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Pak J Public Health is the official journal published by the Health Services Academy, Government of Pakistan. The Academy aspires to become a regional academic centre of excellence in public health training, policy advice and health systems research that is nationally and internationally accredited. The mission of the Academy is to improve the health of the population of Pakistan and its surrounding region by enhancing human resource development and contribution to evidence-based policies and practices.

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Pakistan Journal Of Public Health

Instruction to Authors

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Scope of the Journal

The Pak J Public Health accepts articles from both national and international contributors with a special emphasis on research that will have a direct impact on the practice of public health in Pakistan and around the world.

The types of articles accepted include original articles, review articles and short communications. Special features will include opinion pieces, letters to the editor, education forum and students corner.

Editorial Process

The Pak J Public Health will only publish articles that have not appeared anywhere else. The review process will entail an initial review for short listing articles on the basis of relevance to public health issues, meeting minimum technical/scientific standards, having a significant public health message.

Articles passing the initial short listing process will be subjected to a double blind review by at least 2 reviewers of renowned status in public health field, nationally and internationally. They will assess the articles on the basis of objectives, methodology, scientific rigor and conclusions drawn. Any queries generated during this process will be forwarded to the author/s for correction or revision by the journal editor/s.

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Authorship Criteria

Authorship of the articles can be claimed by those researchers who have made a major contribution in the study. Acceptable contribution would include, design & concept of study, data gathering, interpretation & analysis, article writing, proofing and/or corrections.

Authors would also be expected to declare any possible conflicts of interest as well as the degree of contribution to the above mentioned criteria by each of the authors of the study.

The sequence of authors once submitted will not be changed without the express consent of all authors. Furthermore, the number of authors for each study should reflect the scope of work. National level, multi site studies or those having multiple collaborating partners could have more authors than ones dealing with limited scope.

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This section would require info on any registering bodies for current RCTs/clinical trials.

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The manuscripts should be prepared in accordance with the ICJME guidelines for manuscript submission. Before submitting a manuscript, contributors are requested to check for the latest instructions available. http://www.icmje.org/urm_full.pdf

Articles will have to be formatted to fit Pak J Public Health criteria as follows:

1. Original research

Abstract

Abstracts of original research article should be prepared with a structured format i.e. Introduction/background, objectives, methods, results and discussion/conclusion. Authors must include 4-6 key words. Review article, Case report and other require a short, unstructured abstract. Commentaries do not require abstract. Abstract should not exceed the word limit of 300 words for original articles and the total word count not more than 3000 words, excluding the abstract and references.

Introduction

This section should include the purpose of the article. The rationale for the study or observation should be summarized; only strictly pertinent references should be cited; the subject should not be extensively reviewed. Data or conclusions from the work being reported should not be presented.

Methods

This section must include the type of study, study population, study area, study duration, details of developing tools for data collection, pre-testing, data collection, plan of analysis, ethical considerations and any other detail deemed necessary to be submitted to support the researchers' work. References to established methods should be given, including statistical methods; references and brief descriptions for methods that have been published but are not well known should be provided; new or substantially modified methods should be described, giving reasons for using them, and evaluating their

limitations.

Results

These should be presented in a logical sequence in the text, tables, and illustrations. All the data in the tables or illustrations should not be repeated in the text; only important observations should be emphasized or summarized.

Tables and figures

Tables and figures should be kept to a minimum. Tables must be comprehensible without reference to the text. References should not be cited in the tables. Authors should indicate at approximately what point in the text the table should appear. Figures, graphs, drawings etc. should not be over complex and must be intelligible when reduced in size for printing. They should be on separate sheets, numbered and with legends.

Number tables consecutively in accordance with their appearance in the text. Place footnotes to tables below the table body and indicate them with superscript lowercase letters. Avoid vertical rules. Be sparing in the use of tables and ensure that the data presented in tables do not duplicate results described elsewhere in the article.

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The author's comment on the results, supported with contemporary references, including arguments and analysis of identical work done by other workers. A summary is not required.

2. Review

A comprehensive, evidence-based review of the literature relating to an important, major public health area, with a critical analysis and conclusions. The literature review methodology, including databases searched, search terms and dates, should be detailed. Reviews should normally not exceed 4000 words and should include up to three key message points.

Reviews can be submitted on

- Public health practice and impact
- Health service effectiveness, management and re-design
- Health protection including control of communicable diseases
- Health promotion and disease prevention
- Critique on public health programs or interventions
- Public health governance, audit and quality
- Public health law
- Public health policies and comparisons
- Capacity in public health systems and workforce
- Social determinants of health

This is not an exhaustive list and the Editors will consider articles on any issue relating to public health.

3. Short Reports /commentaries

Manuscripts for publication as Short Reports should be of an overall maximum length of 2000 words, including summary and references. This is equivalent to approximately four printed pages of the Journal. If Tables and/or Figures are included (maximum of one page), the text should be limited to 1500 words. The report should have a short summary, followed by a single text section that is not divided into introduction, results and discussion sections etc. (as in full papers). These should be submitted to the Journal in the same way as full papers (see Submissions).

4. Letter To The Editor

Letters to the editor and replies should offer objective and constructive criticism of published articles. Letters may also discuss matters of general interest to readers of Pak J Public Health and the public health community. Material being submitted or published elsewhere should not be duplicated in letters, and authors must disclose financial associations or other possible conflicts of interest. Letters should not be of more than 500 words and 5 references.

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2. Organization as author: The Cardiac Society of Australia and New Zealand. Clinical exercise stress testing. Safety and performance guidelines. Med J Aust 1996; 164: 282-4.
3. No author given: Cancer in South Africa [editorial]. S Afr Med J 1994;84:15.
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5. Volume with supplement: Shen HM, Zhang QF. Risk assessment of nickel carcinogenicity and occupational lung cancer. Environ Health Perspect 1994;102 Suppl 1:275-82.
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14. Conference proceedings: Kimura J, Shibasaki H, editors. Recent advances in clinical neurophysiology. Proceedings of the 10th International Congress of EMG and Clinical Neurophysiology; 1995 Oct 15-19; Kyoto, Japan. Amsterdam: Elsevier; 1996.
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16. Scientific or technical report Issued by funding/sponsoring agency: Smith P, Golladay K. Payment for durable medical equipment billed during skilled nursing facility stays. Final report. Dallas (TX): Dept. of Health and Human Services (US), Office of Evaluation and Inspections; 1994 Oct. Report No.: HHSIGOEI69200860. Issued by performing agency: Field MJ, Tranquada RE, Feasley JC, editors. Health services research: work force and educational issues. Washington: National Academy Press; 1995. Contract No.: AHCPR282942008. Sponsored by the Agency for Health Care Policy and Research.
17. Dissertation: Kaplan SJ. Post-hospital home health care: the elderly's access and utilization [dissertation]. St. Louis (MO): Washington Univ.; 1995.

Electronic Material

18. Journal article in electronic format: Morse SS. Factors in the emergence of infectious diseases. Emerg Infect Dis [serial online] 1995 Jan-Mar [cited 1996 Jun 5];1(1):[24 screens]. Available from: URL: http://www.cdc.gov/ncidod/EID/eid.htm

19. Monograph in electronic format: CDI, clinical dermatology illustrated [monograph on CD-ROM]. Reeves JRT, Maibach H. CMEA Multimedia Group, producers. 2nd ed. Version 2.0. San Diego: CMEA; 1995.
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Submission of the article

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Pak J Public Health Vol. 3, No. 1, 2013

Letter from the Executive Editor

Welcome to a special issue of the Pakistan Journal of Public health. The theme which has been selected for this March issue is “Climate change, environment, women's health & MDGs”. Publishing this issue was a joint decision of the Health Services Academy the prime institution of public health in Pakistan and Lead Pakistan an NGO working for climate change, water issues, environment conservation, and most importantly on women health affected by all such changes in the nature's milieu.

It is now far and wide established that an escalating frequency and intensity of weather conditions such as scorching heat and freezing cold waves, heavy or too little precipitation, blustery winds and horrendous cyclones are some of the indications of the global climate change. All these result into serious sequels, leaving grave implications for human health. Floods and storms in Pakistan have yielded a considerable toll of death and injuries. More so, the diarrheal and skin diseases emerged as a nightmare because of a serious dearth of clean water for drinking, washing and for cleaning the food items. These natural catastrophes are responsible for a score of stern psychological tribulations, affecting the population. Most vulnerable have been the women and children, in this case. Unspeakable mental health issues including depression have been observed in the aftermath of these disasters. The vector borne diseases have created havoc in certain areas and in certain sub groups of population among whom again women & children belonging to the ultra poor stratum of the society got affected the most. Malaria and dengue fever, for instance, showed a marked increase in the incidence, owing to a soaring temperature and unprecedented rainfalls in Pakistan.

It is therefore imperative to only take measures for combating against these climate and environmental changes and degradation, but also at the same time assess the fragile health status and the state of vulnerability of poor communities in areas most likely to be affected by the adverse impact of climate change. Public health professionals need to be informed and trained in safeguarding the vulnerable from the perils of climate changes. It would also be desirable to ensure that during the natural catastrophes, vaccines, medicines and clean drinking water are available and accessible to the general public so as to reduce their pain and suffering. Last but not the least, it is quite evident that preventive measures and to keep the harm minimal, there would be a need to improve and widen the disease outbreak monitoring, forecasting and surveillance systems to counteract possible climate change health impacts and support prior planning for effective interventions, aimed to safeguard the endangered segments of the population especially the women and children. These are some crucial steps to be ensured in the remaining 1000 days to MDGs where poverty, environment and women & children health indicators are calling for a pressing action.

We hope that this issue is going to give our readers a deep insight to the issues around the theme and will prove to be a useful repository of some specially selected articles.

Dr Babar Tasneem Shaikh
March 2013.

Pak J Public Health Vol. 3, No. 1, 2013

Letter from Guest Editor

Ali Tauqeer Sheikh
Chief Executive Officer, Leadership for Environment and Development, Pakistan (Correspondence to Sheikh AT: atsheikh@lead.org.pk)

It gives me great pleasure to introduce this special issue on ***Health, Environment, Climate Change and Post-MDGs*** of the Pakistan Journal of Public Health. This is the result of collaboration between the Health Services Academy, the prime institution of public health in Pakistan and Leadership for Environment and Development (LEAD) Pakistan, known for its Leadership Development Program, a mechanism through which it has been trying to address challenges in a number of thematic areas, especially in climate change and health, the most germane to this issue. This venture would not have been possible without the encouragement and financial support from the David & Lucile Packard Foundation who are committed in investing and improving health, particularly reproductive health in Pakistan.

This special issue of the Journal is being published under the "Our World"- Women Leadership in Reproductive Health & Development (WLRHD) - a project of LEAD Pakistan in collaboration with the David & Lucile Packard Foundation. The aim of the project is to create and sensitize a cross-sectoral network of leaders of renown and influence, whose influence could be used in public policy engagement to mainstream reproductive health issues in social development sector. But this aim to influence the policy is informed by research and critical feedback from experts working in the field under relevant themes. Two of the areas of thematic focus of the project are on the Millennium Development Goals and Health; and Population, Health & Climate Change; hence this special issue which explores possible linkages underlined in these themes through rigorous techniques of scientific research.

With a population of over 180 million people in Pakistan, where the state health is fraught with overburdened systems, inadequate health polices and poor healthcare financing; climate change has exacerbated the situation. It is a threat multiplier putting tremendous stress on an already dilapidated infrastructure of health, especially in the areas of reproductive/mother and child care. There is a need to prioritize health issues in official decision making. Initiatives to do so must include better data collection – if not basic research - and M&E capacity for more informed decision making. In addition it also requires a policy shift insofar as health and climate change policies have become interlinked. This special issue brings forth some of these relationships through scientific analysis, which, though tentative in some cases, are still compelling enough to invoke the precautionary principle for factoring them into evidence based policy making.

It also calls for public health professionals to be informed and trained in safeguarding the vulnerable from the perils of climate change like changes in temperature and humidity and the increased frequency of extreme events ranging from floods and storms to droughts and desertification. Disease surveillance, forecasting, monitoring, data analysis and proper planning is needed for effective interventions to protect and safeguard population from the ill effects of such climate induced changes.

