) | 1 (6.2) | 2 (10.5) | 2 (7.1) | 6 (20.0) | 1 (3.6) |
| Drug use | Yes | 5 (31.2) | 0 (0.0) | 2 (28.6) | 0 (0.0) | 2 (18.2) | 0 (0.0) | 1 (.1) | 5 (21.7) | 2 (22.2) |
| | No | 234 (17.0) | 127 (11.4) | 43 (12.1) | 26 (12.1) | 70 (12.4) | 12 (9.4) | 46 (7.5) | 126 (11.7) | 41 (8.7) |
| Other substance abuse | Yes | 75 (16.9) | 30 (11.0) | 11 (13.3) | 7 (11.3) | 19 (12.1) | 4 (7.3) | 9 (5.9) | 49 (12.6) | 14 (10.0) |
| | No | 164 (17.2) | 94 (11.6) | 35 (12.5) | 19 (11.6) | 52 (12.5) | 7 (9.2) | 36 (7.8) | 88 (12.1) | 30 (8.8) |
| Air condition in house | Yes | 209 (16.5) | 100 (10.7) | 45 (12.8) | 29 (13.0) | 63 (11.3) | 15 (11.9) | 46 (7.6) | 99 (10.9) | 40 (9.6) |
| | No | 3 (17.6) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (12.5) | 0 (0.0) |
| Frequency of home maintenance | Yearly | 50 (14.8) | 27 (12.1) | 11 (10.8) | 8 (14.0) | 19 (12.3) | 1 (5.3) | 8 (6.2) | *23 (11.0) | 7 (7.8) |
| | As needed | 132 (17.8) | 57 (10.3) | 26 (13.1) | 16 (12.5) | 34 (11.2) | 10 (12.8) | 29 (8.2) | 49 (9.0) | 19 (8.0) |
| | Rarely | 10 (14.9) | 3 (5.9) | 5 (20.0) | 3 (23.1) | 6 (18.2) | 0 (0.0) | 3 (11.5) | 12 (19.0) | 5 (19.2) |
| | Carpet | 42 (15.6) | 16 (8.6) | 5 (7.0) | 5 (18.5) | 5 (5.9) | 1 (3.8) | 5 (6.6) | *15 (16.0) | 4 (5.8) |
| Type of flooring in main living area of house | Tiles | 145 (18.3) | 70 (12.2) | 24 (13.3) | 18 (11.5) | 45 (12.2) | 7 (10.6) | 32 (7.7) | 65 (9.2) | 29 (10.8) |
| | Wood | 3 (14.3) | 0 (0.0) | 2 (13.3) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (33.3) | 0 (0.0) | 0 (0.0) |
| | Rugs | 19 (11.1) | 15 (10.0) | 13 (15.5) | 6 (15.4) | 12 (15.6) | 5 (21.7) | 8 (10.4) | 15 (18.5) | 4 (5.8) |
| | Electricity | 11 (12.4) | 1 (3.7) | *5 (25.0) | 0 (0.0) | 3 (17.6) | 1 (25.0) | ***4 (44.4) | 6 (14.3) | 0 (0.0) |
| Cooking method | Gas | 200 (16.9) | 95 (10.6) | 38 (11.4) | 29 (13.2) | 59 (11.0) | 11 (9.2) | 41 (7.1) | 94 (11.0) | 36 (8.9) |
| | Microwave | 0 (0.0) | 1 (33.3) | 2 (50.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (33.3) |
| House humidity | Yes | 30 (14.3) | 7 (9.2) | 8 (14.3) | 10 (18.5) | 12 (12.8) | 2 (10.0) | **18 (13.4) | 23 (14.9) | 9 (10.6) |
| | No | 156 (16.5) | 86 (11.2) | 31 (11.6) | 13 (9.4) | 42 (10.5) | 11 (12.1) | 23 (5.8) | 64 (9.7) | 24 (8.4) |
| Use of pesticides in house | Yes | 126 (17.4) | 75 (11.7) | 28 (19.6) | 19 (13.5) | 42 (12.1) | 12 (14.5) | 36 (9.2) | 53 (11.4) | 26 (9.0) |

Table 2. Cont'd

| | | | | | | | | | | |
|--------------------------------|-----------|--------------|-----------|-----------|-----------|------------|-----------|-----------|-----------|-----------|
| | Sometimes | 18 (15.0) | 2 (6.5) | 2 (5.6) | 0 (0.0) | 3 (7.9) | 1 (12.5) | 1 (4.8) | 10 (8.9) | 0 (0.0) |
| | No | 60 (16.9) | 19 (9.0) | 10 (11.2) | 7 (10.3) | 12 (8.5) | 1 (3.8) | 6 (3.8) | 27 (10.0) | 12 (12.9) |
| Art hobby in house | Yes | *51 (21.4) | 11 (7.2) | 9 (13.6) | *8 (27.6) | 10 (9.9) | 3 (12.0) | 5 (5.4) | 19 (8.4) | 7 (12.1) |
| | No | 155 (15.7) | 85 (11.5) | 33 (12.1) | 20 (10.9) | 48 (11.2) | 12 (12.8) | 37 (7.7) | 77 (11.9) | 30 (8.8) |
| Pests in home | Yes | 36 (17.9) | 19 (14.3) | *3 (7.5) | 6 (18.8) | 11 (12.2) | 2 (8.7) | 11 (10.6) | 15 (12.3) | 8 (9.9) |
| | Sometimes | 68 (14.7) | 42 (9.8) | 27 (16.8) | 12 (13.6) | 24 (10.1) | 7 (12.3) | 22 (7.3) | 40 (12.3) | 17 (7.8) |
| | No | 104 (18.0) | 34 (10.2) | 12 (8.1) | 11 (11.1) | 19 (9.0) | 5 (12.2) | 7 (4.0) | 38 (8.9) | 12 (11.1) |
| Property built prior to 1988 | Yes | 19 (16.5) | 22 (12.5) | 12 (15.8) | 0 (0.0) | 19 (17.8) | 4 (11.1) | 14 (7.9) | 21 (15.9) | 7 (5.9) |
| | No | 152 (16.6) | 70 (11.5) | 24 (10.7) | 24 (15.9) | 39 (11.0) | 8 (14.3) | 23 (7.8) | 69 (11.0) | 22 (9.6) |
| Reside near industry | Yes | ***43 (27.6) | 12 (16.4) | 13 (14.6) | 9 (21.4) | 15 (14.2) | 4 (20.0) | 13 (10.4) | 17 (12.2) | 5 (8.2) |
| | No | 158 (14.6) | 83 (10.0) | 30 (11.7) | 19 (10.9) | 42 (9.9) | 10 (9.9) | 30 (6.5) | 74 (10.1) | 34 (9.7) |
| Reside ear overhead power line | Yes | **24 (27.3) | 12 (12.0) | 7 (14.6) | 1 (4.0) | *11 (18.0) | 4 (20.0) | 7 (8.3) | 11 (13.8) | 6 (9.7) |
| | No | 178 (16.2) | 79 (10.5) | 36 (12.5) | 25 (13.7) | 45 (9.7) | 9 (9.2) | 35 (7.5) | 76 (10.0) | 29 (8.9) |

*p<0.05; **p<0.01; ***p<0.001.

Table 3. Study profile of participants diagnosed with wheeze in the last 12 months (n=741).

| Variable | Classification (n,%) | Abu Dhabi (185, 13.1) | Al-Ain (146, 12.9) | Western (38, 11.2) | Ajman (31, 12.2) | Dubai (58, 10.7) | UAQ (21, 14.8) | RAK (67, 10.4) | Sharjah (148, 13.1) | Fujairah (47, 9.3) |
|-----------------------|----------------------|-----------------------|--------------------|--------------------|------------------|------------------|----------------|----------------|---------------------|--------------------|
| Sex | Female | 116 (13.2) | **54 (10.0) | 14 (10.1) | 19 (12.2) | 27 (10.8) | 20 (15.6) | 34 (9.8) | 93 (14.2) | 28 (9.0) |
| | Male | 69 (12.9) | 92 (15.6) | 24 (12.1) | 11 (11.3) | 31 (10.7) | 1 (7.1) | 33 (11.1) | 55 (11.7) | 19 (9.9) |
| School | Public | ***68 (9.2) | 108 (13.2) | 17 (10.8) | 21 (12.1) | 42 (10.8) | 13 (12.1) | 50 (11.4) | *49 (10.0) | 31 (8.2) |
| | Private | 117 (17.4) | 38 (12.2) | 21 (11.6) | 10 (12.5) | 16 (10.5) | 8 (22.9) | 17 (8.3) | 99 (15.6) | 16 (12.9) |
| UAE born | Yes | **59 (10.1) | 78 (14.2) | 12 (10.4) | 10 (10.2) | 30 (11.7) | 11 (12.8) | 40 (10.4) | 68 (13.2) | 33 (9.9) |
| | No | 122 (15.1) | 63 (11.4) | 24 (11.3) | 20 (13.2) | 27 (9.7) | 10 (18.2) | 25 (10.4) | 75 (12.7) | 13 (7.9) |
| Father completed HS | Yes | 114 (13.3) | 54 (11.8) | 22 (11.6) | 14 (11.9) | 29 (12.0) | 5 (12.5) | 24 (10.6) | 67 (12.2) | 14 (7.9) |
| | No | 30 (9.4) | 46 (11.4) | 12 (10.8) | 10 (10.9) | 25 (10.3) | 13 (18.1) | 30 (9.5) | 34 (12.3) | 18 (8.9) |
| Mother completed HS | Yes | *98 (14.3) | 42 (11.7) | 19 (11.4) | 12 (13.3) | 25 (11.6) | 6 (16.7) | 16 (7.7) | 65 (12.7) | 11 (6.6) |
| | No | 48 (9.7) | 60 (11.8) | 16 (11.3) | 12 (10.5) | 31 (11.4) | 13 (15.9) | 41 (12.0) | 37 (12.0) | 19 (8.8) |
| Income divided (AED)§ | <\$4084 | 72 (12.9) | 52 (10.7) | 19 (9.5) | 19 (13.1) | 35 (11.6) | 13 (18.1) | 35 (10.2) | *45 (10.2) | 15 (6.9) |
| | >\$4084 | 44 (13.7) | 17 (12.3) | 7 (13.5) | 1 (7.1) | 6 (7.7) | 4 (23.5) | 12 (12.6) | 31 (17.3) | 5 (7.1) |
| House ownership | Own | *42 (9.4) | 56 (12.2) | 15 (12.8) | 13 (16.2) | 24 (9.1) | 11 (13.4) | 45 (10.7) | *39 (9.8) | 18 (6.4) |
| | Rent | 111 (14.1) | 56 (13.4) | 20 (11.0) | 13 (9.6) | 26 (11.3) | 4 (11.8) | 10 (6.8) | 68 (15.1) | 11 (9.6) |
| Ever smoke cigarettes | Yes | **49 (18.8) | ***39 (21.5) | 10 (16.9) | 7 (17.9) | *15 (18.3) | 1 (10.0) | ***13 (24.5) | ***53 (25.1) | ***16 (19.3) |
| | No | 132 (11.6) | 99 (11.0) | 28 (10.3) | 23 (12.4) | 43 (9.5) | 19 (14.8) | 53 (9.4) | 92 (10.3) | 27 (6.6) |
| Current smoking | Yes | ***42 (20.9) | 21 (15.9) | *9 (18.8) | 5 (13.9) | 7 (11.9) | 0 (0.0) | 6 (12.2) | ***35 (22.2) | *10 (16.9) |
| | No | 136 (12.0) | 106 (12.0) | 20 (8.2) | 23 (13.2) | 46 (10.3) | 21 (17.9) | 56 (10.4) | 103 (11.4) | 33 (8.0) |
| Physical activity | Yes | 176 (13.1) | 142 (13.2) | 32 (11.5) | 29 (12.5) | 53 (10.5) | 19 (15.7) | 65 (10.9) | 138 (12.8) | 45 (9.6) |
| | No | 3 (6.3) | 4 (17.4) | 1 (12.5) | 0 (0.0) | 1 (6.2) | 2 (10.5) | 1 (3.6) | 5 (18.5) | 0 (0.0) |

Table 3. Cont'd

| | | | | | | | | | | |
|---|-------------|-------------|--------------|-----------|-----------|--------------|------------|-------------|--------------|------------|
| Drug use | Yes | 2 (12.5) | ***4 (100.0) | *2 (40.0) | 2 (28.6) | 1 (11.1) | 0 (0.0) | 3 (21.4) | ***8 (36.4) | *3 (33.3) |
| | No | 177 (13.2) | 137 (12.7) | 35 (10.7) | 25 (12.0) | 56 (10.7) | 18 (14.6) | 63 (10.6) | 133 (12.7) | 42 (9.1) |
| Other substance abuse | Yes | 68 (15.7) | 29 (10.9) | 11 (14.3) | 9 (15.3) | 20 (13.4) | *12 (22.6) | 16 (10.8) | **6 (17.5) | *20 (14.5) |
| | No | 113 (12.1) | 109 (13.9) | 27 (10.6) | 18 (11.3) | 37 (9.8) | 6 (8.0) | 48 (10.7) | 78 (11.1) | 26 (7.8) |
| Air condition | Yes | *148 (12.0) | 112 (12.4) | 5 (10.9) | 26 (12.1) | 52 (10.2) | 16 (13.1) | 57 (9.8) | 110 (12.5) | 31 (7.7) |
| | No | 5 (29.4) | 1 (9.1) | 1 (33.3) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (33.3) | 2 (33.3) | 0 (0.0) |
| House maintenance | Yearly | 43 (13.1) | 26 (12.0) | 8 (8.8) | 6 (10.7) | 14 (9.9) | 3 (16.7) | 10 (8.0) | 24 (11.8) | 4 (4.7) |
| | As needed | 92 (12.6) | 70 (13.0) | 21 (11.4) | 13 (10.5) | 29 (10.2) | 6 (8.0) | 33 (9.6) | 61 (11.5) | 17 (7.3) |
| | Rarely | 6 (9.2) | 6 (12.2) | 4 (17.4) | 2 (16.7) | 3 (10.0) | 1 (12.5) | 3 (12.0) | 10 (16.1) | 4 (16.0) |
| Type of flooring in house | Carpet | 31 (11.7) | 19 (10.3) | 7 (10.4) | 1 (4.3) | 4 (4.8) | 4 (16.7) | *9 (12.0) | 15 (16.1) | 4 (6.1) |
| | Tiles | 97 (12.5) | 74 (13.5) | 17 (10.3) | 21 (13.4) | 42 (12.5) | 5 (7.8) | 35 (8.8) | 79 (11.6) | 20 (7.7) |
| | Wooden | 6 (30.0) | 2 (33.3) | 1 (11.1) | 0 (0.0) | 1 (20.0) | 0 (0.0) | 2 (66.7) | 0 (0.0) | 0 (0.0) |
| | Rugs | 18 (11.2) | 16 (11.2) | 11 (14.3) | 3 (8.3) | 4 (5.7) | 5 (21.7) | 7 (9.3) | 14 (17.7) | 5 (7.5) |
| Cooking method | Electricity | 12 (13.6) | 3 (11.3) | *5 (29.4) | 0 (0.0) | 2 (15.4) | 0 (0.0) | *3 (33.3) | **12 (29.3) | 0 (0.0) |
| | Gas | 142 (12.3) | 107 (12.3) | 30 (9.9) | 24 (11.3) | 50 (10.1) | 13 (11.2) | 51 (9.1) | 97 (11.7) | 29 (7.4) |
| | Microwave | 0 (0.0) | 1 (33.3) | 1 (25.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (25.0) | 2 (22.2) | 0 (0.0) |
| House humidity | Yes | 31 (15.3) | 13 (17.8) | 11 (15.4) | 7 (13.2) | 12 (13.8) | 1 (5.0) | *21 (16.3) | 20 (13.4) | 7 (8.3) |
| | No | 114 (12.3) | 84 (11.3) | 26 (10.6) | 11 (8.2) | 34 (9.2) | 13 (14.8) | 31 (8.2) | 80 (12.4) | 19 (6.9) |
| Use of pesticides in house | Yes | 74 (10.5) | 74 (11.9) | 24 (12.6) | 16 (11.5) | 35 (10.9) | 12 (14.8) | 37 (9.8) | 54 (11.9) | 19 (6.8) |
| | Sometimes | 20 (16.9) | 3 (10.3) | 3 (8.1) | 0 (0.0) | 4 (11.1) | 0 (0.0) | 4 (19.0) | 16 (14.5) | 1 (8.3) |
| Art hobby | No | 48 (13.8) | 26 (12.7) | 8 (10.1) | 5 (7.7) | 10 (8.1) | 3 (12.0) | 14 (9.2) | 34 (12.7) | 6 (6.6) |
| | Yes | *39 (16.5) | 18 (12.0) | 8 (13.3) | 2 (7.1) | 10 (10.5) | *7 (30.4) | 13 (14.8) | 29 (13.3) | 6 (10.7) |
| Home pests | Yes | 112 (11.2) | 86 (12.1) | 27 (10.8) | 22 (12.4) | 42 (10.6) | 9 (9.8) | 41 (8.8) | 78 (12.4) | 21 (6.3) |
| | Sometimes | 25 (12.8) | 18 (14.2) | 5 (14.7) | 6 (20.0) | 13 (14.9) | 5 (21.7) | 15 (15.5) | 17 (14.3) | 4 (5.2) |
| | No | 52 (11.5) | 58 (13.8) | 18 (12.2) | 8 (9.4) | 15 (6.9) | 6 (10.9) | 27 (9.2) | 37 (11.7) | 17 (8.0) |
| Property built prior to 1988 | Yes | 75 (13.3) | 29 (9.1) | 13 (9.4) | 9 (9.3) | 21 (10.9) | 4 (10.3) | 13 (7.7) | 49 (11.8) | 7 (6.7) |
| | No | 15 (13.5) | 20 (11.4) | 6 (9.2) | 4 (15.4) | 8 (8.1) | 5 (15.6) | 15 (8.9) | 17 (13.3) | 11 (9.3) |
| Near industrial plant | Yes | 118 (13.2) | 70 (12.0) | 21 (10.1) | 18 (12.5) | 37 (11.3) | 8 (14.5) | 30 (10.5) | 74 (12.1) | 16 (7.2) |
| | No | 25 (16.2) | *14 (20.3) | 12 (14.5) | 6 (15.4) | ***18 (19.6) | 3 (15.8) | 16 (13.7) | ***30 (22.1) | 6 (10.7) |
| Near overhead power plant | Yes | 123 (11.6) | 88 (10.9) | 24 (10.3) | 18 (10.5) | 31 (7.8) | 12 (12.2) | 41 (9.1) | 75 (10.5) | 24 (7.0) |
| | No | *17 (19.8) | 14 (14.6) | 5 (11.4) | 2 (8.0) | 6 (11.3) | 3 (15.8) | 10 (12.3) | 12 (15.2) | 4 (6.9) |
| Concerned about air pollution in neighborhood | Yes | 130 (12.1) | 83 (11.4) | 32 (12.1) | 18 (10.2) | 38 (8.9) | 12 (12.6) | 42 (9.2) | 87 (11.8) | 21 (6.6) |
| | Extremely | 33 (17.7) | 15 (12.9) | 9 (19.6) | 6 (14.6) | 7 (9.6) | 5 (18.5) | **24 (17.5) | 21 (31.5) | 5 (6.7) |
| | Moderately | 41 (12.4) | 28 (13.3) | 10 (9.6) | 10 (16.7) | 19 (13.0) | 3 (8.3) | 7 (5.0) | 27 (12.9) | 10 (10.4) |
| | Slightly | 36 (11.0) | 25 (12.4) | 6 (8.1) | 3 (6.7) | 12 (9.2) | 4 (13.3) | 11 (7.9) | 28 (12.1) | 10 (10.0) |
| | Not at all | 41 (10.6) | 38 (11.1) | 11 (11.2) | 5 (7.6) | 11 (7.5) | 2 (8.3) | 16 (10.7) | 30 (11.7) | 5 (4.1) |

*p<0.05; **p<0.01; ***p<0.001.

report asthma (7.0 and 9.3% respectively) than those from Abu Dhabi and Western region (16.9 and 12.7%). Essentially, Abu Dhabi and the

Table 4. Profile of study participants with dry Cough in the last 12 months (n=2,125).

| Variable | Classification (n,%) | Abu Dhabi (531, 38.1) | Al-Ain (391,34.7) | Western (124,34.3) | Ajman (86, 34.4) | Dubai (192, 33.4) | UAQ (67, 48.2) | RAK (195,30.4) | Sharjah (370, 33.0) | Fujairah (169, 33.7) |
|---------------------------------|----------------------|-----------------------|-------------------|--------------------|------------------|-------------------|----------------|----------------|---------------------|----------------------|
| Sex | Female | *350 (40.1) | **210 (39.0) | 43 (30.9) | 60 (39.0) | 89 (35.6) | 65 (52.0) | 112 (32.5) | *233 (35.6) | *115 (37.5) |
| | Male | 181 (34.7) | 181 (30.7) | 81 (36.5) | 26 (27.4) | 103 (31.7) | 2 (14.3) | 83 (28.0) | 137 (29.3) | 54 (28.0) |
| School | Public | ***246 (34.0) | 97 (31.2) | 67 (35.8) | *50 (29.4) | 141 (33.5) | 56 (51.9) | 135 (30.8) | 155 (31.4) | 129 (34.1) |
| | Private | 285 (42.4) | 294 (36.0) | 57 (32.8) | 36 (45.0) | 51 (33.1) | 11 (35.5) | 60 (29.7) | 215 (34.2) | 40 (32.5) |
| UAE born | Yes | 211 (36.7) | **215 (38.8) | 48 (35.6) | 28 (29.5) | 100 (36.4) | 45 (52.9) | 121 (31.3) | 154 (30.0) | *123 (37.0) |
| | No | 313 (39.0) | 166 (30.3) | 72 (33.3) | 56 (37.3) | 91 (30.8) | 22 (41.5) | 70 (29.5) | 208 (35.4) | 44 (27.2) |
| Father completed HS | Yes | 314 (37.0) | 147 (32.2) | 62 (31.3) | 39 (33.1) | 81 (32.1) | *13 (34.2) | 60 (27.0) | 172 (31.3) | 53 (30.1) |
| | No | 117 (37.3) | 154 (38.2) | 49 (39.5) | 30 (33.0) | 93 (35.5) | 40 (55.6) | 101 (31.6) | 92 (33.3) | 75 (36.8) |
| Mother completed HS | Yes | 261 (38.6) | 115 (32.0) | 56 (32.7) | 30 (33.7) | 67 (30.5) | 18 (51.4) | 52 (25.2) | 158 (30.6) | 49 (29.3) |
| | No | 168 (34.5) | 193 (38.0) | 61 (38.9) | 35 (31.0) | 110 (36.9) | 39 (48.1) | 112 (32.7) | 103 (33.8) | 80 (37.0) |
| Income divided (AED)\$ | < \$4084 | 209 (37.8) | 175 (36.2) | 73 (34.3) | 49 (34.0) | 117 (35.7) | 31 (44.9) | 105 (30.5) | 147 (33.3) | 75 (34.2) |
| | < \$4084 | 120 (37.5) | 53 (38.7) | 20 (35.7) | 3 (21.4) | 26 (32.5) | 11 (64.7) | 33 (34.7) | 55 (30.4) | 26 (38.8) |
| House ownership | Own | 155 (35.2) | 171 (36.6) | 46 (33.3) | 1 (26.9) | 102 (36.0) | *44 (53.7) | 133 (31.7) | 126 (31.0) | *10 (35.5) |
| | Rent | 298 (38.5) | 136 (33.1) | 62 (34.1) | 51 (38.1) | 72 (29.3) | 9 (28.1) | 38 (26.0) | 146 (32.4) | 28 (24.6) |
| Ever smoke cigarettes | Yes | 104 (39.8) | 69 (38.3) | 30 (42.3) | 16 (41.0) | ***45 (48.4) | 1 (10.0) | 19 (16.5) | 82 (38.3) | 32 (39.5) |
| | No | 419 (37.6) | 306 (34.0) | 92 (32.5) | 62 (33.7) | 146 (30.7) | 63 (50.8) | 166 (29.5) | 279 (31.4) | 134 (32.8) |
| Current smoking | Yes | 80 (40.4) | 51 (38.6) | 27 (45.0) | 15 (40.5) | 19 (25.7) | 1 (10.0) | 16 (34.8) | 60 (37.5) | 21 (36.2) |
| | No | 424 (37.8) | 300 (34.1) | 83 (32.9) | 56 (32.6) | 155 (34.1) | 60 (51.7) | 163 (30.0) | 286 (31.9) | 137 (33.3) |
| Physical activity | Yes | 508 (38.3) | 372 (34.6) | *105 (35.7) | 80 (35.1) | 173 (33.2) | 57 (47.5) | 182 (30.6) | 353 (32.9) | 160 (34.2) |
| | No | 15 (34.1) | 10 (43.5) | 0 (0.0) | 4 (25.0) | 4 (25.0) | 8 (47.1) | 7 (25.9) | 11 (44.0) | 5 (19.2) |
| Drug use | Yes | 7 (46.7) | 2 (50.0) | 3 (42.9) | 1 (14.3) | ***8 (80.0) | 0 (0.0) | 4 (30.8) | 7 (33.3) | 3 (33.3) |
| | No | 507 (38.1) | 378 (35.1) | 118 (34.2) | 70 (34.0) | 179 (32.3) | 60 (50.0) | 180 (30.5) | 348 (33.2) | 156 (33.8) |
| Other substance abuse | Yes | *186 (43.1) | **109 (41.6) | ***42 (52.5) | *28 (45.9) | 56 (36.6) | 30 (56.6) | *55 (37.4) | ***163 (43.2) | ***64 (47.4) |
| | No | 333 (36.2) | 253 (32.1) | 79 (28.8) | 45 (29.0) | 132 (32.4) | 33 (45.8) | 124 (28.0) | 201 (28.7) | 95 (28.3) |
| Air condition in house | Yes | 456 (37.3) | 309 (34.3) | 118 (34.4) | 73 (34.4) | 186 (34.0) | 53 (44.5) | 177 (30.4) | 279 (31.5) | 131 (32.5) |
| | No | 5 (31.2) | 2 (20.0) | 1 (25.0) | 1 (20.0) | 0 (0.0) | 1 (50.0) | 0 (0.0) | 4 (66.7) | 1 (25.0) |
| Frequency of house maintainance | Yearly | 118 (36.4) | 73 (34.8) | *41 (41.4) | 17 (31.5) | 41 (27.3) | 8 (47.1) | 36 (28.6) | 66 (32.7) | 27 (31.4) |
| | As needed | 280 (38.7) | 179 (33.0) | 55 (27.8) | 45 (36.9) | 101 (33.4) | 31 (41.3) | 103 (30.0) | 170 (31.7) | 79 (34.2) |
| | Rarely | 21 (32.8) | 25 (50.0) | 11 (47.8) | 4 (30.8) | 15 (46.9) | 5 (62.5) | 7 (28.0) | 16 (26.2) | 9 (36.0) |
| | Carpet | 97 (37.2) | 61 (33.7) | 23 (33.3) | 12 (50.0) | 28 (33.3) | *4 (16.0) | 24 (32.4) | 26 (28.3) | 23 (34.3) |
| Type of flooring in house | Tiles | 295 (38.3) | 201 (36.3) | 61 (34.5) | 46 (29.9) | 126 (34.8) | 33 (52.4) | 122 (30.7) | 217 (31.6) | 81 (31.0) |
| | Wooden | 8 (40.0) | 2 (33.3) | 6 (40.0) | 1 (100.0) | 1 (25.0) | 0 (0.0) | 1 (33.3) | 1 (12.5) | 1 (100.0) |
| | Rugs | 51 (32.1) | 38 (27.0) | 25 (30.9) | 14 (40.0) | 25 (32.5) | 11 (50.0) | 21 (27.3) | 32 (39.5) | 23 (35.4) |
| Cooking method | Electricity | 35 (39.8) | 5 (18.5) | **14 (70.0) | 0 (0.0) | 6 (35.3) | 0 (0.0) | 2 (22.2) | 12 (29.3) | 1 (20.0) |
| | Gas | 424 (37.1) | 298 (34.4) | 104 (32.1) | 73 (34.9) | 178 (34.0) | 51 (45.1) | 172 (30.7) | 268 (32.3) | 129 (32.9) |
| House Humidity | Microwave | 1 (25.0) | 1 (33.3) | 1 (25.0) | 0 (0.0) | 1 (25.0) | 0 (0.0) | 1 (25.0) | 3 (33.3) | 0 (0.0) |
| | Yes | 81 (40.1) | 22 (31.0) | 20 (36.4) | 22 (43.1) | *39 (42.4) | 9 (47.4) | 43 (32.6) | 47 (31.5) | 31 (37.3) |
| Use of pesticide | No | 338 (37.1) | 252 (33.8) | 85 (32.4) | 43 (32.1) | 122 (31.0) | 38 (44.2) | 116 (30.4) | 201 (31.2) | 87 (31.4) |
| | Yes | 258 (37.0) | 226 (36.3) | 75 (37.1) | *51 (37.8) | 121 (35.6) | *41 (50.6) | 119 (31.8) | 150 (33.0) | 92 (33.2) |