With regard to MDGs, unfortunately, Pakistan is not on track to achieve most of the health related MDGs. Although some progress has been witnessed improving health outcomes, the momentum is not very encouraging, especially for the poor who are being left behind. Lack of synchronized efforts in sector wide approaches, inter-sectoral collaboration, and moreover, the unmet need for family planning, unsafe abortions, low literacy rates and lack of women empowerment are the main reasons behind poor RH status of Pakistan. Therefore it is time for a paradigm shift from the old model of population control to a new paradigm of a human rights based approach that needs to be included in the management systems and service delivery models. Similarly, while the Millennium Development Goals (MDGs) have been the first instance wherein the global community as a whole set itself targets in health, education, gender equity, environment and poverty reduction; the overarching framework for these targets had been missing. The global community has to think beyond the MDGs for a new set of goals that are situated in the broader context of sustainable development. In this issue we have tried to induce the researchers to look beyond the MDGs for appropriate indicators of health, especially those related to RH, mother and child care.

In the end, I would like to acknowledge the work of the editorial team and thank the contributors and reviewers for their support in making this endeavor successful. We hope that this issue is going to give our readers a deeper insight to the issues around the themes and their linkages; and will inspire young researchers and academics to further explore issues of climate change and health as well as to think about the possible scenarios and health

indicators beyond MDGs; to bring forth qualitative and quantitative evidence that lays the foundation for credible evidence based policies. We also hope that it will prove to be a useful repository and reference to build further upon it.

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Original Article

Association of climate change with magnitude and trends of Malaria in Balochistan

Samina Mohsin Khan[1]

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Abstract

Introduction: Climate change is a new emerging threat of global proportions. The implications of climate change on health are increase vector-borne diseases spatially and temporally. The objectives of the study were to determine the different trends of malaria in Balochistan with respect to geographical distribution; seasonal frequency; and magnitude; and to correlate it with temperature change in Balochistan, irrespective of age, gender and socio-economic status.

Methods: This was a registry based cross sectional study and used the secondary data from 2001 to 2009. Four districts from Balochistan were randomly selected, based on level of malaria endemicity and availability of the records by the Metrological Department. Data was analyzed using statistical software SPSS 16 whereby appropriate statistical tests were applied, including the linear logistic regression models.

Results: The mean monthly temperature in high and low endemic districts was 20.8±7.8 and 20.6±9.1 degrees Celsius, respectively. During the peak summer months of June, July and August, the mean temperature was found to be low in the high endemic districts as compared to the low endemic districts. A linear regression model was applied on the effects of monthly temperature on the monthly parasitic incidence. Among the high endemic districts, there was a strong linear relationship, $p<0.001$, $F=81.14$. However, when the Annual Parasitic Incidence was correlated with Annual Temperature in the high endemic districts, it showed a negative co-relationship, depicting no effect of the annual temperature on the annual parasite incidence rate.

Conclusion: Factors such as resistance to anti-malarial medicine and pesticide, changing land use patterns and human migration may play a role in malaria endemic and the temperature may not be the only major factor driving the increase in malaria. *(Pak J Public Health 2013;3(1):4-8)*

Keywords: Malaria; Temperature; Global warming; Balochistan.

Introduction

Climate change is a new emerging threat of global proportions. During the 20th century, world average surface temperature increased by approximately 0.6°C (1,2). The Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2001) has highlighted that by 2100 the global temperature would increase by 1.8°C -5.8°C (3).

Climate change affects multiple sectors including agriculture, forestry, water resources, air quality, ecosystems, biodiversity, etc. However, among these the effects of climate change on health are the only ones that pose a serious threat to long-term sustainable development. In terms of its effects on health, one of the consequence highlighted by the Fourth Assessment Report of IPCC (2007), is the possible increase in vector-borne diseases spatially and temporally (4). There is pressing need to appraise the health implications of the potential impacts of climate change and timely interventions are devised to reduce the damage (5-8). The fact that an increasing number of malaria epidemics have recently been documented throughout the world bears testament to the observation (9).

The major reasons for such epidemics are climatic factors such as abnormal rains, long periods of increased humidity and temperature and/or more permanent climatic changes as a result of irrigation, agriculture or tree plantations. Military conflicts and civil unrest, along with unfavorable ecological changes have greatly contributed to malaria epidemics, as large number of unprotected and non-immune refugees move into malarious areas (10,11).

The social, cultural and economic dimensions in terms of disproportionate impact on the poor, associated loss of wages and productivity both at the micro and macro levels are enormous. The disease is deeply rooted in the poor communities affecting national development and taking away major share of health budgets.

The malaria situation in the South Asian region remains highly dynamic and evolving, and is likely to be further aggravated by the climate change. There is ample evidence that warming of the earth's temperature and increasing precipitation will hasten the maturation of the parasite in mosquitoes, will increase the biting frequency and will create conditions more conducive to mosquito

breeding (12). Climate change is expected to worsen in the future, both in frequency and intensity, and so are the related health consequences (10). This will disproportionately affect the poor and marginalized sections of society, particularly those living in remote areas such as tribal populations.

Malaria causes about 2414 deaths per day, over 90% of which are in Sub-Sahara Africa. It is both a disease of poverty and a cause of poverty slowing economic growth by 1.3% per year in endemic areas. WHO estimates that globally 33.96 million DALYs are lost due to malaria in which South East Asian Region contributes around 1.34 million (13,14).

Malaria is an enormous health and developmental problem in South East Asia as 1256 million people are at risk for malaria, with more than 120, 000 deaths occurring each year (15). A total of 50.6 million people are at risk of malaria in Bangladesh, where more than 95% of all cases are reported from its 11 highly endemic districts. About 1.5 million cases were reported in India in 2008 alone (16). Whereas in Pakistan in the same year the total number of reported cases were 4.5 million, of which 60% were from the province of Balochistan which has the highest incidence and prevalence of the disease in the country (17,18).

There is a strong likelihood that with changes in climate a consequent change in trends and magnitude of malaria will also be observed. The objectives of the study were to determine different trends of malaria in Balochistan, with respect to the geographical distribution; seasonal frequency; and magnitude; and correlate with the temperature change in Balochistan, irrespective of age, gender and socio-economic status.

Methods

This was a registry based cross sectional study, using the secondary data. Four districts from Balochistan were randomly selected, based on level of malaria endemicity and availability of the records by the Metrological Department. Among these, two districts each were selected from the endemic and non endemic districts by lottery method. Study population was the reported malaria cases in the selected districts. Secondary data for malaria for the last nine years (2001-2009) preceding the research was collected from the 'Provincial Malaria Control Programme, Department of Health, Government of Balochistan' whereas climate related data was obtained from the 'Pakistan Meteorological Department, Government of Pakistan. Data was analyzed using statistical software SPSS 16 whereby appropriate statistical tests were applied, including linear logistic regression models.

Results

Districts Zhob and Khuzdar were selected from the highly endemic districts and Districts Quetta and Chaghi were picked up as the low endemic districts. The demographic detail and mean annual parasitic incidence from each district is given in Table 1.

Table 1: Population & Mean Annual Parasitic Incidence of the selected districts

Endemicity	District	Population	Mean API
High	Zhob	327,657	15.9 ± 8.1
High	Khuzdar	497,184	14.9 ± 8.3
Low	Quetta	940,815	0.013 ± 0.012
Low	Chaghi	155,662	0.22 ± 0.20

Average monthly parasitic incidence for both the high and low endemic areas were analyzed and the high endemic districts were found to have a higher parasitic incidence and are presented in table 2 & 3.

Table 2: Mean monthly parasitic incidence differences between high & low endemic districts from 2001 to 2009

Months	Monthly Parasitic Incidence - High Endemic Districts	Monthly Parasitic Incidence - Low Endemic District
Jan	2.1	0.06
Feb	2.5	0.10
Mar	4.4	0.11
Apr	6.1	0.13
May	8.1	0.08
Jun	22.3	0.19
Jul	31.0	0.13
Aug	19.8	0.16
Sep	41.8	0.18
Oct	28.0	0.17
Nov	21.2	0.11
Dec	10.6	0.03

Table 3: Mean monthly parasitic incidence difference by districts from 2001 to 2009

Months	Zhob	Khuzdar	Quetta	Chaghai
Jan	2.450	1.744	0.003	0.122
Feb	2.783	2.257	0.003	0.200
Mar	4.898	3.967	0.006	0.222
Apr	6.717	5.444	0.010	0.248
May	8.717	7.389	0.009	0.146
Jun	23.080	21.611	0.015	0.374
Jul	32.249	29.756	0.026	0.226
Aug	20.508	19.018	0.039	0.273
Sep	43.515	40.107	0.024	0.331
Oct	29.156	26.906	0.011	0.322
Nov	22.537	19.812	0.006	0.210
Dec	11 747	9 537	0 002	0.049

Temperature

The mean monthly temperature in high and low endemic districts was 20.87.8 and 20.69.1 degrees Celsius, respectively.

It is imperative to note that during the peak summer months of June, July and August, the mean temperature was found to be low in high endemic districts as compared to low endemic districts. There was a 0.24 degrees Celsius difference in June, increasing to 2.56 degrees Celsius in July to 1.94 degrees Celsius in August. Before and after that the high endemic districts remained slightly warmer than the low endemic districts. Details are given in Table 4 and Table 5.

Table 4: Mean monthly temperature differences between high and low endemic districts from 2001 to 2009

Months	Monthly Temp High Endemic Districts	Monthly Temp Low Endemic District	Temperature Difference between Low Endemic and High Endemic
Jan	8.8	7.59	-1.21
Feb	12.2	11.19	-1.01
Mar	17	16.79	-0.21
Apr	22.5	22.12	-0.38
May	27.5	26.96	-0.54
Jun	30.1	30.34	0.24
Jul	29.9	32.46	2.56
Aug	28.5	30.44	1.94
Sep	26.6	26.26	-0.34
Oct	21.2	19.78	-1.42
Nov	15.4	14.43	-0.97
Dec	10.8	9.19	-1.61

Table 5. Mean monthly temperature difference by districts from 2001 to 2009

Months	Zhob	Khuzdar	Quetta	Chaghi
Jan	7.5	13.0	4.7	10.5
Feb	8.8	16.3	7.7	14.6
Mar	14.0	22.0	13.1	20.5
Apr	19.9	27.5	18.5	25.8
May	24.7	32.3	23.7	30.2
Jun	27.9	33.9	27.3	33.4
Jul	28.7	32.8	29.4	35.5
Aug	27.3	31.8	27.6	33.3
Sep	26.2	28.4	22.7	29.8
Oct	20.7	23.5	16.3	23.2
Nov	15.0	18.2	11.9	17.0
Dec	9.5	14.1	6.6	11.8

Monthly temperature and API

An attempt was made to establish correlation between effects of monthly temperature on the parasitic incidence over nine years i.e. from 2001 to 2009 in the high and low endemic districts.

In high endemic districts, it appeared that with the rise in temperature, there was a rise in parasitic incidence. However, during the month of August, there was a decrease in parasitic incidence, followed by an increase in parasitic incidence in September. Beyond September, both temperature and parasitic incidence continued to decrease (Figure 1).

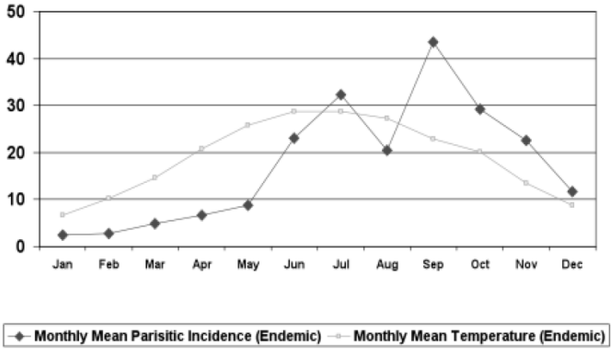

Figure 1. Effect of temperature on monthly parasite incidence over 9 years (2001-2009) among high endemic districts

However, when the same was attempted in the low endemic districts, there was no apparent correlation.