Table 4. Cont'd.

| | | | | | | | | | | |
|---|------------|------------|------------|-------------|-----------|------------|-----------|------------|-------------|------------|
| | Sometimes | 50 (42.7) | 8 (25.8) | 9 (26.5) | 2 (100.0) | 14 (37.8) | 4 (57.1) | 5 (23.8) | 37 (33.3) | 2 (18.2) |
| | No | 129 (37.8) | 58 (28.9) | 28 (31.8) | 16 (24.6) | 40 (28.8) | 5 (21.7) | 46 (29.3) | 77 (28.8) | 28 (30.1) |
| Art hobby in house | Yes | 95 (40.9) | 56 (37.8) | 25 (37.9) | 7 (25.9) | 40 (40.4) | 9 (40.9) | 35 (39.3) | 68 (31.3) | 16 (28.1) |
| | No | 346 (33.6) | 239 (33.5) | 89 (33.5) | 66 (37.3) | 134 (31.8) | 41 (45.1) | 135 (29.0) | 199 (31.4) | 111 (33.6) |
| Pests in home | Yes | 86 (43.9) | 49 (39.2) | **20 (50.0) | 9 (32.1) | 32 (36.0) | 14 (60.9) | 35 (35.0) | **33 (28.2) | 27 (35.1) |
| | Sometimes | 163 (36.2) | 151 (36.3) | 61 (38.1) | 29 (33.7) | 79 (34.1) | 23 (41.8) | 84 (28.9) | 125 (39.4) | 77 (36.2) |
| | No | 195 (35.1) | 94 (29.3) | 36 (25.4) | 35 (36.8) | 65 (31.2) | 14 (38.9) | 48 (28.2) | 116 (27.4) | 24 (23.1) |
| Property built prior to 1988 | Yes | 41 (37.3) | 65 (38.0) | 26 (34.7) | 4 (16.0) | 31 (29.0) | 15 (42.9) | 50 (30.1) | 43 (33.6) | 46 (40.0) |
| | No | 321 (36.4) | 209 (35.7) | 74 (33.5) | 52 (36.4) | 118 (34.0) | 26 (49.1) | 88 (30.6) | 190 (30.9) | 70 (31.2) |
| Reside near industry | Yes | 71 (46.4) | 25 (35.7) | 33 (38.4) | 15 (40.5) | 37 (35.6) | 11 (55.0) | 28 (23.1) | 47 (35.1) | 14 (24.6) |
| | No | 375 (35.9) | 268 (33.4) | 81 (32.1) | 60 (35.1) | 140 (33.7) | 42 (44.7) | 139 (31.2) | 227 (31.6) | 113 (33.0) |
| Reside near overhead power | Yes | 30 (34.9) | 32 (34.4) | **24 (52.2) | 12 (48.0) | 19 (31.7) | 8 (40.0) | 29 (35.8) | *34 (44.2) | 17 (28.3) |
| | No | 401 (37.7) | 243 (33.4) | 87 (30.9) | 60 (34.3) | 152 (33.5) | 44 (48.4) | 128 (28.1) | 232 (31.1) | 103 (32.6) |
| Concern about air pollution in neighborhood | Extremely | 68 (37.8) | 36 (31.3) | 20 (41.7) | 15 (37.5) | 23 (29.9) | 13 (50.0) | 44 (31.4) | 48 (30.8) | 32 (42.7) |
| | Moderately | 136 (42.0) | 82 (38.3) | 38 (35.5) | 18 (32.1) | 61 (38.6) | 17 (44.7) | 39 (28.3) | 71 (33.5) | 30 (30.0) |
| | Slightly | 115 (35.4) | 75 (37.5) | 32 (40.5) | 17 (37.0) | 46 (33.1) | 15 (53.6) | 40 (29.9) | 78 (34.1) | 27 (27.6) |
| | Not at all | 133 (34.5) | 100 (29.4) | 28 (24.8) | 25 (37.3) | 52 (32.7) | 6 (27.3) | 45 (29.6) | 76 (29.3) | 41 (33.9) |

*p<0.05; **p<0.01; ***p<0.001

Table 5. Predictors of diagnosed asthma among adolescents in the United Arab Emirates (UAE).

| Variable (Reference) | Abu Dhabi n = 1048 | | Al Ain n = 1022 | | Western n = 262 | | Ajman n = 213 | | Dubai n = 478 | | RAK n = 490 | | Sharjah n = 750 | | |
|-------------------------------|-----------------------|--------|--------------------|--------|--------------------|--------|------------------|--------|------------------|--------|----------------|--------|--------------------|--------|-----------|
| | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI | |
| Sex (Female) | Male | 1.49* | 1.05-2.12 | - | - | - | - | 2.16 | 0.95-4.89 | - | - | - | - | - | - |
| School (Private) | Public | - | - | - | - | 2.00 | 0.54-7.49 | - | - | 1.51 | 0.58-3.95 | 3.02* | 1.13-8.09 | 2.98** | 1.47-6.04 |
| UAE born (No) | Yes | - | - | 1.74* | 1.16-2.61 | 1.29 | 0.43-3.83 | - | - | 1.43 | 0.69-2.96 | - | - | 0.53 | 0.26-1.06 |
| Current Smoking (No) | Yes | 0.99 | 0.55-1.78 | - | - | - | - | - | - | 1.62 | 0.74-3.54 | - | - | - | - |
| Ever smoke (No) | Yes | 1.55 | 0.92-2.62 | 1.10 | 0.60-2.02 | - | - | - | - | - | - | 1.67 | 0.59-4.71 | 2.03* | 1.16-3.54 |
| House ownership(Rent) | Own | - | - | - | - | 1.40 | 0.52-3.80 | - | - | - | - | - | - | - | - |
| House maintenance (As needed) | Yearly | - | - | - | - | - | - | - | - | - | - | - | - | 1.17 | 0.66-2.07 |
| | Rarely | - | - | - | - | - | - | - | - | - | - | - | - | 2.01* | 1.01-4.40 |
| Type of flooring (Tiles) | Carpet | - | - | - | - | - | - | - | - | - | - | - | - | 1.70 | 0.86-3.38 |
| | Rugs | - | -- | - | - | - | - | - | - | - | - | - | - | 1.62 | 0.79-3.34 |
| Cooking method (Gas) | Others | - | - | - | - | 3.28 | 0.78-13.77 | - | - | - | - | 5.79* | 1.39-24.19 | - | - |
| House humidity (No) | Yes | - | - | - | - | - | - | - | - | - | - | 2.53* | 1.28-5.01 | - | - |
| Art hobby (No) | Yes | 1.35 | 0.91-2.02 | - | - | - | - | 3.08* | 1.19-7.95 | - | - | - | - | - | - |
| Any home pests (Yes) | No | - | - | - | - | 1.01 | 0.42-2.44 | - | - | - | - | - | - | - | - |
| Near industrial plant (No) | Yes | 2.03** | 2.19-3.19 | - | - | - | - | - | - | - | - | - | - | - | - |
| Near overhead power line (No) | Yes | 1.63 | 0.93-2.89 | - | - | - | -- | - | - | 1.71 | 0.77-3.82 | - | - | - | - |

*p<0.05, **p<0.01, ***p<0.001

Table 6. Predictors of wheeze in the last 12 months among adolescents in the United Arab Emirates (UAE).

| Variable (Reference) | Abu Dhabi n= 965 | | Al Ain n= 839 | | Western n= 278 | | Dubai n= 482 | | UAQ n=105 | | RAK n= 433 | | Sharjah n= 708 | | Fujairah N = 433 | | |
|-------------------------------------|---------------------|--------|------------------|-----------|-------------------|--------|-----------------|--------|--------------|------------|---------------|--------|-------------------|-----------|---------------------|-----------|-----------|
| | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI | |
| Sex (Female) | - | - | 1.36 | 0.86-2.17 | - | - | - | - | - | - | - | - | - | - | - | - | |
| School (Public) | Private | 1.73* | 1.06-2.83 | - | - | - | - | - | - | - | - | - | 2.00 | 0.85-4.70 | - | - | |
| UAE born (Yes) | No | 1.01 | 0.56-1.79 | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| Current Smoking (N) | Yes | 0.90 | 0.46-1.77 | - | - | 2.5* | 1.02-6.36 | - | - | - | - | - | 1.12 | 0.45-2.77 | 1.26 | 0.52-3.08 | |
| Drug use (No) | Yes | - | - | - | - | - | - | - | - | - | - | - | 1.33 | 0.21-8.43 | - | - | |
| Unconventional drug use (No) | Yes | - | - | - | - | - | - | - | 4.31* | 1.23-15.16 | - | - | 1.70 | 0.96-2.99 | 2.19* | 1.11-4.31 | |
| Ever smoke (No) | Yes | 1.84* | 1.01-3.32 | 1.81* | 1.05-3.14 | - | - | 1.78 | 0.84-3.68 | - | - | 2.33 | 0.85-6.44 | 3.48*** | 1.65-7.37 | 2.95** | 1.41-6.14 |
| Mother HS (No) | Yes | 1.12 | 0.70-1.80 | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| Income (<\$4084) | >=\$4084 | - | - | - | - | - | - | - | - | - | - | - | 1.51 | 0.83-2.75 | - | - | |
| House tenure (Own) | Rent | 1.27 | 0.74-2.20 | - | - | - | - | - | - | - | - | - | 1.18 | 0.55-2.52 | - | - | |
| Air condition (No) | Yes | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| Floor type (Rugs) | Tiles | - | - | - | - | - | - | - | - | - | - | 1.87 | 0.54-6.52 | - | - | - | |
| | Carpet | - | - | - | - | - | - | - | - | - | - | 3.44 | 0.85-13.95 | - | - | - | |
| Cook method (Gas) | Other | - | - | - | - | 3.18 | 0.93-10.89 | - | - | - | - | 2.78 | 0.51-15.17 | 1.72 | 0.63-4.70 | - | - |
| House humid (No) | Yes | - | - | - | - | - | - | - | - | - | - | 1.57 | 0.78-3.18 | - | - | - | |
| Art hobby (No) | Yes | 1.84* | 1.18-2.87 | - | - | - | - | - | - | 3.18 | 0.93-10.95 | - | - | - | - | - | |
| Near industry (No) | Yes | - | - | 1.93 | 0.99-3.77 | - | - | 2.74** | 1.45-5.18 | - | - | - | - | 1.95* | 1.01-3.77 | - | - |
| Near power (No) | Yes | 2.45* | 1.24-4.83 | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| Concern over air pollution (Slight) | Extreme | - | - | - | - | - | - | - | - | - | - | 4.57** | 1.62-12.92 | - | - | - | |
| | Moderate | - | - | - | - | - | - | - | - | - | - | 1.49 | 0.45-4.93 | - | - | - | |
| | Not at all | - | - | - | - | - | - | - | - | - | - | 2.30 | 0.76-6.96 | - | - | - | |

*p<0.05,**p<0.01,***p<0.001

Western regions such as Al Ruwais primarily generate their income through oil and gas industries, which are contributors of air pollution (Al-Maskari, 2000; The National, 2013), while RAK and Fujairah rely more on agriculture and fisheries. Exposures to arts, crafts, ceramics, stained glass work and similar hobbies are associated with respiratory health in Abu Dhabi,

Ajman and UAQ.