A linear regression model was applied on the effects of monthly temperature on the average monthly parasitic incidence. Among the high endemic district, there was a strong linear relationship, $p<0.001$, $F=81.14$ (Figure 2). This implies that there with the increase in temperature there is a linear increase in the parasitic incidence.

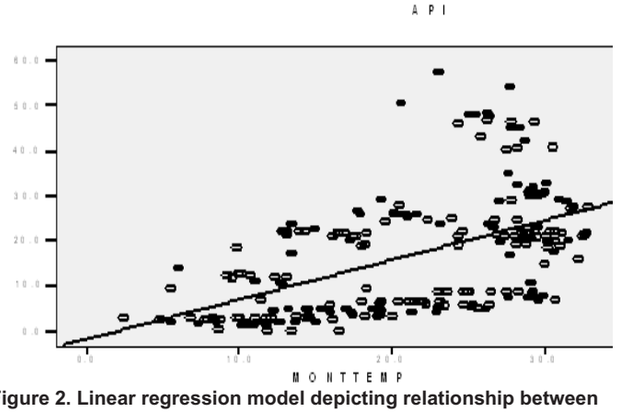

Figure 2. Linear regression model depicting relationship between monthly temperature and API

On the contrary, the same model of association did not show any significant co-relationship in the low endemic districts.

Annual Temperature and API

When the Annual Parasitic Incidence was correlated with Annual Temperature in the high endemic districts, it showed a negative co-relationship, depicting no effect of annual temperature on annual parasite incidence rate as shown in figure 3.

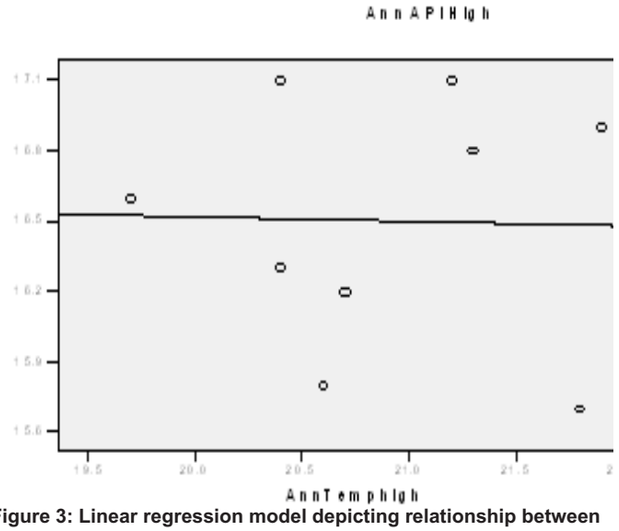

Figure 3: Linear regression model depicting relationship between monthly temperature and API

Discussion

There is no statistical relation found between the Annual Temperature and the Annual Parasitic Incidence during the last nine years i.e. from 2001 to 2009. However, there is an apparent rise in the Monthly Parasitic Incidence corresponding to the monthly temperature during each year over the last nine years in the high endemic districts. This may be attributed to the favourable temperature required for the breeding of the anopheles mosquito (responsible for carrying malarial parasite).

During the month of August, the peak season for Monsoon rains, the temperature decreases along with the API. However, there is a rise in API following rains, despite the fact that the temperature continues to decrease, due to stagnation of water. Also beyond September, both the temperature and parasitic incidence continued to decrease.

Malaria spreads due to reasons other than temperature. The stagnant water in which the mosquito breeds could be one of the important factors highly prevalent in that season. In addition, the metrological data in our study does not show any significant change in the rise of temperature. This finding is consistent with other studies in which a set of well-maintained meteorological records shows no rise in temperature over the recent decades (19,20). Other factors such as resistance to anti-malarial medicine and pesticide, changing land use patterns and human migration may also play roles; and temperature may not be the only major factor driving the increase in malaria. However, as it could be one of the many factors therefore it should be taken into consideration (20).

Future climatic changes may alter the prevalence and incidence of the disease, but obsessive emphasis on "global warming" as a dominant parameter is weak; the principal determinants are linked to ecological and societal change, politics and economics (8). The medical problems involve multiple factors in which the socio-economic environment plays an important role determining the vulnerability of subjects.

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Original Article

Environmental effects on acute respiratory infection in under five children living near brick kilns of rural Sindh, Pakistan

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Abstract:

Introduction: About 9.4% of the total populations in the world are of children less than 5 years of age. Acute respiratory infection (ARI) is currently one of the leading public health problem that contributes around two millions of deaths in children below 5 years of age globally. More than half respiratory infection in the children has been reported due to environmental conditions. Traditional kilns are a serious local health hazard to those living in areas nearby. The research regarding ill effects of brick kilns on under-5 children are scanty in Pakistan. The purpose of this study is to provide base line data regarding acute respiratory infections in under-5 children living near brick kilns.

Methods: A comparative cross sectional study was conducted on 188 mothers under five years of age children in two villages located near and away from brick kilnsat Taluka Sobhodero, Distt; Khairpur Sindh.

Results: ARI prevalence in village located near the brick kilnswas 25% as compared to 13% in village located away from kilns (P = 0.03). ARI was reported in children of having passive smoking (57%) as compared to non passive smoking (43%) (P = 0.04). Also cases were reported more in children of illiterate mothers as compared to literate (94.3% v/s 5.7%, p value 0.03) ARI was more prevalent in children of joint families than nuclear families (80% v/s 20%, p value 0.01) and also in families using wood as cooking fuel than other household fuels like LPG (100% v/s 0%, p value 0.02).

Conclusion: Study concluded that children living near brick kilns are more at risk in developing the ARI as compare to those who are living away from this.*(Pak J Public Health 2013;3(1):9-11)*

Keywords: Acute respiratory infections; Children under five; Brick kilns; Environmental effects; Child health.

Introduction

The United Nations Convention on the Right of the Child states that the child has the right to the highest attainable level of health and right to a safe environment (1). Moreover, mortality and morbidity in children less than 5 years serve as a good indicator of the population well being. Children under 5 years constitute about 9.4% of the total global population (2). Acute respiratory infections (ARI) are currently one of the leading causes of death in children below 5 years of age in the world (3).Globally air pollution is an important factor responsible for children ill health. Unhealthy air is breathed by an estimated 1.1 billion people and claims 3 million lives a year (4). Majority of this ill health are proved to be due to respiratory infections and 50% higher in childrenliving in the most polluted areas than in those in the least polluted areas (5). The most significant health effects of outdoor air pollution are associated with particulate matter (6).

ARIs annually kill an estimated 2 million children under the age of five, among 60 percent of ARIs worldwide are related to environmental conditions (7). The incidence of ARIs in children aged less than 5 years is estimated to be 0.29 and 0.05 episodes per child-year in developing and industrialized countries, respectively, which translates into 151 million and 5 million new episodes each year, respectively. Most cases occur in India, China, Pakistan, Bangladesh, Indonesia and Nigeria (8). ARI prevalence in children under 5 years of age in Pakistan is 14%. It provides data of ARI considering age, sex, cooking fuel and income etc but does not mention out door pollution as one of the risk factors for ARI (9).

Traditional kilns are a serious local health hazard to those living in areas nearby.Estimations show that the Asian informal brick production alone emits 180 million tons of CO2 annually which resembles one third of the CO2 emissions caused by the global aviation industry in 2008 (10).Children are often exposed to multiple environmental health hazards combined with other behavioral, social, and economic risk factors. A multiple studies have identified crowding, nutritional factors, parental smoke, house hold fuels and outdoor pollution as known risk factor for ARI (11). Brick kilns industry is a major unregulated contributor of air

pollution along with other industries and transportation. Kilns pose a public health threat especially for children less than five years of age living in vicinity (12). Most of studies regarding brick kilns and children focus on one aspect of child rights and that is child labor and injuries, where as health issues like common preventable diseases like ARI are missed and not reported, so there is need to study these other health impacts of kilns on children also.

Studies on the environmental impacts of brick kilns are scarce while data on emissions from brick kilns is not available. This unregulated industry in Pakistan poses a public health hazard by virtue of its emissions leading to a risk of ARI, especially in children under the age of five years living in the vicinity. The current study proposes to decrease morbidity in children less than five years of age due to ARI living near brick kilns. Results of this will help identify kiln emissions as a potential risk for ARI among children; it will also help in putting up recommendations for the policy makers to help this industry regulate emissions for the larger public health and environmental interest.

Methods

A cross sectional study was conducted through adopting the convenient sampling method due to poor resources and minimum availability of the study subjects. The study was conducted during the period of April 2011 to May 2011 at Taluka Sobhodero, District Khairpur. Children under five years of age were included from two study areas; one was located close to brick kilns and defined as high risk area and other was located far away from kilns will be regarded as low risk area in the study. Sample size was estimated and188 mothers of children less than 5 years of age were interviewed on semi structured questionnaire during this survey. Children having debiliating illness, T.B, Asthma, mental disability, malnourished children were excluded. The children were identified and approached through the routine Lady Health Workers record. A written consent was obtained from mothers of the respondents after taking ethical approval from institutional review committee of Health Services Academy.Data was analyzed by using SPSS version 17 and univariate analysis was done using “Chi square” test for all the categorical variables.

Results

More than 65% of the children from study areas were aged between 12-59 months. Mothers who were not able to read and write or were able to only read were categorized as Illiterate, 90% of those mothers were illiterate. Interestingly only 2% of the mothers attended the highest level of education as a bachelor. Majority (97% of the mothers) are house wives, with only 3% having Government job. Education status of the fathers was better as compared to mothers as 56% of fathers from both villages were illiterate, only 26% of the fathers were matriculate. Only 9% of the fathers from both villages have government job. Almost all families were using wood as a fuel for cooking in their houses and none of them reported to have air conditioner or humidifier or air filter in their homes.

Table: ARI prevalence in the two villages

ARI prevalence and their factors reported in last 2 weeks of the study			
Factors	**Percentage**	**P value**	**Chi-square**
Village near to Brick kilns	25	0.03	4.248
Village away from Brick kilns	13		
House with history of passive smoke	57	0.04	3.9
Houses with no history of passive smoke	43		
Bed room sharing with 3 or more person	80	0.01	6.07
Bed room sharing with 1 or 2 person	20		
Literate mothers	94.3	0.03	4.07
Illiterate mothers	5.7		
Joint family system	80	0.01	5.21
Single family system	20		
Use wood for cooking	100	0.02	4.55

ARI was higher in children under the age of five living near brick kilns (25%) compared to those living away from the kilns (13%) with significant P value (0 .03). ARI was recorded more in those houses where children having family history of passive smoking (57%) as compared to those having no such history (43%)with significantP value (0.04).

The likelihood ratio 4.037 indicates that the chances of getting ARI are increased when <5 years children are exposed to polluted air by brick kilns along with history of passive smoking in their family.

ARI cases were more in under-5 children sharing their bed room with 3 or more (80%) compared to those sharing with 1 or 2 people(20%) with significant P value (.01) were reported. Cases were reported more in children of illiterate mothers as compared to literate (94.3% v/s 5.7%, p value 0.03). ARI was more prevalent in children of joint families than single families (80% v/s 20%, p value 0.01) and also in families using wood as cooking fuel than other household fuels like LPG (100% v/s 0%, p value 0.02).

Discussion

Polluted air due to brick kilns can cause ARI has been found during this study. Linked to this is perhaps poor legislation regarding the environmental hazards of pollution due to these kilns (13). ARI were higher in village located near kilns compared to village located away from

kilns. Acute respiratory infection in children of both villages was compared along with history of passive smoking in their family. ARI cases were more in under five children sharing their bed room with 3 or more compared to those sharing with 1 or 2 people.The findings of our study are very similar to study by regarding environmental health effects of brick kilns in Kathmandu valley statistically significant high odds ratios for respiratory (14). Also cases were reported more in children of illiterate mothers as compared to literate. The findings of the study doneamong under five childrenclearly revealed that children born to lower educated mothers are at a significantly higher risk of severe ARI than children born to educated mothers in Bangladesh which resembles to our study in which children of the illiterate mother have given high prevalence and significant results for ARI in children under-5 years of age (15). The relation between parental education and acute and respiratory infections (ARI) in children has been explored in other parts of the world (16). ARI was more prevalent in children of joint families than nuclear families.Most of the respondents (mothers) were aware that smoke is the major cause of Acute Respiratory infection in their under 5 children. Indian study also reported high prevalence rate of 58%, which is also similar in our study (17). Similar study on the impact of brick kilns on the health of children living near brick kilns are more likely to suffer from illness related to air pollution compared to similar people living in an area without kilns (13).

Conclusion

Study concluded that children living near brick kilns are more at risk in developing the ARI as compare to those who are living away from this.Policies should be introduced to develop these brick kilns away from the populated areas and awareness should be given at the local level regarding the health hazards due to this issue.

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Original Article

Awareness about biomedical waste related risks among sanitary staff of public and private hospitals in Rawalpindi

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Abstract

Introduction: Biomedical waste includes various types of hazardous materials, which can transmit many diseases. The sanitary staff of health care facilities is at a great risk of contracting various infections as a result of exposure to different types of hospital waste. Proper knowledge about the appropriate handling of these high risk materials is imperative for risk reduction. The current study purports to look into the level of knowledge, attitude and practices of sanitary staff posted at public sector hospitals in Rawalpindi and government sanitary workers posted around various private clinics which generate a considerable amount of healthcare waste.

Methods: Mix methodological approach including quantitative and qualitative components was adopted. For the qualitative component, cross-sectional, semi-structured questionnaire based survey was conducted in one public sector hospitals of Rawalpindi (Pakistan) and around various private healthcare facilities among the 68 members of the sanitary staff working in and around these facilities from October to December 2012. The qualitative component included five in-depth interviews with the sanitary workers.

Results: The knowledge of sanitary workers was found to be lacking in many aspects with regards to hazards involved with high risk waste management, waste segregation, collection, transportation, storage and disposal. Only 15 % were aware of the risk of blood borne infections through needle stick injuries. Most respondents had a casual attitude towards personal protection, and only 17% said that they always used personal protective equipment. Relevant narratives have also been included in the results section, after manual content analysis of the information provided by the respondents.

Conclusion: Robust health education measures and proper periodic training schedules are the need of the hour. Provision of personal protective equipment should also be an essential part of the preventive strategy. *(Pak J Public Health 2013;3(1):12-16)*

Keywords: Hospital Waste Management; Environmental Health; Sanitary workers; Needle stick injuries; Pakistan.

Introduction

Medical waste is generally defined as any waste generated during the medical diagnosis or treatment of humans or animals, in related research, or in the production of biologicals used in clinical activities (1). Healthcare waste management is an integral part of every health care facility, and should be carried out with surgical precision. Of the total amount of waste generated by health-care activities, about 80% is general waste. The remaining 20% is considered hazardous material that may be infectious, toxic or radioactive. Every year an estimated 16 000 million injections are administered worldwide, but not all of the needles and syringes are properly disposed of afterwards (2).

In the developed world healthcare management is advanced and employs modern techniques (3). High-income countries generate on average up to 0.5 kg of hazardous waste per bed per day; while low-income countries generate on average 0.2 kg of hazardous waste per hospital bed per day. However, health-care waste is often not separated into hazardous or non-hazardous wastes in low-income countries making the real quantity of hazardous waste much higher (2). In a study conducted in Iran it was found out that the hospital waste generation rate was 4.45 kg/bed/day (4). Similarly the results of a recent study conducted in Jordan, indicated that the medical waste generation rate ranged from approximately 0.5 to 2.2 kg/bed day, which comprised of 90% of infectious waste and 10% sharps (5). Results from many developing countries showed that the most identifiable discrepancy discovered in hospital waste management process was at the waste segregation stage (3,4).

Pakistan also has a serious issue regarding healthcare waste management. Each year around 250,000 tons of medical waste is annually produced from all sorts of health care facilities in the country (6). In a recent study in

Pakistan showed that around 2.0 Kg of waste/bed/day is produced out of which 0.1-0.5 can be categorized as risk waste. Daily about 4 to 2,000 Kg of waste is generated by various health outlets; of which 75% to 90% is non-risk produced by the health care premises, housekeeping, and administrative functions while only 10-25% is infectious and needs more careful disposal. Moreover, failure of proper disposal of used syringes, blades etc. leads to their reuse enhancing the risk of disease transmission (7).

The sanitary staff at healthcare facilities comes into direct contact, at multiple levels with various types of waste materials. This fact puts them in very hazardous circumstances, as they are not only prone to get diseases themselves but their casual attitude towards appropriate waste management might also create problems on a larger scale. It is imperative that the sanitary staff should be trained and should have a periodic evaluation mechanism which sees over the whole process of hospital waste management (8). The current study purports to look into the level of knowledge, attitude and practices of sanitary staff posted at public sector hospitals in Rawalpindi and government sanitary workers posted around various private clinics which generate a considerable amount of healthcare waste. This survey was carried out to find out about the extent of awareness of our respondents regarding healthcare waste segregation, collection, transportation, storage and disposal.

Methods

This study was carried out in 1 public sector hospital of Rawalpindi and around 9 private healthcare facilities. These private clinics were situated in areas of Sadiqabad, Khayaban-E-Sir Syed, DhokHassuand Transformer Chowk. The respondents selected for this study were those men who were working in these localities as sanitary staff and who were directly involved with healthcare waste management. The respondents were selected through non-probability purposive sampling. The sanitary workers who consented to become part of the study guided us to the similar prospective respondents they knew about. The data was collected at the workplaces of the respondents.

Mix methodological approach including quantitative and qualitative components was adopted. The quantitative part was a survey on sanitary workers whereas qualitative component included in-depth interviews with the same study population. The study was completed from October to December, 2012. For the quantitative component, sample size was 68 using non-random purposive sampling technique. The data was collected by two teams of interviewers. Each team comprised of 2 interviewers and one supervisor. The teams were provided with transport and communication facilities. The team members received training on the questionnaire of the study. Each respondent was explained the purpose of the study and all his concerns were addressed. The confidentiality of all information was assured. Those, who finally agreed to participate, were asked to give verbal informed consent. The data was collected using a semi-structured questionnaire in Urdu language to avoid language barriers. The main areas of focus in the data collection tool were KAP of healthcare sanitary staff regarding proper hospital waste management. The basic information collected was regarding demographic features of the respondents, knowledge about waste segregation, knowledge about hazards of contact with high risk wastes, use of personal protective equipment, trainings provided etc.The data recorded on the questionnaires was entered in SPSS version 17.0. Descriptive statistical analysis was carried out in order to document frequencies and percentages.The qualitative part of the study included five (05) interviews with the sanitary workers. The key narratives were identified and presented, after relevant content analysis.

Results

Socio-demographic features

The respondents were divided into 5 class intervals based on age, 32% were from 18-25 years, 17% were from 26-32 years, 19 % were from 33-40 years, 22% were from 41-50 years and the remaining 10% were above 50 years of age. Only 9 % of the respondents were involved with sanitary work for less than a year, 59 % had been working from 1-5 years, 25% had been working for 6-10 years and 7% for more than 10 years. All respondents were male. With regards to education 36% were completely illiterate, 39% had no formal education but could read and write, 17% had primary or below primary education and 8% were middle and above. Around 45 respondents were working around private clinics and the remaining 23 were working at a public sector hospital.

During the course of data collection, when asked about the educational status, one respondent said:

"Do you think we would have been doing this sort of work if we were educated?"

This simple yet extremely pertinent question points towards the fact that; how these individuals who spend their lives surrounded by things that other people disgust, in order to prevent the exposure of others to hazardous materials, are looked down upon. Motivation and training are the needs of the hour. The sanitary staff

deserves more respect and need to know how important their role actually is in health care settings, especially with regards hospital waste management.

Knowledge about waste management process

Regarding segregation most respondents (73%) were unaware of the waste segregation process and the different colors identifying various types of healthcare waste. Most respondents (92%) were aware of the waste collection process and the timings of waste collection; they considered this step to be their primary duty. Many respondents (63.7%) said that they had at least once used covered trolleys for waste transportation to the storage and disposal site, but the most commonly (57.2%) used transportation method was a wheel burrow. We asked our respondents about the storage site and we received mixed opinions in this regard. A majority of the subjects (73.4%) were of the opinion that biomedical waste should be stored for not more than 24 hours and the floor of the storage room should be made out of concrete to prevent seepage of infectious materials to the underground water. Only one of the three hospitals had an incinerator, which also was out of order at the time of interview.

The sanitary staff around private clinics had never received any form of formal or informal training in healthcare waste management. They did not consider healthcare waste to be any different from other waste, as one respondent said:

"I have been working around this clinic for the past 15 years and I pick the garbage twice a day and throw it in the garbage dump around the corner, the municipal corporation's truck comes and takes it away every day."

We received very interesting ideas and experiences with reference to the process of waste disposal. One respondent said:

"We usually throw most of the waste collected in the garbage dump behind the hospital, it is easier and usually nobody looks over there, but I think this is wrong. This waste material is very dangerous and contains many high risk materials like used syringes, drips and even human remains, blood and feces."

Another interesting side to the story was explained by another respondent who told us:

"Have you noticed the large sizes of the cats and rats of our hospital? This is because they feed on placentas and human blood day and night."

Emphasizing the importance of proper waste disposal, one respondent gave a very relevant reason:

"Recently I caught some garbage scavengers, collecting used uncut syringes and drip sets from the garbage dump near our hospital. This needs to stop, the hospital administration should develop a better system of hospital waste disposal, they should make our job easier as we are already overburdened."

Regarding proper training one respondent said:

"I have been working at this hospital for the past 25 years. Whatever I have learned I have learned on the job. We have had occasional trainings, but this practice should be conducted more often so that we may learn more techniques about our work."

A sanitary worker around a private clinic said:

"We have never been trained about anything. What training is needed to simply pick up rubbish and throw it on the same place every day?"

Needle-stick injuries: experiences, knowledge and prevention

Needle stick injuries are a hazard associated with the profession of health care, and just like all other health care professionals sanitary workers are at a much greater threat than any other health care group. Around 23.6% of our respondents had experienced a needle stick injury, during the past three months. 81.2% had experienced needle injuries at least once in their lifetime. Most (87.7%) respondents knew that needle injuries can cause different types of diseases, but when asked about the exact diseases which are caused by needle injuries 35.5% said HIV/AIDS, 46% said Hepatitis B and C, around 17.3% said that no diseases are spread through needle stick injuries.

Most respondents (92%) had not received periodic screening examinations, including blood borne and other infectious and occupational diseases. One respondent made it very simple:

"Playing with rubbish is what runs our livelihood, you cannot be afraid of what you have to work with, it is just like a doctor being afraid of touching his patients. We get stuck with needles repeatedly, but there's no way around it. I have had many needle pricks but look at me I am perfectly fine till now."

Use of Personal Protective Equipment

Around 73.2% of the respondents said that PPEs were not available on all times, 64.5% said that they had used some PPEs in the past 1 week. Most respondents (67.8%) had a casual attitude towards using PPEs, they said that there was no supervision or obligation for their use of PPEs, as one respondent put it:

" The first thing is that we are not provided with this equipment, and once something is broken there is no way we get a new one, besides if God wills to cause or prevent any accident then these weak instruments cannot play any

part. I use gloves and boots when I can but I don't mind working without them as well."

Referring to the lack of supervision and coordination one respondent said that:

"We do not have a central point from where we can get a regular supply of PPEs, and our supervisor only asks us to wear them only when someone important is coming to inspect the hospital."

A respondent working around a private clinic said that:

"We got our yellow jackets last year, but a few years ago we received thick rubber gloves but since then no new equipment has been given, I often get stuck with needles, but now my fingers have become hard and these small needles don't hurt me."

Safety manuals, SOPs and occupational hazards

We asked our respondents if they had any knowledge about standard operating procedures and safety prerequisites like Material Safety Data Sheets. Around 96.7% they were unaware of any formal SOPs. A respondent said that:

"We only do what we are told to do, we have been doing this for a long time now and we know how to do our job."

A respondent explained things in a very simple manner:

"You don't have to go to school to learn how to throw garbage."

Discussion

Health care waste management is a very important and a much studied concept, there is a lot of literature available on the topic, yet the sanitary staff working with these hazardous materials is an under-researched topic. These people are at a constant risk of getting infected and are also a key component in the cycle of disease transmission. In a study conducted in 8 hospitals of Karachi showed that only 1 of these 8 hospitals arranged regular training sessions for their sanitary staff (9).