Adolescents who attend public schools in RAK and Sharjah are more likely to have asthma. While this finding may be a reflection of the participants' socioeconomic status, it may also be indicative of indoor air quality inside public schools. In contrast, we found an association between attending private schools in Abu Dhabi

City and wheeze. These inconsistent findings point to the possible need for a wide-scale national campaign that assesses indoor air quality in public and private schools in the UAE. It is interesting to note that sex and being born in the UAE emerge as significant predictors of respiratory health only for participants who reside in the emirate of Abu Dhabi. These findings may

Table 7. Predictors of dry nocturnal cough in the last 12 months among adolescents in the United Arab Emirates (UAE).

| Variable | Abu Dhabi n= 1253 | | Al-Ain n= 1025 | | Western n=290 | | Ajman n=176 | | Dubai n= 471 | | UAQ n= 80 | | RAK n=590 | | Sharjah n= 764 | | Fujairah n= 368 | |
|-------------------------------|----------------------|-----------|-------------------|-----------|------------------|------------|----------------|-----------|-----------------|------------|--------------|-----------|--------------|-----------|-------------------|-----------|--------------------|-----------|
| | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI | OR | 95% CI |
| Sex (Male) | | | | | | | | | | | | | | | | | | |
| Female | 1.22 | 0.96-1.55 | 1.37* | 1.05-1.79 | - | - | - | - | - | - | - | - | - | - | 1.26 | 0.92-1.74 | 1.17 | 0.73-1.86 |
| School (Private) | | | | | | | | | | | | | | | | | | |
| Public | 1.34 | 0.96-1.67 | - | - | - | - | 0.51 | 0.26-1.03 | - | - | - | - | - | - | - | - | - | - |
| UAE born (No) | | | | | | | | | | | | | | | | | | |
| Yes | - | - | 1.41* | 1.08-1.85 | - | - | - | - | - | - | - | - | - | - | - | - | 1.35 | 0.77-2.37 |
| Drug use (No) | | | | | | | | | | | | | | | | | | |
| Yes | - | - | - | - | - | - | - | - | 3.58 | 0.67-19.14 | - | - | - | - | - | - | - | - |
| Unconventional drug use (No) | | | | | | | | | | | | | | | | | | |
| Yes | 1.20 | 0.94-1.53 | 1.60** | 1.18-2.16 | 2.89*** | 1.55-5.37 | 1.48 | 0.71-3.11 | - | - | - | - | 1.54* | 1.04-2.28 | 2.04*** | 1.48-2.81 | 1.91* | 1.17-3.12 |
| Ever smoke (No) | | | | | | | | | | | | | | | | | | |
| Yes | - | - | - | - | - | - | - | - | 2.33** | 1.37-3.96 | - | - | - | - | - | - | - | - |
| Father HS (Yes) | | | | | | | | | | | | | | | | | | |
| No | - | - | - | - | - | - | - | - | - | - | 1.18 | 0.43-3.22 | - | - | - | - | - | - |
| House tenure (No) | | | | | | | | | | | | | | | | | | |
| Yes | - | - | - | - | - | - | - | - | - | - | 2.44 | 0.70-8.50 | - | - | - | - | 1.43 | 0.79-2.60 |
| House maintenance (As needed) | | | | | | | | | | | | | | | | | | |
| Yearly | - | - | - | - | 1.88* | 1.06-3.34 | - | - | - | - | - | - | - | - | - | - | - | - |
| Rarely | - | - | - | - | 2.63 | 0.96-7.28 | - | - | - | - | - | - | - | - | - | - | - | - |
| Flooring (Others) | | | | | | | | | | | | | | | | | | |
| Tiles | - | - | - | - | - | - | - | - | - | - | 1.33 | 0.48-3.74 | - | - | - | - | - | - |
| Cooking (Gas) | | | | | | | | | | | | | | | | | | |
| Others | - | - | - | - | 4.55** | 1.72-12.02 | - | - | - | - | - | - | - | - | - | - | - | - |
| House humid (No) | | | | | | | | | | | | | | | | | | |
| Yes | - | - | - | - | - | - | - | - | 1.45 | 0.88-2.39 | - | - | - | - | - | - | - | - |

Table 7. Cont'd.

| | | | | | | | | | | | | | | | | |
|------------------------|---|---|---|---|-------|-----------|------|-----------|---|---|------|------------|---|---------|-----------|---|
| Pesticide use (No) | | | | | | | | | | | | | | | | |
| Yes | - | - | - | - | - | - | 2.00 | 0.98-4.01 | - | - | 3.22 | 0.92-11.29 | - | - | - | - |
| Home pest (No) | | | | | | | | | | | | | | | | |
| Yes | - | - | - | - | 2.72* | 1.43-6.09 | - | - | - | - | - | - | - | 1.04 | 0.66-1.64 | - |
| Sometimes | - | - | - | - | 2.07* | 1.14-3.73 | - | - | - | - | - | - | - | 1.72*** | 1.26-2.35 | - |
| Reside near power (No) | | | | | | | | | | | | | | | | |
| Yes | - | - | - | - | 2.31* | 1.12-4.77 | - | - | - | - | - | - | - | 1.86* | 1.11-3.11 | - |

*p<0.05, **p<0.01, ***p<0.001.

be reflective of gender behaviors in Abu Dhabi but are worth further investigations.

In terms of individual responses and behaviors, our study suggests that current or exposure to smoking is associated with respiratory health for most UAE regions. This is not surprising, given that exposure to environmental tobacco is a well-recognized risk factor of asthma and respiratory symptoms (Al-Sheyab et al., 2014; Mcleish and Zvolensky, 2010). These findings highlight the importance of reducing tobacco usage among all adolescents in the UAE. In the UAE, there is zero tolerance for illegal drug use and harsh judicial penalties. Therefore, adolescents often choose to smoke burning ants, which are high in formic acid, as may be perceived as a legal alternative to getting high (The National, 2014).

Building on current knowledge (The National, 2014; Rudell et al., 1996), we found associations between other substance abuse and respiratory health in Al-Ain, Western, RAK, Sharjah and Fujairah. It may be that adolescents residing in these regions are less aware of the potential risk of smoking burning ants, therefore it is important to develop educational campaigns that focus on the consequences and health risks of other substance abuse.

CONCLUSION

This study was subject to several limitations. First, exposure data used in our analyses are proxies of exposure assessments. For instance, air quality was assessed based on proximity to pollution sources rather than on actual exposure assessments. Unfortunately, data on air quality exposure is scarce in the UAE. Second, data were self-reported and may have been subject to response bias.

Sampling led to lower representations of adolescents who attend private schools in Dubai and among males who reside in the UAQ. This is relevant as the population of Dubai consists of a large proportion of expatriates; hence results related to the expatriate population in Dubai are likely to be biased. Finally, response to the self-administered survey may have been influenced by the presence of social workers, with the possibility of under-reporting tobacco use among females given social norms.

Despite these limitations, this study contributed to knowledge of a detailed profile and regional environmental predictors of respiratory health among UAE adolescents that is crucial for public health planning.

ACKNOWLEDGMENTS

The authors acknowledge the contribution of Dr. Rania Dghaim in the design and data collection phase of the NSPHUAE.

Conflicts of interest

The authors declare that they have no conflicts of interest.

REFERENCES

- Al-Maskari F, Bener A, Al-Kaabi A, Al-Suwaidi N, Norman N, Brebner J (2000). Asthma and respiratory symptoms among school children in United Arab Emirates. *Allerg. Immunol.* 32(4):159-63.
- Al-Sheyab N, Alomari MA, Shah S, Gallagher P, Gallagher R (2014). Prevalence, pattern and correlated of cigarette smoking in male adolescents in northern Jordan, and the influence of waterpipe use and asthma diagnosis: a descriptive cross-sectional study. *Int. J. Environ. Res. Public Health* 11:9008-9023.
- Arif A, Delclos G, Lee E, Tortolero S, Whitehead L (2003). Prevalence and risk factors of asthma and wheezing among US adults: An analysis of the NHANES III data. *Eur. Respir. J.* 827-833.
- Arshad S (2009). Does exposure to indoor allergens contribute

- development of asthma and allergy? *Curr. Allergy Asthma Rep.* 10(1):49-55.
- Balzano G, Fuschillo S, Melillo G, Bonini S (2008). Asthma and Sex Hormones. *Allergy* 56(1):13-20.
- Barakat-Haddad C (2013). Prevalence of High Blood Pressure, Heart Disease, Thalassemia, Sickle-Cell Anemia, and Iron-Deficiency Anemia among the UAE Adolescent Population. *J. Environ. Public Health*. <http://dx.doi.org/10.1155/2013/680631>.
- Bush R (2008). Indoor allergens, environmental avoidance, and allergic respiratory disease. *Allergy Asthma Proc.* 29(6):575-9.
- Center for Disease Control (CDC) (2004). Asthma prevalence and control characteristics by race/ethnicity - United States, 2002. *Morb. Mortal. Wkly. Rep.* 53(07):145-48.
- Chung K, Pavord I (2008). Prevalence, pathogenesis, and causes of chronic cough. *Lancet* 371:1364-74.
- Cook DG, Strachan DP (1999). Summary of effects of parental smoking on the respiratory health of children and implications for research. *Thorax* 54:357-66.
- Eisner MD, Yelin EH, Trupin L, Blanc PD (2001). The Influence of Chronic Respiratory Conditions on Health Status and Work Disability. *Am. J. Public Health* 92(9):1506-13.
- Esposito S, Tenconi R, Lelii M, Preti V, Nazzari E, Consolo S, Francesca Patria M (2014). Possible molecular mechanisms linking air pollution and asthma in children. *BMC Pulmonary Medicine* 14:31.
- Evans R, Stoddart G. (1990). Producing health, consuming health care. *Soc. Sci. Med.* 31(12):1347-1363.
- Gorman B, Asaithambi R (2008). Biology, Social Environment, and Health: How Family History and Social Conditions Affect Adult Asthma. *Social Science Quarterly*, 89(3):728-750.
- Gwynn R (2004). Risk Factors for Asthma in US Adults: Results from the 2000 Behavioral Risk Factor Surveillance System. *J. Asthma* 41:91-98.
- Islam T, Gauderman WJ, Berhane K, McConnell R, Avol E, Peters JM, Gilliland FD (2007). Relationship between air pollution, lung function and asthma in adolescents. *Thorax* 62(11):957-63.
- Kelly FJ, Fussell JC (2011). Air pollution and airway disease. *Clin. Exp. allergy* 41(8):1059-71.
- Khondker HH (2009). Social change in the United Arab Emirates: challenges of migration and 'Emiratization'. Middle East Institute, Singapore, Perspectives 001.
- Lai CK, Beasley R, Crane J, Foliaki S, Shah J, Weiland S (2009). Global variation in the prevalence and severity of asthma symptoms: phase three of the International Study of Asthma and Allergies in Childhood (ISAAC). *Thorax* 64(6):476-83.
- Litonjua A, Carey V, Weiss S, Gold D (1999). Race, socioeconomic factors, and area of residence are associated with asthma prevalence. *Pediatr. Pulmonol.* 28:394-401.
- Lopez AD (2006). Chronic obstructive pulmonary disease: current burden and future projections. *Eur. Respir J.* 27(2):397-412
- Masoli M, Fabian, D, Holt S, Beasley R (2004). The global burden of asthma: executive summary of the GINA dissemination committee report. *Allergy* 59(5):469-78.
- Mcleish A, Zvolensky M (2010). Asthma and Cigarette Smoking: A Review of the Empirical Literature. *J. Asthma* 47(4):345-61.
- Natural Resources Defence Council (NRDC) (2014). Asthma and air pollution. Available at: <http://www.nrdc.org/health/effects/fasthma.asp>
- Pattenden S (2006). Parental smoking and children's respiratory health: independent effects of prenatal and postnatal exposure. *Tob Control* 15(4):294-301.
- Pearce N, Ait-Khaled N, Beasley R, Mallol J, Keil U, Mitchell E, Robertson C (2007). Worldwide trends in the prevalence of asthma symptoms: Phase III of the International Study of Asthma And Allergies In Childhood (ISAAC). *Thorax* 62(9):758-766.
- Rona RJ (2000). 'Asthma and Poverty.' *Thorax* 55:239-44.
- Rudell B, Ledin, M, Hammarstrom U, Stjernberg N, Lundback B, Sandstrom T (1996). Effects on symptoms and lung function in humans experimentally exposed to diesel exhaust. *Occup. Environ. Med.* 53:658-62.
- Silva GE, Sherrill DL, Guerra S, Barbee RA (2004). Asthma as a risk factor for COPD in a longitudinal study. *Chest* 126(1):59-65.
- The International Study of Asthma and Allergies in Childhood (ISAAC) Steering Committee (1998). Worldwide variations in the prevalence of asthma symptoms: the International Study of Asthma and Allergies in Childhood (ISAAC). *Eur. Respir. J.* 12(2):315-335.
- The National (2014b). What to do with carcinogenic Sharjah smog? Available at: <http://www.thenational.ae/thenationalconversation/editorial/what-to-do-with-carcinogenic-sharjah-smog>
- The National (2013). Air quality master plan to battle pollution in Abu Dhabi. Available at: <http://www.thenational.ae/uae/environment/air-quality-masterplan-to-battle-pollution-in-abudhabi>
- The National (2014a). Air pollution in Sharjah as toxic as in Beijing, survey shows. Available at: <http://www.thenational.ae/uae/environment/air-pollution-in-sharjah-as-toxic-as-in-beijing-survey-shows>
- The National (2014c). Experts call for careful eye to be kept on UAE air pollution levels. Available at: <http://www.thenational.ae/uae/environment/experts-call-for-careful-eye-to-be-kept-on-uae-air-pollution-levels>
- The National (2014d). UAE: More than a third of youth smoke ants to get high. Available at: <http://www.edarabia.com/25120/uae-more-than-a-third-of-youth-smoke-ants-to-get-high/>
- UAE Ministry of Environment, Tedaq Census (2005) Preliminary Results of Population, Housing and Establishment Census 2005, United Arab Emirates, Ministry of Economy, Abu Dhabi, UAE, 2006. Available at: www.csc.unc.edu.uaee/public/UNLICOMMUAE2005CensusResults07282008.pdf
- Wieringa MH, Weyler JJ, Van Bever HP, Nelen VJ, Vermeire PA (1999). Gender differences in respiratory, nasal and skin symptoms: 6-7 versus 13-14-year-old children. *Acta Paediatr.* 88(2):147-9.
- World Health Organization (2003). Prevention of Allergy and Allergic Asthma. Available at: http://whqlibdoc.who.int/hq/2003/WHO_NMH_MNC_CRA_03.2.pdf?ua=1
- World Health Organization Fact sheet N° 307 (2013). Asthma. Available at: <http://www.who.int/mediacentre/factsheets/fs307/en/>
- World Health Organization Fact sheet N° 310 (2014). The Top 10 Causes of Death. Available at: <http://www.who.int/mediacentre/factsheets/fs310/en/>
- World Health Organization. Global surveillance, prevention and control of chronic respiratory diseases: a comprehensive approach, Available at: [http://www.who.int/gard/publications/GARD%20Book%202007.pdf?ua=1;2007\[accessed02.04.14\]](http://www.who.int/gard/publications/GARD%20Book%202007.pdf?ua=1;2007[accessed02.04.14])

Full Length Research Paper

Knowledge and misconception of young women toward sexual transmitted infection and condom use in Northern Ethiopia: Cross sectional study

Girmatsion Fisseha

College of Health Science, School of public health, Mekelle University, Ethiopia.

Accepted 23 February, 2015

The aim of this study was to assess the knowledge and misconception about sexual transmitted infections (STIs), mode of transmission, prevention methods and use of condom among young women in Northern Ethiopia. A facility-based cross-sectional study was employed among 326 young women aged 15 to 24 years from 1st to 30th May, 2013. A multistage sampling technique was used to select young women attending outpatient facility. A pre-tested interviewer guided structured questionnaire was used for data collection. Data was entered, cleaned and analyzed using statistical package for social sciences (SPSS) version 20.0. Descriptive statistics like frequency, percent, table and graphs were used to present the findings. From the total of 326 young women included in this study, 305 women participated with a response rate of 93.6%. One hundred and fourteen (40.4%) of the young women had poor knowledge about STIs mode of transmission and prevention methods. Regarding prevention of STIs, 119 (39%) youths were not aware of at least one method of STI prevention methods such as consistent condom use, being faithful and abstaining. About 28 (9.9%) youths had misconceptions regarding prevention methods of STIs and 149 (48.9%) young women had ever used condom. Seventy three percent of the youths knew at least one place where they can get condom. This study indicated that there is poor knowledge and high misconception about sexual transmitted infections, mode of transmissions and prevention methods among young women and many do not use condom during sexual contact. Therefore, it is better to design strategies to create awareness for younger women in school and those out of school about STIs. In addition, establishing reproductive health and HIV/AIDS club is an important intervention at school.

Key words: Knowledge, misconception, condom use, young women, Northern Ethiopia.

INTRODUCTION

Sexual transmitted infection (STI) is an infections cause by organisms that are passing through sexual activity from an infected partner. More than 40 types have been identified and regarding as group of communicable

diseases that are transmitted predominantly by unprotected sexual contact (Orisatoki and Oguntibeju, 2010). STIs in nature can be either asymptomatic or symptomatic. Regardless of the presence or absence of

E-mail: adugnawmph@yahoo.com.

Author(s) agree that this article remain permanently open access under the terms of the [Creative Commons Attribution License 4.0 International License](http://creativecommons.org/licenses/by/4.0/)

symptoms, all STIs can lead to major complications if left untreated like infertility, Human Immunodeficiency Virus (HIV), prolonged pelvic pain and psychological problems (Las and Vasan 2000).

According to World Health organization (WHO) estimates, about 484.4 million new cases of curable STIs occurred among both sex aged 15 to 49 years old every day (World Health Organization, 2012). STI's including HIV mainly affects sexually active young people. Young adults aged 15 to 29 years, account for 32% of Acquired Immunodeficiency Syndrome (AIDS) cases reports in developing countries (Alexander and Lipi, 2008). Risky sexual behavior such as unprotected sex among the youths who hold various misconceptions about the use of condom for protective sex is the main factor for increasing the magnitude of STIs prevalence among youths (Orisatoki and Oguntibeju, 2010).

In developing countries such as sub-Saharan Africa, STI case burden is very high. About 108 million STIs cases are occurred every day. It is estimated that 80 to 90% of the global burden of STIs occurs in the developing world where there is limited or no access to diagnostics (World Health Organization, 2007) and little study has been carried out on their prevalence and incidence rate (Berhane et al., 2006). In Ethiopia, despite the large scale up of health care investments in prevention and treatment of sexual transmitted disease (STD) (TRHB, 2013) STIs prevalence remain a major problem for the youths. Yet, STIs are grossly underreported in Ethiopia (Berhane et al., 2006).

In Ethiopia, modern contraceptive utilization by young women is poor; only 27.4% of youths aged 15 to 24 years use any modern contraceptive and with 54.6% unmet need for modern contraceptive in 2011. About 92.3% of young women have knowledge about male condom and 55% about female condom but only 0.4% of women age 15 to 24 used male condom during sexual contact in 2011 (CSA Ethiopia and ICF International, 2012). STD prevalence among youth women in Ethiopia rises from 2.9 to 3.6% during 2005 and 2011 (CSA Ethiopia and ICF International, 2012). In addition, Ministry of Health compiled 113,386 and 104,607 STIs cases during 2011 and 2012 in the country (MoH FDRE, 2012). However, the factor associated with STD among youths is not well studied in Ethiopia and study area. Therefore, the aim of this study is to assess the knowledge, misconception and condom use among young women in Northern Ethiopia. In which it helps as input for the prevention and control of STDs programs among youths in the Ethiopia.

METHODOLOGY

Study setting and period

This study was conducted from 1 to 30 May, 2013 in Ceteral zone of Tigray, Northern Part of Ethiopia. It is 1,017kms far from the capital City of Ethiopia. In central zone there are three hospitals, 57 health centers which offer service for STD's patients based on

syndromic approach. Health coverage of the zone is 85%. They have been given service for youths in separated areas (TRHB, 2013).

Study design and sampling

Health facility based cross-sectional study design was employed. The study population was a randomly selected young women age from 15 to 24 years who visited the selected health facilities during the study period. There were a total of 326 young women who participated in the study. The sample size was calculated using a single population proportion formula by taking previous study in Ethiopia, 3.6% prevalence of STDs (Central Statistical Agency and ICF International, 2012) with 95 % confidence interval and a precision of 3%, and adding 10% for non response rate, the calculated total sample size was 323 young women. Multi-stage sampling technique was used to select the study participants.

Measurements

Data was collected using semi-structured questionnaire pretested and adapted to local context by reviewing similar literatures and from Ethiopian demographic and health survey (EDHS) (CSA Ethiopia and ICF International, 2012; Bereket et al., 2013). The questionnaire includes variables on socio-demographic, reproductive, sexual behaviors and STD related Knowledge's. The instrument was first prepared in English and then translated to the local language Tigrigna to make it easy and understandable, and also to reduce language barriers between the data collectors and study subjects. Data was collected by ten female nurses and supervised by three health officers. Data were collected from youths who came for health service. Quality of the data was assured by carrying out careful design, translation and retranslation of the questionnaire, cleaning of data and appropriate recruitment and training was taken for both data collectors and supervisors. The principal investigator coordinated the data collectors through regular daily supervision of data collection. All completed questionnaire were examined by the principal investigator for completeness and consistency. Then the collected data were edited, coded, entered, cleaned and analyzed using SPSS software version 20.0 statistical package. The magnitude of knowledge and misconception was estimated by preparing 12 item questions which contains question about STIs awareness, mode of transmission and prevention, and aware of misconception about STDs prevention. If a young woman answered at least eight (67%) items question correctly, she was considered as having good knowledge otherwise she is considered as having poor knowledge. Use of condom was measured if the young woman ever use either male or female condom when she comes in contact with her boyfriend.

Data processing and analysis

The outcome variable of this study was knowledge and misconception about STIs prevention methods and mode of transmission among young women which is categorical variable and categorical data analysis method was used. Descriptive analysis: the categorical variables were submitted to absolute (n) and relative (%) frequencies. Quantitative variables were submitted to median, mean and standard deviation. The magnitude of knowledge was estimated. If a young woman answered at least eight items correctly, she was considered as having good knowledge otherwise she is classified as having poor knowledge.

Ethical consideration

Ethical clearance was obtained from Mekelle University Ethics

Table 1. Socio-demographic characteristics of young women, Central Zone of Tigray, Ethiopia.

| Socio demographic variables | No | (%) |
|------------------------------------|-----------|------------|
| Residence | | |
| Urban | 202 | 66.2 |
| Rural | 103 | 33.8 |
| Age of respondent | | |
| 15-19 | 80 | 26.2 |
| 20-24 | 225 | 73.8 |
| Religion of respondent | | |
| Orthodox | 279 | 91.5 |
| Muslim | 22 | 7.2 |
| Other* | 4 | 1.3 |
| Ethnic group | | |
| Tigray | 299 | 98 |
| Other** | 6 | 2 |
| Education level | | |
| No education | 28 | 9.2 |
| Primary | 71 | 23.3 |
| Secondary | 115 | 37.7 |
| Above secondary | 91 | 29.8 |
| With whom they lived | | |
| Alone | 75 | 24.6 |
| Parents /relatives | 110 | 36.1 |
| Husband/steady partner | 120 | 39.3 |
| Occupation | | |
| Student | 93 | 30.5 |
| Unemployed | 39 | 12.8 |
| Small trade | 40 | 13.1 |
| Daily labor | 37 | 12.1 |
| House wife | 43 | 14.1 |
| Commercial sex worker | 5 | 1.6 |
| House servant | 24 | 7.9 |
| Government employee | 24 | 7.9 |
| Monthly family income | | |
| 200-450 | 39 | 12.8 |
| 451-1000 | 149 | 48.9 |
| 1001-1500 | 77 | 25.2 |
| 1501-5000 | 40 | 13.1 |

Other*: Catholic and protestant. Other**: Amara and Oromo.

Review Board. Letter of support was obtained from the Tigray Regional Health Bureau. Moreover, an informed oral consent was obtained from all study participants. The study participants were informed about the purpose study. They were also told they had right to discontinue or refuse to participate in the study any time they wanted to. Confidentiality and privacy were maintained.

RESULTS

Socio-demographic characteristics

A total of 305 young women participated in this study giving a response rate of 96.3%. Nearly two third of the young women (66.2%) were from urban residence, and most of them 225 (73.8%) were in the age group between 20 to 24 years. The median age of the young women was 21 years (range from 15 to 24 years). Most of the young women 279 (91.5%) were Orthodox Christian follower and almost all 299(98%) were Tigrayan in ethnicity. About 115 (37.7%) young women had secondary school education and 91(29.8%) had above secondary school education. Concerning occupation of the young women, 93(30.5%) were students (Table 1).

Sexual relationship and condom use by young women

Majority of the young women, 217 (71.1%) had experienced their first sexual intercourse between the age of 15 and 19 years and 9.8% between the age of 9 and 14 years. The median age at first sex was 17 years (range 9 to 24 years). Out of the total young women, 155 (39.7%) were married and have cohabiting partners, however, 69 (29.9%) were separated. Of the total young women, 27 (8.9%) had two and more sexual partners in the last 12 months and 51(16.7%) had two and more sexual partners in their life time. The median age of the partners was 28 years (range 16 to 60 years). Regarding the sexual relationship, almost half 155 (50.5%) of the young women were married and about one fourth of the young women had boyfriend. Regarding their last sexual intercourse, 19 (6.2%) young women were forced and 18 (5.9%) were cheated for money (Table 2).

Behavioral characteristics of the young women

During the last 12 months, 67(22%) young women reported that they had watched pornography. 66 (21.6%) young women reported that they drank alcohol during the last sexual intercourse, of which 49 (78.6%) did not use condom during their sexual intercourse. Similarly, 12 (3.6%) young women reported that they chew chat. Among the total young women, 149 (48.9%) never used condom. Of those young women who ever used condom, 95 (63.8%) used condom in their last sexual intercourse and 32 (21.7%) consistently used condom (Table 3).

Knowledge of young women about mode of transmission and prevention of STIs

Most of youths 282 (92.5%) heard about STIs. About 114

Table 2. Sexual behavior and condom use by young women, Central Zone of Tigray, Ethiopia.

| Sexual relationship of young women | No | % |
|---|-----------|----------|
| Marital status | | |
| Married /cohabiting partner | 155 | 50.8 |
| Boyfriend | 135 | 44.2 |
| Divorced/widowed | 15 | 4.9 |
| Partners living condition | | |
| Living with her now | 162 | 70.1 |
| Living elsewhere | 69 | 29.9 |
| Age at first sexual intercourse | | |
| ≤14 | 30 | 9.8 |
| 15-19 | 217 | 71.1 |
| 20-24 | 58 | 19 |
| Age of the last male partner | | |
| 15-24 | 95 | 31.1 |
| 25-34 | 154 | 50.5 |
| 35-44 | 39 | 12.8 |
| ≥45 | 17 | 5.6 |
| Number of sexual partner in the last 12 months | | |
| One | 278 | 91.1 |
| Greater or equal to two | 27 | 8.9 |
| Relationship to the last sexual partner | | |
| Husband /cohabiting partner | 155 | 50.8 |
| Boyfriend | 76 | 24.6 |
| Casual acquaintance | 74 | 14.3 |
| Number of sexual partner in life time | | |
| One | 254 | 83.3 |
| Greater or equal to two | 51 | 16.7 |
| Last sexual intercourse | | |
| Voluntary | 268 | 87.9 |
| Forced | 19 | 6.2 |
| For favor/cheating | 18 | 5.9 |

(40.4%) youths had poor knowledge on STIs mode of transmission and prevention. About 72 (23.6%) youths were not aware of at least one method of STIs transmission such as unprotected sexual intercourse, contaminated sharp materials, and mother to child. The predominant mode of transmission mentioned by the youths was unprotected sex 249 (88.3%). The predominant unmentioned mode of transmission was from mother to child 219 (77.7%). Regarding prevention of STI 119 (39%), youths were not aware of at least one

method of STI prevention method such as consistent condom use, being faithful and abstaining. The predominant prevention method mentioned by the youths was being faithful 199 (70.6%). The predominant unmentioned prevention method was abstaining 164 (58.2%). About 28 (9.9%) youths had misconceptions regarding prevention methods of STIs. Seventy three percent of the youths knew at least one place where they can get condom. The predominant place mentioned for the distribution of condom was government health

Table 3. Behavioral characteristics of young women in the last 12 months, Central Zone of Tigray, Ethiopia, April, 2013.

| Behavioral characteristics of young women | No | (%) |
|---|-----------|------------|
| Frequency of watching pornography (n=305) | | |
| Not at all | 238 | 78 |
| Ever watched | 67 | 22 |
| Drink alcohol in the last sexual intercourse with the last partner (n=305) | | |
| Neither partner nor respondent | 239 | 78.4 |
| Both partner and respondent | 66 | 21.6 |
| Last partner used condom after drinking alcohol (n=66) | | |
| No | 49 | 74.2 |
| Yes | 17 | 25.8 |
| Chew chat in the last sexual intercourse (n=305) | | |
| Partner or respondent | 12 | 3.9 |
| Neither | 293 | 96.1 |
| Condom used during the last sexual intercourse with the last partner (n=305) | | |
| No | 54 | 36.2 |
| Yes | 95 | 63.8 |
| Ever used condom (n=305) | | |
| No | 156 | 51 |
| Yes | 149 | 48.9 |
| Consistently condom used (n=149) | | |
| No | 117 | 78.5 |
| Yes | 32 | 21.5 |
| Ever heard of STD (n=305) | | |
| No | 23 | 7.5 |
| Yes | 282 | 92.5 |

institution 194 (82.7%). Majority of the youths 197 (64.6%) had not convinced their partner to use condom even though they had interest to use condom during sexual intercourse (Figure 1).

DISCUSSION

This study determines the knowledge and misconception status of young women toward sexual transmitted infections, methods of prevention and mode of transmission. About 40.4% young women in this study had poor knowledge on STD transmission and prevention which is lower compared to a study in Welaita University (64%) (Rajapure et al., 2013) and it is comparable with the study of Gondar (Yitayal et al., 2011). This difference might be due to health institution based study, in which

respondents may have had better contact and got information from health professionals that may increase their knowledge on STIs.