Sanitary staff should be the focus of attention of the Hospital Waste management plan and members from this group of workers should be made part of the Waste Management Teams. These people are the actual implementers of biomedical waste management.

The prevalence of needle stick injuries is a serious risk associated with healthcare settings. In a study conducted in three hospitals of Rawalpindi among the nurses, it was found out that 67% of the respondents had experienced needle stick injuries and almost all (99%) had not reported the incident due to lack of a reporting system (10).These injuries are a mode of transmission of many diseases like Hepatitis B & C and HIV/AIDS. A study conducted in Nigerian hospitals concluded that needle stick injuries can be prevented with simple interventions, which would not only prevent diseases but would also reduce long term treatment and diagnostic costs (11).

A major issue that quite commonly escapes the attention of planners, implementers and policy makers is regarding the uncontrolled mushroom like private healthcare sector. The people associated with this sector do not fall under any regulatory authority, especially the sanitary workers involved in cleaning these facilities. We need to pay more attention to this occupational group.

Conclusion

Biomedical waste management is a very important public health concern. Everyday tons of hospital waste is generated in many healthcare settings. The disposal of these hazardous materials is a process that requires surgical precision, and even more so, on the part of the people who come into direct contact with healthcare waste. The current level of knowledge and prevalence of high risk practices among sanitary workers should be an issue of concern.

Robust health education campaigns, periodic screening mechanisms, regular trainings and enforced use of personal protective equipment should be the focus of all prescribed interventions and plans regarding sanitary worker safety.

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Original Article

A cross sectional study to determine factors associated with utilization of maternal health services in Faisalabad district of Punjab, Pakistan

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Abstract

Introduction: Pakistan is struggling hard to achieve MDG goal 5 that is to reduce MMR (maternal mortality ratio) from 490 to 260. Utilization of antenatal care, facility delivery and family planning services result in improved maternal health which leads to reduction in MMR. This study explores the factors related to the use of maternal health services in one district of Pakistan.

Methods: A cross sectional household survey was conducted in Faisalabad district of Punjab to explore factors related to utilization of maternal health services. Data was collected from 1383 women of 15-45 years of age group who were pregnant at the time of the survey or had given birth in the last 18 months. Correlates for health service utilization were identified using logistic regression.

Results: Although ANC (Antenatal care) visits and facility delivery was much higher among women of Faisalabad, around 80% and 77% respectively, use of contraceptives was very poor i.e; only 23%. ANC and facility delivery were significantly associated with parity, education, wealth and health workers visit which was opposite for the family planning use. Association of women autonomy and mass media with the utilization of ANC and institutional delivery were also found to be significant.

Conclusion: The present study suggest that to in order to improve maternal health there is need to target women who are; from poorest wealth quintile, uneducated, having two to three children and have less autonomy. Furthermore ANC and post partum period should be used as an ideal time period for counseling women for adopting family planning methods. *(Pak J Public Health 2013;3(1):17-26)*

Keywords: Maternal health services; Family planning; Maternal mortality; Health services utilization.

Introduction

Maternal health is important for the overall development and progress of a country, therefore Maternal Mortality Ratio (MMR) has been on the priority list of many countries' health policies and strategies (1). In Pakistan MMR has declined from 490 to 260 per 100,000 live births from 1990 to 2010, but the pace of this decline is far slower in comparison to other Asian countries, like Nepal, which has successfully achieved its MDG 5 (1). A number of factors have played a pivotal role in decreasing MMR globally including: health system strengthening, female education, accessibility to the healthcare facility. In order to set priorities for policy making and program designing for reduction of MMR, there is need to explore all factors related to maternal mortality.

Studies have identified two types of factors which influence utilization of maternal health services; program related and non-program related factors (2). Fertility rate, wealth, education, access to health facility, skilled birth attended (SBA) are all important determinants of maternal health and therefore play a crucial role in reduction of maternal deaths by two third (3,4). Past studies have also identified income and wealth as strong factors influencing utilization of maternal health services (5,6). Due to high out of pocket expenditure, utilization of maternal health services, especially among poor and underserved population, is very low (7). Antenatal care (ANC) visits help in monitoring the maternal health and the development of fetus during pregnancy which helps in reduction of any risk to both mother and child. Accessibility and utilization of antenatal services varies among different socio economic group of women, it is more common among women belonging to a higher socio economic background (8). Studies have shown that periodic ANC visit are associated with an increase in facility deliveries and ultimately decrease in perinatal mortality (9).

Education is one of the important factors influencing utilization of maternal health services. Role of education in improving women decision making and health has already been published as they are more inclined toward using ANC and PNC (Post natal care) services (10). Pakistan has a very high still births rate of 32 per 1,000 which is more common in uneducated women (11). A study conducted in Pakistan has identified maternal education,

urban residences and husband's education as influencing factors on utilization of maternal health services (12).

Women autonomy has also been found as an important driving factor in health service utilization. Studies conducted in India have shown that women who have more freedom of movement had more SBA (skilled birth attendants) deliveries (13). In Pakistan, like other South Asian countries, the society is predominantly patriarchal, autonomy of women is very low and most of the decisions regarding health especially family planning are made either by mother-in-law or husband. A study in Nepal has identified mother-in law as the main decision makers and had negatives views against family planning and reproductive health (14). A study in Pakistan has identified that autonomy was associated with higher rate of ANC visits and health facility delivery (2).

Community health visitors also play an important role in improving the health of women living in far flung rural areas, where availability and access to health services is limited (15). Studies have already established that community health workers (CHW) visit has a positive role in increasing use of ANC services and facility based delivery (16). Studies in Nepal and Tanzania have also found home visits by community outreach worker to be an important factor influencing utilization of maternal health services(17,18). Similarly in Pakistan Lady Health Workers (LHW) program has played a positive role in improving health of mothers and its impact evaluation study has shown that although there was no impact on skilled birth attendance, there was increase in ANC utilization (19). This finding was similar to findings from a study conducted in Nepal (17).

To improve maternal health outcomes during pregnancy there is a need to find factors associated with utilization of ANC, health facility delivery and family planning. This study is based on data collected for the baseline household survey conducted for a current demand side financing (DSF) project in Faisalabad district.

Methods

A cross-sectional survey was conducted to understand the population of interest at one point in time. It was conducted in Faisalabad district, which is mostly urban with population of 7.1 million. Data collection was conducted by team of ACNielsen Pakistan, (Pvt.) Ltd. which took almost two months to complete i.e. from 19th July to 31st August 2012. Study was ethically reviewed and approved by Population Services International (PSI) Research Ethics Board (REB).

Respondents selected were, currently married women of 15-45 year age group who were not sick or mentally handicapped, with age of their youngest child up to 18 months, including women who were currently pregnant. Women from all socio-economic groups were part of the sample. Total 1383 women were interviewed. Sample size was calculated using PASS software based on the assumption that CPR will increase up to 20% from the baseline to end line survey in the intervention area i.e. Faisalabad.

A multistage sampling strategy for the baseline household survey was used. Faisalabad is predominantly, an urban district. Pakistan Census Organization has divided urban population in charges and circles. Maps and population estimates of the charges and circles are available. Based on census information the district was divided into urban clusters. A list off total 80-100 clusters that represent the urban population were entered into SPSS and a random sample of 65 clusters was selected. One mother was randomly selected from each household using a Kish grid.

Three dependant variables; ANC visit, facility delivery and family planning utilization were used for this analysis. Binary variables were created for each dependent variable. Independent variables included were; mother's age, parity, mother's education, wealth quintile, mother's autonomy, home visits by health worker in the last 12 months and exposure to mass media. These variables had been identified as important determinants of health care utilization from a detailed literature search. Wealth quintiles were created in a manner similar to PDHS. Binary logistic regression model was used to determine bivariate relationship between each independent variables and outcomes of three dependent variables: the use of ANC, delivery at a health facility and the use of FP (Family Planning). Multivariate model was used for those independent variables which were found to be significant at the bivariate level. SPSS version 18.0 was used for data analysis.

Results

Characteristics of the respondents

Characteristics of the respondents showed that the highest percentage of women were in 25-29 age groups. Nearly 70% of mothers in sample were under 30 years of age. About 46% of mothers had three or more children. Percentage of illiterate women was about 24%. About 40% of women fell in the lowest two wealth quintile. Only 14.5 % women reported visit by health worker during the last 12 month. Although ANC visit and facility based delivery was much high among the surveyed women i.e; 80% and 77% respectively but current use of contraceptives was very

low, i.e. 23.5%. Percentages of women in low and high autonomy group were similar, i.e. 40% each as compare to 19% women in medium autonomy group.

Table 1: Characteristics of respondents

	% (n=1383)
MATERNAL FACTORS	
Mother's Age	
15 – 19	2.7
20 – 24	22.3
25 – 29	40.8
30 or more	34.2
Parity / Living children	
1	26.8
2	25.5
3	18.1
4	14.0
5	7.1
6	4.3
7 or more	2.5
Mother's Education	
None	24.9
Primary	18.5
Middle	17.4
Secondary	23.4
Intermediate	8.7
Graduate or higher	7.2
HOUSEHOLD FACTORS	
Mother's Autonomy	
Low	40.3
Medium	19.5
High	40.2
Wealth Quintiles	
Lowest / First	19.9
Second	20.2
Middle	17.2
Fourth	26.6
Highest / Fifth	16.1
PROGRAM FACTORS	
Health worker visited during last 12 months	
No	83.9
Yes	14.5
Mass Media Exposure	
Less than once a week	17.9
At least once a week	82.1
Use of Services	
Visited for ANC during last pregnancy	
No	18.1
Yes	80.3
Delivered last child at a health facility	
No	21.0
Yes	77.4
Currently using family planning	
No	76.5
Yes	23.5
Total	100.0

Antenatal care

Table 2 shows factors associated with at least three ANC visit made by a woman during her last pregnancy. Overall ANC visit was almost 80%. ANC visit was almost the same among different age groups of women. As the parity increases there was decline in women having three ANC visits, it was more than 80% among women having three or less children compare to 61% of women with seven or more children. Education plays a vital role in improving the health of women. This baseline also shows similar results, %age of ANC visit increases with the increase in the level of education, 70% of women with no education had ANC visits as compare to 90% of women having higher education. Similarly ANC visit increases with the increase in wealth quintile, about 68% of women from poorest quintile have ANC visit as compare to 90% among women from the wealthiest quintile.

This baseline also shows the relationship of ANC visit and health workers visit. Health workers visit in past 12 months was associated with more ANC visits. About 87% of women who were visited by the health workers had three ANC visits as compare to 80% of women who were not visited. Similarly mass media exposure for at least once a week was associated with more ANC visits. 83% of women who had mass media exposure at least once a week made three ANC visits as compare to 72% who were not.

Column of Unadjusted odds ratio shows significance level of relationship at the bivariate level. The chances of having ANC visits decrease with the increase in parity. Column three shows the relations at multi-variate level. All women, above primary education were two times more likely to have ANC visit as compare to women with no education. Mother's autonomy did not play any role in making ANC visit. Women who had health visitor's visit in past 12 months were 1.60 times more likely to have ANC visits as compare to women who were not visited. Women who were exposed to mass media exposure at least once a week were 1.98 times more likely to have three ANC visits as compare to women having no exposure.

Institutional Delivery

Table 3 shows the factors associated with use of health facility for last delivery. Column 1 shows the percentage of mothers who had their last delivery at a health facility, by maternal, household and program factors. Overall 77.4% of women reported having their last delivery at a health facility. Health facility delivery was same among different age groups. An interesting finding was as the parity increases the %age of facility delivery decreases up to 5 children followed by a much more increase in facility

Table 2: Factors associated with antenatal care visits

	ANC visit during last pregnancy %	Unadjusted odds of ANC visit	Adjusted odds of ANC visit
Mother's Age			
15 - 19	75.7	1.00	1.00
20 - 24	86.9	2.12	2.13
25 - 29	83.0	1.88	1.57
30 or more	77.0	1.85	1.08
Parity / Living children			
1	88.9	1.00	1.00
2	84.7	0.67	0.69
3	79.2	0.49*	0.47**
4	75.8	0.52*	0.39***
5	78.6	0.61	0.46*
6	63.3	0.34**	0.22***
7 or more	61.8	0.34*	0.20***
Mother's Education			
None	71.3	1.00	1.00
Primary	79.1	1.22	1.52*
Middle	86.3	1.68*	2.54***
Secondary	86.3	1.42	2.52***
Intermediate	87.3	1.55	2.76**
Graduate or higher	90.7	1.94	3.93***
Mother's Autonomy			
Low	84.3	1.00	1.00
Medium	76.7	0.60*	0.61*
High	81.3	0.80	0.81
Wealth Quintiles			
Lowest / First	67.2	1.00	1.00
Second	79.3	1.51	1.87**
Middle	85.3	1.87*	2.85***
Fourth	86.7	2.17**	3.2***
Highest / Fifth	90.0	2.62**	4.4***
Health worker visited during last 12 months			
No	80.7	1.00	1.00
Yes	87.0	1.81*	1.60*
Mass Media Exposure			
Less than once a week	72.1	1.00	1.00
At least once a week	83.7	1.43	1.98***
Total	80.3		
R-squared			12.0%

Table 3: Factors associated with facility delivery

	Use of health facility for delivery %	Unadjusted odds of facility delivery	Adjusted odds of facility delivery
Mother's Age			
15 - 19	78.4	1.00	1.00
20 - 24	82.0	1.09	1.25
25 - 29	79.7	1.18	1.08
30 or more	75.3	1.14	0.84
Parity / Living children			
1	87.9	1.00	1.00
2	82.2	0.62*	0.64*
3	78.8	0.50*	0.51**
4	70.6	0.40**	0.33***
5	58.2	0.23***	0.19***
6	65.0	0.37*	0.26***
7 or more	70.6	0.60	0.33*
Mother's Education			
None	63.2	1.00	1.00
Primary	74.7	1.48	1.72**
Middle	85.0	2.36***	3.32***
Secondary	85.3	1.75*	3.39***
Intermediate	86.4	1.84	3.72***
Graduate or higher	96.9	7.15**	18.28***
Mother's Autonomy			
Low	75.2	1.00	1.00
Medium	78.9	1.36	1.24
High	82.1	1.61**	1.51*
Wealth Quintiles			
Lowest / First	58.7	1.00	1.00
Second	72.7	1.55*	1.88**
Middle	84.5	2.57***	3.84***
Fourth	85.9	2.96***	4.30***
Highest / Fifth	92.7	4.61***	8.98***
Health worker visited during last 12 months			
No	79.5	1.00	1.00
Yes	74.0	0.69	0.74
Mass Media Exposure			
Less than once a week	70.9	1.00	1.00
At least once a week	80.4	1.02	1.68**
Total	77.4		
R-squared			19.5%

delivery with parity of 6. Health facility delivery increases with the level of education and wealth. About 63% of women with no education, compared to 74.7% with primary and 96.9% with higher education had their last delivery at a health facility. Similarly only 58% of women in lowest wealth quintile delivered at health facility as compare to 92% of women from highest wealth quintile. Other factors which were associated with the institutional delivery were women autonomy and mass media exposure. About 75% women with low autonomy had facility delivery as compare to 82% women with high autonomy. Similarly 80% of women who were exposed to mass media at least once a week had facility delivery as compare to 70% who had less media exposure.

At bivariate level factors which had the largest effect on the health facility delivery were parity, education, women autonomy and wealth. Education level had the most impact on health facility delivery; women with higher education level were 18.28 times more likely to have heath facility delivery as compared to women with no education. Similarly the likelihood to having facility delivery increases with the level of wealth; health facility delivery was highest among women from the highest wealth quintile (AOR= 8.98) as compared to women from lowest quintile. At multivariate level, after controlling for other factors mass media exposure at least once a week became significantly associated with health facility delivery.

Family Planning

Table 4 shows the factors associated with the current use of family planning among women. Overall only 23% women were currently using the family planning method at the time of survey. The use of contraceptives increases with the increase in age of women, with least %age of use in 15-19 years of age group i.e; only 10.5% as compare to 31% among women of 30 or more age group. With increase in parity the use of contraceptive also increases. With parity of one child current use of contraceptive was 10.2%, with parity of three it was 26% as compared to 50% among women having seven or more living children. Increase in education level did not affect the %age of current use of contraceptives. At bivariate level the association of current use of contraceptives became significant for women with intermediate and graduate level education. But after controlling for all other factors at multivariate level, this association becomes insignificant. Wealth did not have any effect on use of contraceptive; it was almost same among women from all socioeconomic groups. Wealth did not show any association with use of family planning both at bivariate and multivariate level. 41% of women who were visited by the health workers were currently using family planning as compared to 20.9% women who were not visited by health workers. Health worker visit during last 12 months was significantly associated with use of family planning at bivariate and also at multivariate level. Use of family planning among women visited by health workers were twice as compare to women who were not visited. Use of contraceptives among women who were exposed to mass media for less than a week and who were exposed at least once a week was almost the same and association was insignificant. Women with high autonomy were 0.74 times less likely to adopt the family planning methods as compared to women who had low autonomy.

Discussion

This study was conducted to identify the determinants of utilization of maternal health services in district Faisalabad in order to have baseline indicators for the voucher project's planning and implementation.

Antenatal care visits play a vital role improving health of mother as well as child resulting in improved MMR. Due to prevalent misconceptions and perceptions against danger signs during pregnancy, routine antenatal visits are not considered important by many women and are done only to confirm the pregnancy (20). Studies have shown that improving antenatal visits can help in creating awareness among poor uneducated women which helps in reduction of mortality and morbidity among them (21). The study has shown that %age of use of ANC was very good among women of Faisalabad but as the parity increases this %age decreases. This finding is consistent with previous studies from Indonesia and Pakistan which have similar findings that as parity of women increases their inclination towards use of antenatal care visits decreases because ANC are considered important only in first pregnancy (2,22). Strategies should be made to create awareness among women regarding ANC visits for all the pregnancies. Also ANC visits can be used as a platform to increase rate of skilled attendant delivery in a health facility (23) which later on helps in improved maternal and child mortality and morbidity (24,25). This study has also shown that with increase in the level of wealth, ANC visit and facility delivery improves. This finding is consistent with findings of other studies from Pakistan (2).

Women education plays a crucial role in improving maternal health. Studies have confirmed that improving education level of the women improves the utilization of maternal health services and altering reproductive health of the women (26). Our study shows similar findings, with increase in education level utilization of ANC as well as

Table 4: Factors associated with the current use of family planning

	Current use of family planning %	Unadjusted odds of current use of family planning	Adjusted odds of current use of family planning
Mother's Age			
15 - 19	10.5	1.00	1.00
20 - 24	15.9	1.07	1.61
25 - 29	22.2	1.02	2.42
30 or more	31.1	1.03	3.83*
Parity / Living children			
1	10.2	1.00	1.00
2	21.0	2.25***	2.32***
3	26.0	3.28***	3.08***
4	35.6	5.96***	4.84***
5	39.8	7.54***	5.79***
6	36.7	7.40***	5.07***
7 or more	50.0	12.09***	8.76***
Mother's Education			
None	20.9	1.00	1.00
Primary	25.8	1.51	1.31
Middle	23.8	1.38	1.18
Secondary	21.6	1.45	1.04
Intermediate	28.3	1.87*	1.49
Graduate or higher	26.3	2.00*	1.35
Mother's Autonomy			
Low	25.1	1.00	1.00
Medium	27.4	0.87	1.13
High	20.0	0.63**	0.74*
Wealth Quintiles			
Lowest / First	22.9	1.00	1.00
Second	23.7	1.16	1.04
Middle	23.1	1.46	1.01
Fourth	23.1	1.22	1.01
Highest / Fifth	25.1	1.62	1.13
Health worker visited during last 12 months			
No	20.9	1.00	1.00
Yes	41.0	2.57***	2.64***
Mass Media Exposure			
Less than once a week	24.7	1.00	1.00
At least once a week	23.2	1.04	0.92
Total	23.5		
R-squared			15.3%

facility delivery increases. In contrast to the studies which have shown that with increase in level of education use of contraceptive increases, our study showed that there is no impact of education on use of contraceptives, contraceptive use among women with different level of education was the same (2,27).

Current use of family planning was very poor i.e; 23% among the women who have delivered in past one year. It was lower than the national level of contraceptive prevalence rate i.e. 29.6% (27). Although women were having good contact with the providers during pregnancy and rate of institutional delivery was also good, but use of contraceptive within one year of delivery was extremely low. This time period of pregnancy and post partum can be utilized as an opportunity for counseling women to adopt family planning. Studies have already published that post partum IUCD (intrauterine contraceptive device) is a feasible and effective method of contraception (28). Women who have been counseled for FP during postpartum period were more likely to use any method as compare to those who were not counseled (29). Interventions should be developed to counsel all women during antenatal and postnatal period.

Financial barriers play an important role in maternal health service utilization and in Pakistan about 38% of women are not attending health facility delivery only because of high cost of these services (30). This study has also shown that the wealth has substantial impact on utilization of facility delivery and ANC services. However, the association of wealth with use of FP was opposite; results have shown that use of contraceptive across different wealth quintile was almost the same. This finding was opposite to the association of wealth on FP use in PDHS 2006-7 and a study from Jhang (2,27). Studies have shown that to remove financial barriers, insurance and other social safety schemes can play a vital role, by improving financial status of the population and therefore utilization of ANC and institutional delivery (31). One of the methods adopted by many developing countries is demand side financing models (32). Studies in Pakistan and Bangladesh have already shown positive effect of demand side financing schemes on the utilization of facility delivery (33,34).

Media is a strong mean of promoting awareness about maternal health. The lack of association between exposure to mass media and family planning is similar to findings from the study conducted in Jhang (2). This shows that media in Pakistan has not been able to target the right audience therefore there is a need to formulate strategies to make media campaigns more effective in conveying family planning and maternal health message.

Women's autonomy is an important factor associated with maternal health services utilization. Contrary to the findings from the literature (35) our study has shown very interesting findings; high autonomy was only significantly associated with the health facility delivery, as autonomy increases from low to high its association with family planning use becomes negative. This is an interesting phenomenon and needs to be explored further.

Conclusion

Maternal factor, particularly parity and mother's education, have a substantial impact on ANC visit and facility delivery. To gain maximum impact from a demand side financing program in Faisalabad, the program should target women from the poorest quintile, with two or more children and having no education. Lessons learned from this demand side financing model can later be used to strengthen up the health systems for improving utilization of maternal health services. Policies should be made at local and national level to; capitalize post partum period for counseling women for family planning adoption, and improving role of mass media in promoting maternal health and family planning.

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Original Article

Health system preparedness: A rapid need assessment of flood in Pakistan, 2011

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Abstract

Introduction: Pakistan has a disaster prone geography specifically vulnerable to floods and earthquakes. In 2011 massive floods affected 5.0 million people in 22 districts of Sindh province. The objective of this assessment was to provide a quick overview, prioritize needs and gaps of health services available to the affected population.

Methods: A descriptive observational study was conducted to explain the situation, in terms of health services available to the affected population. Rapid assessment tool was introduced to Executive District Officers of 22 districts in Sindh.

Results: Female head of household was the largest vulnerable group. Health facilities were accessible within one-two hours on foot or by cart. The supplies of essential medicines and vaccines were inadequate for the post flood period. EmOC services were attainable in 40% of health facilities. Supply of clean potable water was disrupted in whole of the affected area. Despite of a number of early warning alerts and outbreak reported; no major epidemic occurred.

Conclusion: In wake of rapid climatic changes we identify a need of capacity building to manage such calamities. Restoration of affected health services and prevention and control of communicable disease should be the first step of response during floods. Outreach health workers and volunteers can play an important role by informing people about the risk of the on-going outbreaks. Facility specific preparedness plans should be developed, which detail out standard operating procedures during floods and identify clear lines of command. *(Pak J Public Health 2013;3(1):27-33)*

Keywords: Disaster preparedness; Floods; Health system response; Health cluster; Medical needs.