Respondents who did not know at least two symptoms of STD in this study were 55.3%. It is higher compared with a study conducted in Addis Ababa high school among adolescents, where 17.9% of the youths had knowledge of at least two symptoms of STDs (Moges et al., 2013). Health institution based study may have caused such difference because youths who came to health institution may have accessed to information on STIs from health providers. In our study, young women had misconception regarding mode of transmission and prevention of STD. This is consistent with a study conducted in Southern Ethiopia and South Africa, (Muluken and Maereg, 2012; Rajapure et al., 2013). This may be due to the fact that youth's misconception may

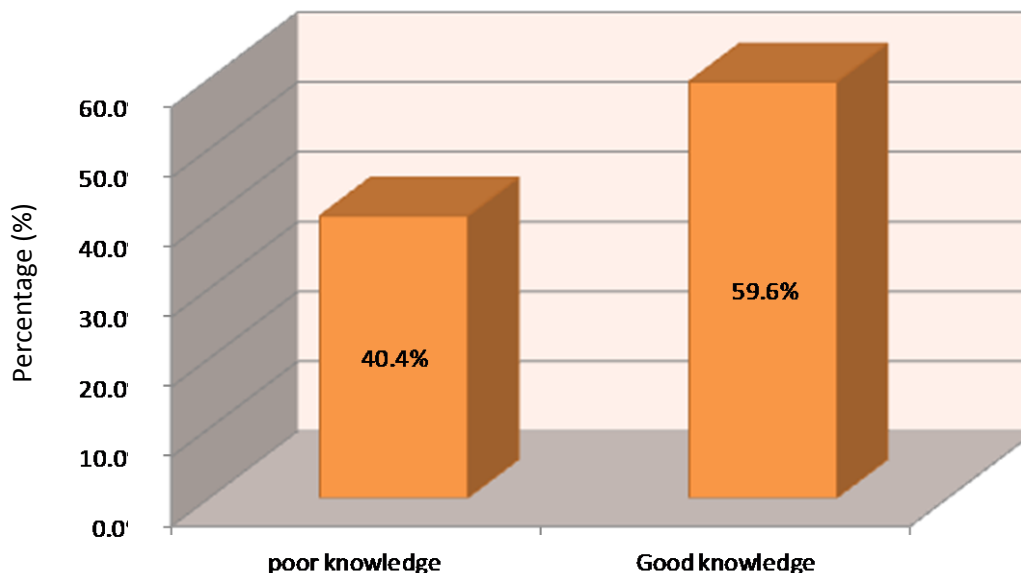


Figure 1. Knowledge of young women about STD transmission and prevention in central zone of Tigray, Ethiopia, April, 2013.

result in unprotected sexual intercourse with infected individual that may acquire an STD.

This study has revealed lower condom use compared to a study conducted in northeast Ethiopia (Moore et al., 2007). This may be due to a difference in the socio-economic characteristics of the respondent and differences in infrastructures. In our study, about 17% young women have above one sexual partner in their life. Of those who had above one partner in their life, 60.8% had history of signs and symptoms of STD compared to those who had one partner (13.4%). This is lower compared to a study conducted among University students (52.6%) and among private college students (35%) (Zelalem, 2013). This may be due to the difference in socio-demographic characteristics, study area and study populations. This study has also identified 51.1% young women who had never used condom.

As a limitation of this study, STIs was assessed only through the report of young women. So, under reporting or over reporting may be possible since the study deals on sensitive issues and personal questions. Therefore, any interpretation of this finding within these variables shall take into account the degree of precision. The strength of this study is the use of measurement of Ethiopian Demographic and Health Survey, which enabled the making and comparison of findings with other national and international literatures to be valid.

Conclusion

Young women had low knowledge on STIs rout of transmission and prevention methods. In addition,

misconceptions about prevention of STIs were one of the worst problems among the young women. Many women do not use condom during sexual contact. Having multiple sexual partners in lifetime, low awareness of at least two clinical features of STIs, having misconception on the mode of transmission and prevention of STIs and having a previous history of STIs were found to be the problems of young women. To solve the problem, multiple approaches should be needed. Working with concerned stakeholders mainly health sector and education sector in order to address young women and to improve the knowledge of young women on STI and avoid misconceptions on the mode of transmission and prevention. Establishing and strengthening youth friendly services are also mandatory. In addition, use of local media like FM radio, distributing leaflets should be designed to the level of young women.

ACKNOWLEDGEMENTS

The authors would like to thank Mekelle University for funding this research. Our gratitude goes to data collectors and respondents who participated in this study. The authors are also grateful to Tigray regional health bureau, Woreda health office, staffs of the hospital and health centers for their contribution in the accomplishment of this study.

Conflicts of interest

The authors declare that they have no conflicts of interest.

REFERENCES

- Alexander M, Lipi D (2008). Study of knowledge, perception and attitude of adolescent girls towards STIs/HIV, safer sex and sex education: (A cross sectional survey of urban adolescent school girls in South Delhi, India). *BMC Women Health* 8:12.
- Bereket Y, Terefe G, Mulat T (2013). Prevalence and Associated Factors of Sexually Transmitted Infections among Students of Wolaita Sodo University, Southern Ethiopia. *Int. J. Sci. Technol. Res.* 2(2).
- Berhane Y, Haile mariam D, Kloos H (2006). *Epidemiology and Ecology of Health and Disease in Ethiopia*. Sharma Books p 849.
- Central Statistical Agency [Ethiopia] and ICF International (2012). *Ethiopia Demographic and Health Survey 2011*. Addis Ababa, Ethiopia and Calverton, Maryland, USA: Central Statistical Agency and ICF International.
- Las S, Vasan R (2000). knowledge and attitude of college students in kraals towards HIV/AIDS, STI and sexuality in Indian.
- Ministry of Health Federal Democratic Republic of Ethiopia (MoH FDRE) (2012). *Report on Progress towards Implementation of the Declaration of Commitment on HIV/AIDS*. Addis Ababa, Ethiopia: HAPCO.
- Moges B, Yismaw G, Kassu A, Megabiaw B, Alemu S, Amare B, Muluye D (2013). Sexually transmitted infections based on the syndromic approach in Gondar. *BMC Public Health* 13:143.
- Moore AM, Biddlecom AE, Zulu EM (2007). Prevalence and meanings of exchange of money or gifts for sex in unmarried adolescent sexual relations hips in sub-Saharan Africa. *Afr. J. Reprod. Health* 11(3):44-61.
- Muluken D, Maereg W (2012). Predictors of consistent condom use among University students: Hierarchical analysis Debre Berhan, Ethiopia. *Global J. Med. Public Health* 1(4):23-28.
- Orisatoki RO, Oguntibeju OO (2010). Knowledge and attitudes of students at a Caribbean offshore medical school towards sexually transmitted infections and use of condoms. *West Indian Med. J.* 59(2):171-176.
- Rajapure V, Tirwa R, Poudyal H, Thakur N (2013). Prevalence and Risk Factors Associated with Sexually Transmitted Diseases (STDs) in Sikkim. *J. Community Health* 38(1):156-162
- Tigray Regional Health Bureau (TRHB) (2013). *Tigray regional health bureau profile for the 20011/12 EFY*. Tigray, Mekelle.
- World Health Organization (2007). *Global strategy for the prevention and control of sexually transmitted infections: 2006-2015*. Geneva: WHO. Available from: <http://www.who.int/reproductivehealth/>
- World Health Organization (2012). *Global incidence and prevalence of selected curable sexually transmitted infections – 2008*. World Health Organization. Available at: <http://www.who.int/reproductivehealth/publications/rtis/stisestimates/en/>
- Yitayal Shiferaw, Agersew Alemu, Amanuel Girma, Afera Getahun, Andarge Kassa, Alemayehu Gashaw, Abebe Alemu, Takele Teklu and Baye Gelaw (2011). Assessment of knowledge, attitude and risky behavior towards HIV/AIDS and other STIs among preparatory students of Gondar town, North West Ethiopia, March. *BMC Res. Notes* 4:505
- Zelalem A (2013). Prevalence and correlates of multiple sexual partnerships among private college students in Bahirdar city, northwest Ethiopia. *Sci. J. Public Health* 1(1):9-17.

Full Length Research Paper

Reproductive health needs and service utilization among youths in West Badewacho Woreda, Hadiya Zone, South Ethiopia

Niguss Cherie¹, Gurmesa Tura² and Aderajew, N Teklehaymanot^{2*}

¹Hadiya Zone Health Office, South Ethiopia.

²Department of Population and Family Health, College of Public Health and Medical Sciences, Jimma University, Ethiopia.

Received 22 December, 2014; Accepted 29 January, 2015

Youths are facing different sexual and reproductive health problems. Most health services for youth are designed for adults and do not always have favorable conditions to meet the special needs of youths. Also, youths have been characterized by low sexual and reproductive health service utilization. Identifying and integrating young people preferences and needs regarding health facility helps better to serve the youth. Sexual and reproductive health needs and service utilization among youths in West Badewacho Woreda, Hadiya Zone, South Ethiopia was assessed. A cross sectional study was conducted from 1st to 30th March, 2014 in West Badewacho Woreda, Hadiya Zone, South Ethiopia. A simple random sampling technique was used and total sample size was 658 youths. Data were entered into epi data 3.1 and exported to Statistical Package for the Social Sciences (SPSS) version 20. Descriptive statistics for age and family size, proportion for categorical variables, bivariate and multivariate logistic regression analysis were performed. Total of 640 subjects participated in the study and yielded 97.3% response rate. Out of total participants, 25.8% never had sex. From the total respondents, 76.3% need at least one component of sexual and reproductive health services. During multivariate analysis, sex, age, knowledge about reproductive health, participation in peer education, youth educational status and never had sex were predictors to have reproductive health service need. Out of the total participants, only 29.4% youths utilized reproductive health services in the last one year. In multivariate analysis, never had sex (AOR 3.080, 95% CI [1.918 to 4.944]), never heard about sexual and reproductive health (AOR = 2.016, 95% CI [1.308 to 3.106]) and had need to reproductive health services (AOR = 8.564, 95% [4.080 to 17.977]) were predictors to sexual and reproductive health service utilization. Youths have imprecise sexual and reproductive health knowledge. In contrast to the huge sexual and reproductive health needs, the services provided by the nearby health facility are far from addressing the needs, even if the services were available, its unfriendliness to youths resulted in less utilization of the available services.

Key words: Youths, adolescent, sexual, reproductive health, service utilization.

INTRODUCTION

Globally, there are 1.8 billion young people aged 10 to 24 years, representing 33% of the world's

population, with over 85% living in developing countries. Recent estimates (in 2013) indicate that 17.0%

of the global population, 20.0% of Sub-Saharan Africa and 20.3% of Ethiopian population are composed of youth aged 15 to 24 years in which 4/5th live in rural parts (World Health Organization, 2011).

Worldwide, the young ones are facing different sexual and reproductive health problems like unwanted pregnancy, unsafe abortion, sexual transmitted infections (STI) including the human immunodeficiency virus (HIV) and substance abuse, but people who are young are usually mistakenly perceived to be healthy and not in need of special health services (Roudi-fahimi and El Feki, 2008; Alliance A youth, 2005). In the developing world, unmarried people in the past were nearly expected to need reproductive health services. Viewing youths as a specific group with their own reproductive health service needs is a relatively recent practice (Regmi et al., 2010; Ethiopia Minister of Health, 2006). Health services for youth are not designed as needed and do not always have favorable conditions to meet the special needs of youths this is because, youths' accesses to the services are not clearly understood by themselves and service providers. Attracting the youth to the clinical services has remained a challenge and that there is need to create demand and improve health-seeking behavior of the youth (African youth alliance, 2012; Alliance/pathfinder, 2005).

Ethiopia adapted International Conference on Population and Development (ICPD) agreement and take measures that have been commenced to alleviate the problem which includes the development of the national adolescent and youth reproductive health strategy, youth policy, standards on youth friendly reproductive health (RH) services, and youth sector development plan (Chicago university, 2013). In spite of this, most of the existing services are still adult-centered, non-youth friendly, undertaken in small scale and not well organized to meet the RH service needs of this section of the population. But despite these initiatives, reproductive health service utilization among the youth still faces a lot of challenges related to the sensitive nature of youth sex and sexuality (Center Ukh development, 2011). There is no youth center and stand alone youth friendly facility at West BADEWACHO Woreda while youth reproductive health services are offered using the integrated model of service delivery in health facilities. There is limited information about such programs operation and barriers for utilization in health facilities at the study area even at county level. In Ethiopia, there is no clear evidence about youth sexual and Reproductive Health (SRH) need and as well gaps. This study aim to investigate youth's reproductive health needs, service utilization and facility service operational barriers for youth friendly services at public health facilities. This

study had also identified areas for service quality improvements aim to adjust and organize reproductive health services of public health facilities. It is also important for health planners and policy makers to design a strategy for improve youth/adolescent reproductive health center. This research is also expected to fill gaps in this area of research and add to the existing body of knowledge.

MATERIALS AND METHODS

The study was conducted from 1st to 30th March, 2014 in West Badewacho Woreda, Hadiya Zone, South Ethiopia. West Badewacho is located at 348 km from Addis Ababa to the south and 114km from Hawasa to the west and 100 km from Hosanna town. Community based cross-sectional study by employing both quantitative and qualitative techniques were conducted.

Quantitative part

A total sample size of 658 youths were used in this study, using the following assumptions $p=18.8\%$ taken from rural youth reproductive health service utilization study at North West Ethiopia, Mechakel District 2013, 95% CI, 5% marginal error and 10% non-response rate and design effect 2.

Qualitative study

Purposive sampling technique was used for qualitative study from four health centers in the Woreda and four health posts were selected randomly. Six service providers and two health centers heads were selected purposively and participated in the study from health facilities, then in-depth interview of health facility heads and service providers with facility observation was conducted by principal investigator using interview guide and observation checklists.