Introduction

Natural disasters interfere with economy and destroy infrastructure, resulting in a disruption of livelihoods, normal services and health care. Floods can be particularly disruptive, leading to widespread collapse of infrastructure (1). Flood disasters are the most common (40%), natural disaster worldwide and have been more widely documented than any other natural disaster. They occur globally and are weather and climate change related events. The public health consequences of flooding include disease outbreak resulting from the displacement of people into overcrowded camps and cross contamination of water sources with faecal material and toxic chemicals (2).

Pakistan is one of the most vulnerable countries to the consequences of the climatic change because of its diverse geographical and climatic features. Global warming is bringing a lot of interactive changes to the physical processes responsible for the climate system dynamics. Such changes, sometimes appear as occurrence of extreme events of unprecedented intensity casting irreversible loss to the natural resources. Due to rise in temperature, significant changes in hydrological cycle occur in the form of changing precipitation pattern, increased precipitation events and weather-induced natural disasters (3).

The number of natural disasters and severity of their impact have increased in recent decades. These developments highlight the need for improved preparedness and response in the health sector, inter alia, and the important role of public health in disaster management. The key question is how should health systems prepare for and respond to natural disasters? Health sector and public health institutions have key function as these institutions have specialized knowledge of the situation and needs of societies, that could enable public health specialists to play a more active role in disaster-related decision making bodies and disaster management teams (4). Poor and weaker members of the society have always been more vulnerable to various types of disasters. Poor co-ordination at the local level, lack of early-warning systems, often very slow responses, paucity of trained dedicated clinicians, lack of search and rescue facilities and poor community empowerment are some of the factors, which have been contributing to poor response following disasters in the past (5).

Pakistan has a traditional relief and response oriented disaster management system baring defenses that have been erected over the years against the flood hazard. District and the community are the two key entities in articulating disaster response on impact. Recent experiences have adequately highlighted their striking

limitations. In the district situation it is the near absence of warning and planning instruments and a feeble outreach, while for the communities are weak in social organization and disaster coping mechanisms (6).

The risk of infectious diseases after weather or flood-related natural disasters is often specific to the event itself and is dependent on a number of factors, including the endemicity of specific pathogens in the affected region before the disaster, the type of disaster itself, the impact of the disaster on water and sanitation systems, the availability of shelter, the congregating of displaced persons, the functionality of the surviving public health infrastructure, the availability of healthcare services, and the rapidity, extent, and sustainability of the response after the disaster. Weather events and floods may also impact disease vectors and animal hosts in a complex system (7). Preventing infectious disease transmission should be the main focus of relief efforts. Adequate hygiene and sanitation are of primary importance in diarrheal disease prevention. Flood victims need safe water and information about the benefits of maintaining hygienic practices, such as hand washing with soap, exclusive breast-feeding for the first 6 months and disposal of human excreta to curtail disease transmission. Mass vaccination for children against measles and cholera is particularly important (8).

Pakistan has a disaster prone geography. Recent natural calamities at China, Japan and United States of America have shown human society's vulnerability to nature. With an overall objective of defining the Pakistan's response to immediate mass scale disaster, a cross sectional study for flood 2011 is presented for the introspection and future management of such issues. National Health Emergency Preparedness & Response Network (NHEPRN), conducted a rapid need assessment survey, in collaboration with Provincial Health Department, Sindh and World Health Organization (WHO) in 22 flood affected districts of Sindh. According to National Disaster Management Authority (NDMA) statistics, around five million people were affected at the time of study. The objective of this assessment was to provide a quick overview, prioritize needs and gaps of health services available to the affected population.

Methods

It was a descriptive observational study. Data was collected from 8th to 12th September, 2011 at 22 flood affected districts by the WHO Surveillance Officers. The affected districts were notified by Disaster Management Authority. The districts included were Badin, Thatta, Hyderabad, Sukkur, Khairpur, Shaheed Benazirabad, Shikarpur,Tando Muhammad Khan, Tando Allahyar, Umerkot, Jacobabad, Kamber, Shadadkot, Jamshoro, Larkana, Ghotki, Kashmore, Matiari, Sanghar, Tharparkar, Mirpurkhas, Dadu and Nowshero feroze. For the sake of clarity and future planning, the damaged facilities were assessed by regions. The districts were divided into South, Central and North region. A similar approach was used by another study of Seropositivity of Hepatitis C in jail inmates Pakistan (9).

The Executive District Officers of 22 districts were interviewed. An observation checklist (rapid assessment tool) was used. Rapid assessment tool is a standard tool which is used by international agencies working in humanitarian crises. It includes open ended interviews, direct observation and written documents. It was a mix of primary and secondary data analysis. The variables relevant to healthcare in natural disasters were chosen. The concept of vulnerability was taken from “Vulnerability, Vulnerable Population and Policy” by Ruof. According to this, each specialist such as anthropologist, disaster management specialist, health & nutrition expert, and economist has its own reasons to define and measure vulnerability. The common rule includes research subjects such as handicapped, mentally disabled, children, and chronically ill, homeless people, economically disadvantaged and educationally disadvantaged (10).

The rapid need assessments are done in emergencies usually within the first week of post disaster, and the organization itself has legal mandate to conduct this kind of survey with collaboration of other stakeholders. However, the ethical considerations were undertaken and departmental permission to conduct this study was taken from Director General Office, Health Department of Sindh.

Results

Six variables were assessed; accessibility to the districts, physical damage to health care outlets / facilities, vulnerable groups, existing health care services and water quality and sanitation status.

Physical accessibility to flood affected districts

It was found that 21 Districts out of 22 were accessible by various means like cars, 4WD (four wheel drive), light truck and heavy truck. Tando AllahYar was reported inaccessible at that time. Badin, Dadu and Shaheed Benazirabad were accessible only by 4WD. Four districts were accessible by all four means. Eleven districts were accessible by three means of transportation.

Health facilities which were accessible within one hour walking were found in 12 districts. It was reported that 1-2 hour accessibility to health facilities on foot or by cart

Table 1: Distribution of functional and accessible health facilities

Regions	BHUs			RHCs		
	Total	Damaged	%	Total	Damaged	%
South*	215	81	38	37	17	19
Central**	220	87	39	40	8	20
North***	247	56	23	34	5	15
Total	682	224	33	111	20	11

South*: Hyderabad, T.M.Khan, Thar, Badin, Thatta, Mirpurkhas, Umerkot
Central**:Matiari,Tando Allah Yar, Benazirabad, Nosheroferoze, Dadu,Sanghar, Jamshoro
North***: Jacobabad, Kashmore, Sukkur, Larkana, Kamber, Ghotki, Shikarpur, Khairpur

was found in two districts i.e Sanghar and Tharparkar. While average time of two hours for accessibility was reported in five districts (Sukker, Khairpur, Jacobabad, Larkana and Kamber).

Health facilities status

1,290 functioning and accessible hospitals/ clinics were reported in the 22 flood affected districts. Out of 682 BHUs, 224 were damaged. There were 111 RHCs, out of which 20 were damaged. The highest percentage (39%) of damaged BHUs and RHCs (20%) was in Central region; whereas the North region had relatively low percentage of damaged health facilities.

Healthcare situation

According to statistics of Health Department Sindh, fifty deaths due to drowning and snake bites were reported till 12th September. The overall healthcare delivery situation in Sindh rapidly deteriorated. About 33% of Basic Health Units (BHU) and 11% of the Rural Health Centers (RHC) were unable to fulfill health services needs of population due to issues of geographical accessibility or damage to the infrastructure. Supply of essential medicines was found to be adequate till the end of the September, 2011. Essential emergency obstetric (EmOC) services were disrupted at 40% of the health facilities. The supply of clean potable water was reported to be badly disrupted in almost all the affected districts. Diseases Early Warning System (DEWS), established during floods 2010 reported to be well in place and the system had detected 193 alerts out of which 36 were confirmed outbreaks. These were responded through the Rapid Response Team and controlled within 48 hrs.

Vulnerable groups

The most presented vulnerable groups across the 22 flood affected districts were the female head of households present in nine districts (41%). The second largest group was chronically ill (36%) in eight districts. The marginalized group (political/religious/ethnic/others) represented the third largest group in seven districts (32%). Another group at risk was with severe disability which was found in seven districts (32%). There were also unaccompanied minors and elders representing (18%) each in four districts.

Communicable disease surveillance and response

From 1st January to 29th July 2011, 940 alerts were generated and investigated, 167 outbreaks were identified, responded and controlled. The major outbreaks reported were Acute Watery Diarrhea (AWD), Measles and Pertussis. In post flood period from 1st August to 8th September 2011, a total of 193 alerts were generated and investigated. 36 outbreaks were identified, responded and controlled. Districts Thatta, Badin, Dadu, Mirpurkhas, Tharparkar, Khairpur, Tando Muhammad Khan, Nowshero Feroz and Ghotki were particulay at high risk of outbreaks. Brief description of the alerts, outbreaks for the most common diseases is described in figure 1.

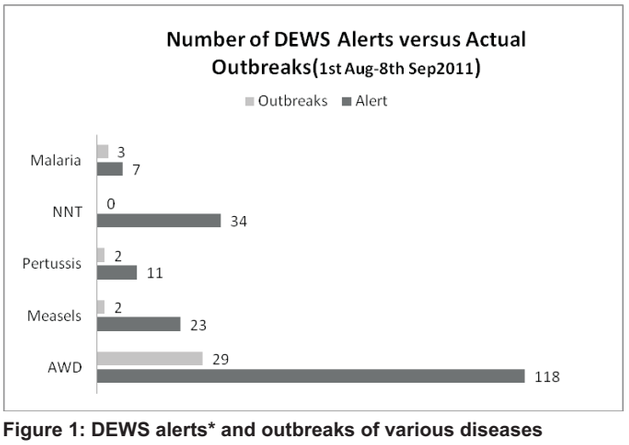

Figure 1: DEWS alerts* and outbreaks of various diseases
** Alerts are unusual health events that sometimes signal the early stages of an outbreak.*

Provision of maternal and child healthcare services

Maternal and child healthcare services were available at 40% of the health facilities; predominantly with acute shortage of basic newborn kits. 64% did not have sufficient supply of oxytocysin and anticonvulsants. The shortage of these essential was key impediments in conduction of caesarian section and assisted deliveries. 41% of assisted vaginal deliveries and 32% caesarian sections were done.

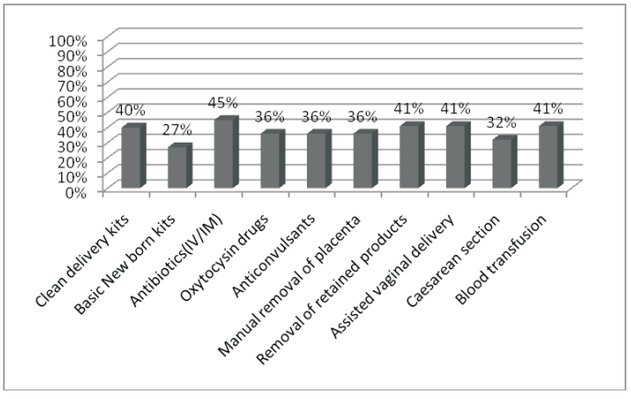

Figure 2: Maternal and child health care services across 22 districts

Availability of drugs/commodities

32% of the flood affected health facilities had adequate stocks, medicines, equipments and other consumables for a maximum period of two weeks while 50% of the health facilities had insufficient medicines and consumables to provide effective primary health care facilities to the affected population. It is pertinent to mention that the availability of medicine and consumables was noticed when sufficient buffer stocks were repositioned at Hyderabad and Sukkur hub(temporary warehouse for stocks) with collaboration of WHO. These supplies included emergency health kits, essential medicines, hygiene kits, mosquito nets, aqua tabs and gerry cans. A limited population of 178,000 was catered through these supplies. Vaccines [immunization and antisnake venom (ASV)] and other stocks of injectables were available in 32% of the health facilities for one month.