Sampling procedure

Multi stage sampling technique was used from 22 kebeles (administration unit) in the district, 7 kebeles were selected by simple random sampling technique then sampling frame of youth's age 15 to 24 years old was prepared from health post house hold family folder at each selected kebeles; proportional allocation to size of youths was used. After that, we selected proportional number of youths by simple random sampling technique from each selected kebeles. When more than one youth was found per household one youth was selected by a lottery method to avoid Household collinearity effect. When a youth was not found at home three consecutive visits was made before considering them as non-respondent. A questionnaire was adapted by reviewing different literatures and customized based on the study objectives and study area. After translation to amharic and hadiyssa by language expert's, face-to-face interview was conducted by trained data collectors who speak both languages and translated back to English. Ten data collectors who completed college diploma nurses and two Bsc clinical nurse supervisors were recruited and

*Corresponding author. E-mail: aderajewnu@gmail.com.

Author(s) agree that this article remain permanently open access under the terms of the [Creative Commons Attribution License 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

Table 1. Socio demographic characteristics of youths in West Badewacho Woreda, 2014.(N=640).

| Characteristics | Frequency | Percent (%) |
|----------------------------------|-----------|-------------|
| Sex | 326 | 50.9 |
| Male | | |
| Female | 314 | 49.1 |
| Current residence | | |
| Urban | 158 | 24.7 |
| Rural | 482 | 75.3 |
| Age category | | |
| mean age 19.1 (SD± 3.0) 15-19 | 382 | 59.3 |
| 20-24 | 258 | 40.7 |
| Religion | | |
| Orthodox | 113 | 17.7 |
| Protestant | 437 | 68.3 |
| Catholic | 88 | 13.8 |
| Marital status | | |
| Single | 582 | 90.8 |
| Ever married | 58 | 9.2 |
| Family size ≤5 | 249 | 38.9 |
| >5 | 391 | 61.1 |
| Living condition | | |
| With both parents | 456 | 72.3 |
| With either one parent | 135 | 21.1 |
| Others | 49 | 7.6 |
| Youth educational status | | |
| Illiterate | 41 | 6.4 |
| Primary school | 423 | 66.1 |
| Secondary school and above | 175 | 27.5 |
| Youth occupational status | | |
| House wife | 17 | 2.7 |
| Farmer | 105 | 16.5 |
| Student | 439 | 68.6 |
| Merchant | 78 | 12.2 |
| Father educational status | | |
| Illiterate | 234 | 36.6 |
| Primary school | 349 | 54.5 |
| Secondary school and above | 57 | 8.9 |
| Mother educational status | | |
| Illiterate | 344 | 53.8 |
| Primary school | 280 | 43.7 |
| Secondary school and above | 16 | 3.5 |

underwent one day training. The questionnaire was Pre tested on 33 youths in Jarso Mazoria kebele before data collection to check consistency and corrections were taken. Anonymity was kept during data collection. Interviews were conducted in a private place and confidentiality was kept and respondents were assured that the information will not be accessible to others. After completing each interview, data collectors checked for completeness of questionnaire. Data was checked for completeness, consistency and entered to EPI data 3.1 then exported to SPSS version 20 for analysis. Descriptive statistics for age, family size and age at first sex, proportion for categorical variables, bivariate and multivariate logistic regressions with 95%CI analysis were performed. Candidate variables with P-value less than 0.25 in the bivariate analysis were included in the multivariate logistic regression analysis to develop model. Then variables P-value of less than 0.05 in multivariate analysis were taken as significance and included in the final model. Results were organized using tables, charts and statement. Qualitative data was analysed thematically in narrative way and triangulated with quantitative findings.

Ethical consideration

In order to maintain confidentiality, the sitting arrangement of the participants was considered: all the selected youths were called and made to sit in prior arranged rooms. Each youth took a single seat with sparse arrangement of chairs and desks. No names or identifiers were included on the questionnaire. For the qualitative part, we obtained verbal consent from the participants. Then the data collectors made the interview by using semi-structured interview guide. The interview was entirely tape recorded and field notes were taken.

RESULTS

Socio demographic characteristics

Out of the total participants, 165 (25.8%) never had sex and among those, 134 (81.2%) have had sexual intercourse in the last 12 months. The mean age to start sexual intercourse was 16.9 (SD ± 2.8). Major reasons for sexual debut were personal desire 63 (38.2%), peer pressure 53 (32.1%), marriage 38 (23%) and others (6.7%). The study shows that 74 (55.2%) of the sexually active youths had more than one sexual partner in the past one year (Tables 1 and 2).

Knowledge on sexually transmitted infections

From all respondents 335 (52.3%) heard about sexually transmitted infections. The most common types of STI mentioned to be known were gonorrhoea 282 (44.1%), syphilis 212 (33.1%), chancroids 106 (16.6%) and Lymphogranuloma venereum (LGV) 61(9.5%). Common STI symptoms mentioned by youths were burning during urination 213 (33.1%), genital ulcers 140 (21.9%) and genital discharge 168 (26.3%). Out of sexually active participants 28 (20.8%) had experienced either one of STI symptom. But from these, only 11 (39.2%) sought medical treatment. Some youths had misconceptions on

Table 2. Source of SRH information for youths of West Badewacho Woreda, Hadiya Zone, (N=640).

| Source of information | Percent (%) |
|--------------------------|-------------|
| Health extension workers | 29.2 |
| Radio | 16.0 |
| Television | 8.5 |
| School | 15.2 |
| Health professionals | 14.3 |
| Peers | 13.7 |
| Family | 3.2 |
| Total | 100.0 |

Table 3. Attitude of youths towards nearby health facility SRH services West Badewacho Woreda, Hadiya Zone, (N=640).

| Statements | Level of agreement | | | |
|---|--------------------|-------------|-------------|-------------------|
| | Strongly agree | Agree | Disagree | Strongly disagree |
| Youths do not need sexual and reproductive health information | 161 (25.2%) | 33 (5.2%) | 47 (7.3%) | 399 (62.3%) |
| Education to youths about SRH Leads to high-risk sexual behaviors | 130 (20.3%) | 67 (10.5%) | 93 (14.5%) | 350 (46.8%) |
| Youths should know how to use contraceptive | 407 (63.6%) | 61 (9.5%) | 30 (4.6%) | 141 (22.0%) |
| Unmarried women can use contraceptive | 155 (24.2%) | 74 (11.6%) | 154 (24.1%) | 257 (40.2%) |
| Providing YRHS in health post is comfortable to youths | 265 (41.4%) | 160 (25.0%) | 106 (16.6%) | 109 (17.0%) |

the mode of transmission of STIs. More than half of the respondents 382 (59.7%) said STIs are transmitted through unprotected sex and 40.3% had misconception like urinating on a hot stone 110 (17.2%), urinating when moon rise (11.9) and sitting on hot stone 71 (11.1%)

Knowledge on fertility and family planning

The fertility awareness of youths was assessed by asking the period that a woman can get pregnant if she has unprotected sex. Out of these, 91 (40.4%) males and 134 (59.6%) were females. The most frequently mentioned family planning methods were pills 415 (64.8%), injectables 305 (47.7%) and condoms 260 (40.6%). The most common utilized contraceptives were condom (52.5%), pills (31.1%), injectable (26.2%), implanon (9.8%), intrauterine contraceptive device (IUCD) (6.5%) and others (4.9%).

Knowledge on HIV/AIDS

Some youths had misconception about HIV/AIDS transmission. Three hundred and forty (53.1 %) respondents had misconceptions on the mode of

transmission of HIV such as, body contact, mosquito bite and sharing of meal with an HIV infected person. The most commonly mentioned HIV/AIDS prevention methods include, sexual abstinence 415 (64.8%), having one uninfected faithful partner 458 (71.6%), using condoms correctly and consistently 407 (63.6%) and avoiding sharing of sharp materials 206 (32.2%).

Attitude of youths towards nearby Health facility SRH services

As indicated below in Table 3, most youths 446 (69.6%) had favorable attitude towards reproductive health information to youths. More than half (66.4%) agreed with the idea of availing reproductive health services in health post is comfortable to youths. Although the proportion of youths that agreed on the need for youths to know contraception usage was high 468 (73.1%), the proportion of youths counteracting the idea of unmarried women who have sexual practice to use contraceptive was also high 411(64.3%) (Table 3).

STI/HIV/AIDS risk perception of youths

Of the 640 respondents, 256 (40.0%) stated that their

Percent (%)

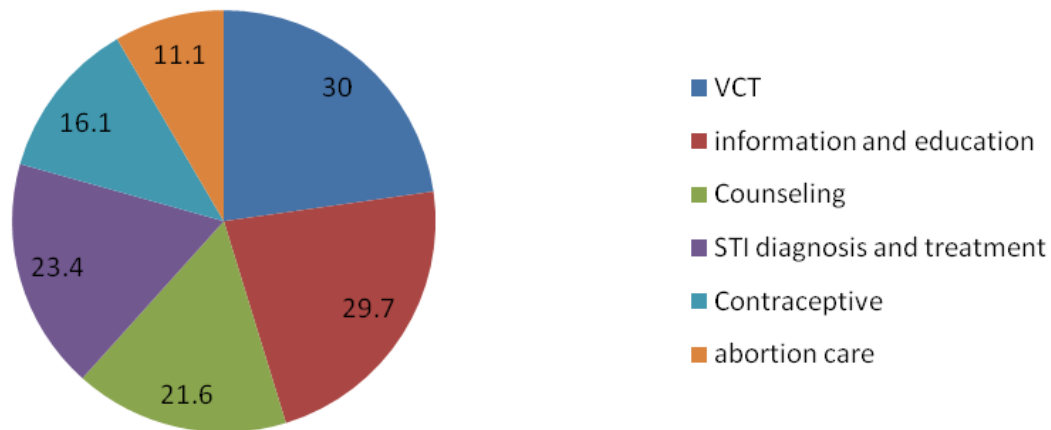


Figure 1. Unmet needs of SRH services among youths in West Badewacho Woreda (2014).

level of risk to acquiring STI/HIV/AIDS was low while 141 (22.0%) perceived that their level of risk was high as illustrated in the pie chart. The major reasons for low or no risk perception by the respondents was abstinence or sexual inactivity, having a single sexual partner while few alluded it to the use of condoms during sex. Those that felt to be at a higher risk reasoned multiple sexual partnerships, inconsistent condom use and no condom use at all as the reasons for their higher STI/HIV infection risk.

Unmet needs of SRH services among youths

In response to questions regarding sexual and reproductive health service provision modalities; the youth stated that they would prefer a room within the health center that is separate from other services (33.0%) followed by in health post (25.8%) and out of health facility within their own center (22.3%) Figure 1. During bivariate analysis educational status, age, knowledge about SRH, participation in peer education, ever had sex, and know nearby health facility provide SRH service were associated with sexual and reproductive health service need among youths. After controlling for potential confounding variables through logistic regression sex, educational status, age, knowledge about SRH, participation in peer education, and know nearby health facility provide SRH service are predictors to have need to SRH services.

Female youths (all of them didn't have any experience of having child) were about 69% (AOR = 1.693 CI: [1.081 to 2.535]) they were more likely to have need for SRH service than the males. The odds of having need to SRH

services was about 1.6 times (AOR = 1.6, 95%CI [1.126 to 2.473]) higher for secondary school and above educated youths than primary school educational status youths. Youths aged 20 to 24 years were 80% (AOR = 1.8, 95%CI [1.158-2.763]) more likely to have a need for SRH services than those 15 to 19 years old. Participants' have had good knowledge (above mean knowledgeable and below mean didn't know) about sexual and reproductive health service need was 60% (AOR= 1.6, 95%CI [1.028-2.062]) higher than those who had poor knowledge. The odds of having need for SRH services was 2 times (AOR=2.0, 95%CI [1.194 to 3.377]) higher for youths who participated in peer-to-peer SRH education than those who did not participate. The odds of needing sexual and reproductive health services among youths who knew about the availability of a health facility providing sexual and reproductive health service was 2 times (AOR=1.94, 95%CI [1.163 to 3.245]) higher than those who did not about the availability (Table 4).

From qualitative study according to the informants, both health centers and catchment health posts provide reproductive health services to youths. The range of services provided by both health centers were voluntary counselling and testing (VCT), family planning, counseling, STI diagnosis and treatment and abortion. The health posts provide family planning and information, education and communication about reproductive health. Based on their experience, most key informant participants mentioned that most youths would like to get to a health facility for contraception, condom and abortion services. The service provider said:

"Some youths ask contraceptive, condom and we give them. When we place condom out of Health post room no

Table 4. Bivariate and multivariate logistic regression analysis of factors associated with having need to reproductive health services among youth, West Badewacho Woreda.

| Characteristics | Had need to SRH service | | | Crude OR (95%CI) with p-value | AOR (95% C.I) with p-Value |
|-------------------------------------|-------------------------|-----|-------|----------------------------------|-------------------------------|
| | Yes | No | Total | | |
| Sex | | | | | |
| Male | 239 | 87 | 326 | 1 | 1.7 (1.081-2.535)* |
| Female | 249 | 65 | 314 | 1.39 (0.966-2.013) | - |
| Total | 488 | 152 | 640 | - | - |
| Educational status | | | | | |
| Primary school | 93 | 233 | 314 | 1 | 1.6 (1.126-2.473)* |
| Secondary school | 95 | 219 | 326 | 1.59 (1.103-2.303)* | - |
| Total | 188 | 452 | 640 | - | - |
| Peer education participation | | | | | |
| Yes | 143 | 25 | 168 | 2.1 (1.315-3.373)** | 2.0 (1.194-3.377)** |
| No | 345 | 127 | 472 | 1 | - |
| Total | 488 | 152 | 640 | - | - |
| Age | | | | | |
| 15-19 | 274 | 111 | 385 | 1 | - |
| 20-24 | 211 | 44 | 255 | 1.88 (1.2702.801)** | 1.8 (1.158-2.763)** |
| Total | 484 | 155 | 640 | - | - |
| SRH knowledge score | | | | | |
| Poor knowledge | 228 | 95 | 323 | 1 | 1.6 (1.028-2.062)* |
| Good knowledge | 256 | 61 | 317 | 1.64 (1.13-2.375)** | - |
| Total | 484 | 150 | 634 | - | - |
| Ever had sex | | | | | |
| yes | 138 | 27 | 165 | 1.8 (1.155-2.901)** | 1.4 (0.843-2.363) |
| No | 350 | 125 | 475 | 1 | - |
| Total | 488 | 152 | 640 | - | - |
| Know nearby health facility | | | | | |
| Yes | 208 | 46 | 254 | 2.48 (1.552-3.994)** | - |
| Provide SRH service No | 280 | 106 | 386 | - | 1.94 (1.163-3.245)* |
| Total | 488 | 152 | 640 | 1 | - |

1=Reference category *p<0.05 , **p<=0.01, ***p<=0.001.

condom when we back from lunch. This shows even if they fear many youths have needed to utilize SRH services”.

Most key informants mentioned youth reproductive health services are given together with other services in adult outpatient department (OPD) and delivery case team in both health centers. The waiting area was together with adult patients/clients. All of the informants agreed on the non comfortable of waiting area and service provision room to youths.

“From my experience when youths came to health center they do not know where the service is given and fear to tell what they want to get. Most of them came and stand on the corner of health center don't ask any thing. But when I ask their need they tell me if they want VCT I provide the service and take them to delivery case team for other SRH services. They never sit and wait services at waiting area with adult clients/patients” service provider key informant.

According to service providers for the issue of service

utilization, the service unit aim to provide reproductive health services which are not comfortable to youths with the possibility of hearing others conversations and sometimes there is interruption while delivering services. Since a single provider is expected to deliver family planning (FP), VCT and other sexual and reproductive health services at same time, use of separate rooms for different services were difficult. According to key informants, most sexual and reproductive health services were free to youths except sexually transmitted infection case treatment and HCG pregnancy test that are provided with fee.

Concerning approach of service provider who visited the service said that, 144 (66.4%) youths were comfortable and welcoming while 73 (33.6%) youths were not comfortable and welcoming. On the other hand, the proportion of youths that were satisfied with the service they got from the nearby health facility were 140 (64.5%). All Key informants mentioned that generally, FP provision, abortion cares and prevention of mother-to-child transmission of HIV (PMTCT) training were provided to service providers but no specific training on youth reproductive health service.

The observation finding shows that in all studied health facilities, no signs announcing the presence of RH services together with the list of services and working hours at the gate. The waiting area was in front of the card room on the corridor of adult OPD and delivery room. The service unit at the adult OPD had not been screened to examination bed and it was easy to hear client conversation from outside. From training inventory review, no staff was trained about counseling, STI diagnosis and treatment, youth sexual and reproductive health services. Even if not specific to youths, there were posters about family planning, HIV/AIDS and antenatal clinic (ANC).

The bivariate analysis showed that utilization of the nearby health facility for sexual and reproductive health services is positively associated with being female (COR 1.61, 95%CI 1.144 to 2.272), married (COR 2.56, 95%CI 1.492 to 4.441), had need to SRH services (COR 9.2, 95%CI 4.579 to 18.503), ever had sex (COR 4.1, 95% CI 2.827 to 6.002), participation in peer education (COR 2.38, 95% CI 1.647 to 3.455), Know nearby health facility provide SRH service (COR 1.52, 95%CI 1.044 to 2.212), age 20 to 24years old (COR 1.44, 95%CI 1.024 to 2.048) and high risk perception to STI/HIV/AIDS (COR 1.93, 95%CI 1.248 to 3.004). Results of multivariate analysis dedicated that have need to sexual and reproductive health services, ever had sex and ever heard about SRH are the main predictors of sexual and reproductive health service utilization. The odds of sexual and reproductive health service utilization was 8 times (AOR= 8.56, 95% [4.080 to 17.977]) higher for youths who had need to SRH services than those who did not need the services. Reproductive health service utilization among youths who heard about SRH was 2 times (AOR = 2.02, 95% CI

(1.308 to 3.106)] higher than never heard about it. The odds of reproductive health service utilization to ever had sex youths was 3 times (AOR 3.08, 95%CI [1.918 to 4.944]) higher than abstainers (Table 5).

DISCUSSION

Youths in West Badewacho Woreda have huge sexual and reproductive health need while the services available are far from addressing these needs. Moreover, the study gives an insight into the gap in youths knowledge on sexual and reproductive health and their poor service utilization despite the fact that there are risky sexual practices among youths.

More than half of the respondents heard about sexual and reproductive health. This is lesser than the study conducted in Addis Ababa University students (Regmi et al., 2010). This discrepancy explained is due to less information sources and weak peer education programs in the study area. The major sources of information were health extension workers followed by radio and television. This is consistent with the previous studies of Mechekel and Gondar (Ethiopia Minister of Health, 2006; African youth alliance 2012). More than half of the respondents had experienced either one of STI symptom. This is higher than the study conducted in Nigeria (Alliance/pathfinder 2005). The difference may be that, consistent condom utilization is low and misconception about mode of transmission is high in the study area.

More than half of the respondents did not know fertile time in a woman's menstrual cycle. When we see the proportion of females and male, it is better than the findings of the recent Ethiopian demographic health survey of women and men of all ages in the community knowing the unsafe period of a woman (Roudi-fahimi and El Feki 2008; Regmi et al., 2010). Still the observed proportion is not adequate to say youths are knowledgeable on this issue. This study dedicated that out of sexually active youths in the last one year use contraceptive. This is comparable with the study conducted in Chicago university (Chicago university, 2013). The major services needed by youths were VCT, information and education, counseling, contraceptive, abortion car and condom distribution. This study finding is lower than the studies done in Addis Ababa University (Center Ukh development, 2011). The possible reason for the discrepancy is lack of information and low awareness about sexual and reproductive health in the study area. The current study indicates that around 30% youths visited health facilities for sexual and reproductive health services in the past one year. This result is higher than previous studies done in Nepal among youth (Chicago university, 2013). This may be due to difference in infrastructure and socio cultural background in two countries. The most frequent visited health facilities were health center followed by health post and private clinic for

Table 5. Bivariate and multivariate logistic regression analysis of factors associated with utilization of reproductive health services among youth in West Badewacho Woreda.

| Characteristics | Utilized SRH service | | | Crude OR (95%CI) | AOR (95% C.I) |
|-----------------------------------|----------------------|-----|-------|-----------------------|------------------------|
| | Yes | No | Total | | |
| Sex | | | | | |
| Male | 80 | 246 | 326 | 1 | 0.743 (0.484-1.143) |
| Female | 108 | 206 | 314 | 1.61 (1.144-2.27)** | - |
| Total | 188 | 452 | 640 | - | - |
| Marital status | | | | | |
| Single | 159 | 422 | 581 | 1 | 0.794 (0.386-1.633) |
| Ever married | 29 | 30 | 59 | 2.56 (1.492-4.441)** | - |
| Total | 188 | 452 | 640 | - | - |
| Had need to SRH service | | | | | |
| Yes | 179 | 309 | 488 | 2.38[1.647-3.455]*** | - |
| No | 9 | 143 | 152 | 1 | 8.564[4.080-17.977]** |
| Total | 188 | 452 | 640 | - | - |
| Ever had sex | | | | | |
| Yes | 87 | 78 | 165 | 4.1 (2.827-6.002)*** | 3.080 (1.918-4.944)*** |
| No | 101 | 373 | 475 | 1 | - |
| Total | 188 | 452 | 640 | - | - |
| Ever heard about SRH | | | | | |
| Yes | 133 | 210 | 343 | 0.36 (0.250-0.519)*** | 2.016 (1.308-3.106)** |
| No | 55 | 242 | 296 | 1 | - |
| Total | 188 | 452 | 640 | - | - |
| Had peer to peer education | | | | | |
| Yes | 73 | 95 | 168 | 2.38 (1.647-3.455)*** | - |
| No | 115 | 357 | 472 | 1 | 1.403 (0.886-2.220) |
| Total | 188 | 452 | 640 | - | - |
| Know nearby health | | | | | |
| Yes | 95 | 159 | 254 | 1.52 (1.044-2.212)* | - |
| Provide SRH service No | 70 | 178 | 248 | 1 | 1.403 (0.886-2.220) |
| Total | 188 | 452 | 640 | - | - |
| Age | | | | | |
| 15-19 | 102 | 283 | 385 | 1 | 0.95 (0.621-1.460) |
| 20-24 | 87 | 168 | 255 | 1.44 (1.024-2.048)* | - |
| Total | 189 | 451 | 640 | - | - |
| Family size | | | | | |
| <5 | 90 | 159 | 249 | 1 | 1.483 (0.981-2.242) |
| >=5 | 98 | 293 | 391 | 0.59 (0.418-0.834)** | - |
| Total | 188 | 452 | 640 | - | - |
| Risk perception to STI/HIV | | | | | |
| High | 56 | 85 | 141 | 1.93 (1.248-3.004)** | - |
| Low/no | 132 | 467 | 499 | 1 | 1.09 (0.630-1.907) |
| Total | 188 | 452 | 640 | - | - |

¹Reference category, *p<0.05 , **p<=0.01 *** p<=0.001.

sexual and reproductive health services which is consistent with the study conducted in Gondar and Mechekele (USAID, 2007; Mengistu and Melku, 2013).

With the approach of service provider, more than half of the youths who visited the service said they were comfortable and felt they were welcomed. This study result is lower than that of previous studies in India and Botswana (Center Ukh development, 2011; Mengistu and Melku, 2013). The possible explanation for the discrepancy may be service providers at the study area were not trained about counseling and youth friendly services. This is supported by qualitative findings. The major reasons for not welcoming were that service provider see and fear when they get to meet new person's and the case of not having money, this is comparable with previous studies conducted in Dessie mechekele and kenya (Mengistu and Melku, 2013; Guttmacher Institute, International Planned Parenthood Federation, 2010; Okereke, 2011).

Concerning accessibility of health facility to utilize sexual and reproductive health services, only 10.5% youths take more than two hours to reach the nearby health facility on foot from their home. This is less than the study conducted in Guttmacher Institute, International Planned Parenthood Federation (Guttmacher Institute, International Planned Parenthood Federation, 2010). This discrepancy may be difference in health care system and infrastructure of the two countries. Consistent with different studies in the current study, old youths were more likely to utilize sexual and reproductive health services than young youths Nepal and Kenya (Okereke, 2011). A substantial number of studies identified that youths with secondary education and above were more likely to utilize sexual and reproductive health service than primary. This study also supported the above claim. Female youths were more likely to utilize sexual and reproductive health services as compared to male youths kenya (Okereke, 2011). This finding is different from that of a study conducted in mechekele and rural Ethiopia (Molla et al., 2009) and Nigeria. A possible explanation can be that most participants in peer education were females that can lead to open discussion and increase awareness.

CONCLUSION

Consistent with other study, youths who participated in peer to peer education were more likely to utilize sexual and reproductive health services than not participated ones Rural Ethiopia (ICOMP, 2009; Molla et al., 2009). This can be justified by the fact that discussion of services with peer categories allows youths to create more opportunities to exchange information and experiences to get awareness about services. Consistent with other studies, youths with high risk perception to acquire STI/HIV/AIDS were more likely to utilize sexual

and reproductive health services than those who had low risk perception Gondar (Okereke, 2011). Unlike other studies, knowledge about sexual and reproductive health (Mengistu and Melku, 2013; Okereke, 2011; Molla et al., 2009) and residence are not associated with sexual and reproductive health service utilization. The possible explanation is that the current study conducted in rural district where the towns are small do not have significant difference in many aspects with that of the nearby rural kebeles.

Conflicts of interest

The authors declare that they have no conflicts of interest.

REFERENCES

- African youth alliance (2012). Reproductive Health White Paper World. Youth Alliance pp. 1–15.
- Alliance A youth (2005). Research Utilization Developing and Scaling Up a Counseling Tool to Promote Integrated Services for Youth pp. 18-38.
- Alliance/pathfinder (2005). Integrating Youth-Friendly Sexual and Reproductive Health Services in Public Health Facilities. A Success Story and Lessons Learned in Tanzania pp. 1–17.
- Center Ukh development (2011). Helpdesk Report: Adolescent Reproductive Health in Ethiopia pp. 1–21.
- Chicago university (2013). Policy Brief School-based Health Centers: Implications for Adolescent Reproductive Health pp. 1–8.
- Ethiopia Minister of Health (2006). National Adolescent and Youth Reproductive Health Strategy pp. 4–68.
- Guttmacher Institute, International Planned Parenthood Federation (2010). Facts on the sexual and reproductive health of adolescent women in the developing world. Available at: <http://www.guttmacher.org/pubs/FB-Adolescents-SRH.pdf>
- ICOMP (2009). Linked Response to Reproductive Health and HIV / AIDS. Available at: http://www.icomp.org.my/pub/youth_friendly_linked_response.pdf
- Mengistu TS, Melku AT (2013). Sexual and reproductive health problems and service needs of university students in south east Ethiopia a Exploratory qualitative study. *Sci. J. Public Health* 1(4):184-8.
- Molla M, Emmelin M, Berhane Y, Lindtjørn B (2009). Readiness of youth in rural Ethiopia to seek health services for sexually transmitted infections. *Afr. J. AIDS Res.* 8(2):135-46.
- Okereke CI (2011). Unmet Reproductive Health Needs and Health-Seeking Behaviour of Adolescents in Owerri Nigeria. *Afr. J. Reprod. Health* 14(1):43–54.
- Regmi PR, Teijlingen E Van, Simkhada P, Acharya DR (2010). Barriers to Sexual Health Services for Young People in Nepal. *J Health Popul Nutr.* 28(6):619–627.
- Roudi-fahimi F, El Feki S (2008). Facts of life Youth Sexuality and Reproductive Health in Middle East North Africa. Available at: <http://www.prb.org/pdf11/facts-of-life-youth-in-middle-east.pdf>
- USAID (2007). Integrating Family Planning and HIV / AIDS Services for Young People: Tools for Programming. Available at: <https://www.k4health.org/toolkits/info-publications/integrating-family-planning-and-hiv-aids-services-young-people-tools>
- World Health Organization (2011). Young People Today . Time to Act now. Available at: <http://unesdoc.unesco.org/images/0022/002234/223447E.pdf>



Journal of Public Health and Epidemiology

Related Journals Published by Academic Journals

Journal of Diabetes and Endocrinology

Journal of Medical Genetics and Genomics

Journal of Medical Laboratory and Diagnosis

Journal of Physiology and Pathophysiology

Medical Practice and Reviews

Research in Pharmaceutical Biotechnology

academicJournals