Water and sanitation

The flood caused major damage to the existing infrastructure (already damaged from 2010 flooding) of water supply, drainage and sewerage system. Water systems, public facilities, electricity and transportation were paralyzed resulting a major impact on the livelihoods of the affected people. Accessibility was another problem which exacerbates the situation in all affected districts. It was found that eighteen districts were having problem in physical access to water, whereas Tando Allah Yar, Shikarpur and Jamshoro were reported to have problem in water quality. At the time of data collection, no information on water status was available in Mitiari, S. Benazirabad TM Khan and Tharparkar. Dewatering and carcasses removal was required in fourteen districts.

Discussion

A vast geographical area of Sindh province was affected by the floods including 22 districts. A large number of household were damaged resulting in displacement of families. Initially the deaths were due to drowning and snakebites. The immediate health impacts of floods include drowning, injuries, hypothermia, and animal bites. Health risks also are associated with the evacuation of patients, loss of health workers, and loss of health infrastructure including essential drugs and supplies. In the medium-term, infected wounds, complications of injuries, communicable diseases, and starvation are indirect effects of flooding. Likewise, long term effects of flooding are chronic diseases, disabilities, and poverty-related diseases including malnutrition (11).

In floods 2010, a preliminary damage and need assessment showed that floods resulted in mild to moderate damage to the country's public health infrastructure, including basic health units and dispensaries which suffered the most damage. Short term strategies should focus on establishing essential health services packages (primary healthcare, emergency obstetric care, response to disease outbreak, supply of essential medical supplies, etc). Cross cutting issues such as care for vulnerable groups (women of reproductive age, children and the elderly) should also be addressed as a priority. In the medium and long term, a comprehensive health sector revitalizing strategy should aim at the provision of minimum standards for health care, based on the key principles of equitable access to essential health care, results and accountability (12).

In 2008, after heavy rains and flooding, Iowa Department of Public health conducted a rapid need assessment to quantify the scope and effect of the floods on human health. The assessment revealed that many households have been temporarily displaced and future health risks may emerge as the result of inadequate access to prescription medication or the presence of environmental health hazards. This exercise highlighted the need of improved communication measures and ongoing surveillance and relief measures. It also demonstrated the utility of rapid need assessment survey tools and suggested that increased use of such surveys can have significant public health benefits (13).

Table 2: Summary of health health indicators assessed in 22 districts

Indicators		Total Districts	%
How long stocks of medicine will last?	One week	7	32%
	Two week	9	41%
	Three week	1	5%
	Four week	5	23%
How long stocks of vaccine and injection equipment will last?	One week	4	18%
	Two week	7	32%
	Three week	4	18%
	Four week	7	32%

During flood 2011, the damage to the infrastructure hampered the timely access to the health care facilities. The first level health care facilities i.e. BHUs and RHCs were damaged. The damaged healthcare facilities resulted in interrupted healthcare delivery services. The maternal and child health services were inadequate with insufficient supplies. The stocks of medicines, vaccines, consumables were sufficient only for two weeks. The district government's established static medical camps in the functional healthcare facilities for the affected population. Mobile medical camps and outreach teams were sent for areas with difficult access.

Studies in a similar setting such as India inform that public primary health care facilities are the frontline institutions which deal with the disasters, particularly in rural settings. The healthcare facilities are ill prepared to handle the flood despite being faced by them annually. Basic utilities and essential medical supplies are lacking during floods. Lack of human resources along with missing standard operating procedures; pre-identified communication and incident command systems are the main hindering factors in mounting an adequate response to the floods (14).

The results of rapid assessment floods 2011 showed that poor water and sanitation system and lack of potable water further deteriorated the situation and invited outbreaks. Due to this the largest outbreak reported was Acute Watery Diarrhea (AWD). Measles was another major issue reported. Number of malaria cases was increasing and tetanus cases were also being reported. DEWS which was established in 2010 was well in place and outbreaks were reported by the rapid response teams and controlled. However, there were no deaths reported by these outbreaks. The displaced population in camps was in urgent need of mass vaccination campaigns for measles & Vitamin A and tetanus, which were arranged by the District government through International partners. Due to increase in snakebite cases, anti snake venom was required as the stocks were insufficient. NHEPRN ensured provision of ASV through National Institute of Health as it is the sole organization to provide ASV to the provinces. NHEPRN as co-chair of National Health Cluster replenished the stocks of essential medicines and supplies according to the need of the districts with collaboration of International partners. This fact cannot be denied that government procedures are cumbersome and lengthy for providing supplies for emergency healthcare needs. In the district budgets limited or no funds were allocated to meet the demands in a disaster situation.

In Bangladesh, during the flood, the number of cholera and non-cholera diarrhea cases was almost six and two times higher than expected, respectively. In the post-flood period, the risk of non-cholera diarrhea was significantly higher for those with lower educational level, drinking tube-well water or using a distant water source and unsanitary toilets (15).

Study in Thailand shows that District Development Committee (DDC) encountered several problems, including inability to use the existing data base and lack of accurate information, human resources, adequate funds and coordination among agencies. Guidelines should be formulated to strengthen district level planning for rehabilitation after a disaster (16). Another example is of Vietnam, which is one of the most disaster-prone countries

in the world. A cross-sectional survey showed there was a higher incidence of dengue and other communicable disease, and psychological issues. It recommended that for people in flood prone areas, flood prevention and mitigation strategies need to be seriously thought through and acted upon, as these people are exposed to greater health problems such particularly communicable diseases (17).

Hospitals and health systems must have a living, actionable plan for disaster preparedness and business continuity. Keeping the data center running and ability to communicate during a natural disaster or event is paramount (18). Simple steps like developing facility specific preparedness plans which detail out standard operating procedures during floods and identify clear lines of command will go a long way in strengthening the response to future floods. The facilities should ensure that baseline public health standards for health care delivery identified by the Government are met in non-flood periods in order to improve the response during floods (12).

This study shows that the most vulnerable group was females across 22 districts. The reproductive health care delivery services were inadequate at the time of floods. According to National Nutritional Survey 2011, Sindh has highest prevalence (34.2%) of Anemia in women (19). The females with preexisting anemia, internal displacement and food shortage were an ideal victim of acute malnutrition.

Strengths of this study is that, it is the first review of data from floods with a public health perspective. Limitation is that it is a rapid analysis, so that causality and in-depth analysis of issues was not possible. However the study adds further for policy makers and health authorities to understand that prioritization of medical needs of the affected population is the most pressing issue.

Conclusion

Floods and their impact are likely to increase in the future due to urbanization and land use changes, high concentrations of poor and marginalized populations, and a lack of regulations and preparedness efforts (1). There is a need for effective policies to reduce and prevent flood-related morbidity and mortality. Such steps are contingent upon the improved understanding of potential health impacts of floods. Global trends in urbanization, burden of disease, malnutrition and maternal and child health must be better reflected in flood preparedness and mitigation programs (20).

Government has an infrastructure and system to handle such calamities, and all other agencies normally route their inputs through the government structure, which though need capacity up gradation and policy realignment. Reestablishing and improving the delivery of primary health care through restoration of affected health services should be the first step. Prevention and control of communicable disease should be the main focus of response during floods. Immediate medical supplies should be provided while restoring an appropriate level of sanitation. Outreach health workers and volunteers can play an important role by informing people about the risk of the on-going outbreaks. They can facilitate early referral of patients and promote preventive measures. DEWS although placed in the system should be strengthened by the district health governments.

In Pakistan scenario, a detailed operating procedure is needed at all levels of importance. Inter-sectoral collaboration should be strengthened to overcome challenges faced providing relief and recovery to a substantial displaced population. National capacities should be built to initiate far reaching reforms like a single preparedness and response plan for all types of disaster. This will enable government to cope with disasters effectively and maintain sustainability, hence reducing dependency on foreign aid for sustainability.

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Original Article

Adequate visits, inadequate service: comprehensiveness of ANC in Samarinda & Balikpapan, East Kalimantan

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Abstract

Introduction: With reference to the recommended essential antenatal services in Indonesia, this study assessed the provision of essential minimum care to pregnant women who attended government primary health care centres.

Methods: Using a structured questionnaire, exit interviews were conducted with 182 pregnant women in their third trimester following receipt of ANC at primary health care centres in two cities of East Kalimantan province, Indonesia.

Results: For those who attended the government health care centres, access to ANC in terms of number of visits and the timing of the visits were quite close to the national recommendations. At the government health centres a majority, however, did not receive the full set of even basic antenatal care components. The research also pointed that despite attending the government health centre for four or more ANC visits many women used the ANC services provided by the private doctors as well.

Conclusion: The ANC at the government primary care facilities lacks comprehensiveness, and quality improvement measures are necessary if these services are to contribute to better health of mother and babies. The health departments and those involved in managing national safe motherhood initiatives should not be satisfied with the information that a large number of pregnant women may now be accessing ANC from skilled health care providers. *(Pak J Public Health 2013;3(1):34-8)*

Keywords: Ante natal care; Quality of care; Safe motherhood; Primary health care; Indonesia.

Introduction

Over the last decade, Indonesia has made significant improvements in the provision of health care to its population (1); however, progress in a number of maternal health indicators still remains at a relatively poor level (2).It is estimated that just 66% of pregnant women in Indonesia are receiving government recommended number of antenatal care (ANC). The maternal mortality ratio (MMR) is amongst the highest in South East Asia, and is about double that of the MMR in Philippines and three times that of Vietnam (3).

For women without any specific health conditions, at least 4 ANC visits to an appropriately trained health care provider arerecommend (4).This recommendation by the World Health Organisation (WHO) has been adopted as a national policy for safe motherhood service provisionby the Indonesian Ministry of Health.The Indonesian Ministry of Health has also stipulated that during every antenatal visit, all pregnant women should receive the basic minimum services of height and weight measurements, blood pressure measurement, and an abdominal examination, and that blood and urine tests occur at least once during pregnancy.

The role of adequate and appropriate ANC provided by skilled health care providers is highly important. The ANC provides opportunities to address issues such as anaemia, malnutrition, education about breastfeeding, identification of risks such as hypertension and preeclampsia, and prevention against tetanus. Additionally, it provides opportunities for provision of information about access to care and referral, which can increase likelihood of skilled birth attendance (5).

As many life-threatening complications with no identifiable clinical risk factors are not apparent during ANC visits and occur during the delivery stage, the usefulness of ANC on its own for a decrease in maternal mortality is questioned (6). However, the importance of ANC for better health of mother and baby is undeniable. Extensive evidence supports the importance of ANC in reducing adverse pregnancy outcomes (7).The challenges to the effectiveness of ANC are predominantly such antenatal practices that focus solely on risk management, rather than

including health promotion aspects (8). The benefits of ANC to the mother for safer delivery and to the baby in terms of healthy growth and infection reduction are widely acknowledged (9). Such benefits require comprehensive and high quality ANC provided by skilled health care providers with access to needed resources. In East Kalimantan the government records points out that a large majority of pregnant women now receive ANC from skilled workers. Therefore, it is important to identify if the quality of ANC is in line with the recommended by the MOH and WHO.

This study is aimed at identifying whether women attending the government primary health care centres (puskesmas) are receiving essential minimum ANC services as mandated by the MOH in line with the WHO guidelines. Puskesmas provide access to primary care for a large number of people. Puskesmas provide a range of primary care services including ANC and PNC. Some of these puskesmas are also equipped with birthing units where trained midwives provide intrapartum care. While there has been some research conducted on the quality and responsiveness of Indonesia's primary health care services (2,3,10-12); there has been limited information provided with such studies conducted in the East Kalimantan province.East Kalimantan provides a valuable case study as the many districts in the province have access to significant relative wealth, which is being used by the decentralised district authorities for an improved network of primary care services, improving access by making health centres open for 24 hours, and by investing in the training and recruiting of human resource for health.

Methods

Using a structured questionnaire, exit interviews were conducted with pregnant women following their receipt of routine ANC at primary health care centres (puskesmas). The exit interviews were conducted at 15 puskesmas in the districts ofSamarinda and Balikpapan. As the objective was to assess the quality of ANC services provided at the government health centres (puskesmas), only those women were interviewed who attended these centres in order to identify whether they received the needed essential minimum quality of care.

The research team, comprised of the University researchers and provincial and district health managers, strategically selected these puskesmas out of the total 46 puskesmas to represent different puskesmas size, puskesmas serving population living in different areas of these cities, and puskesmas based in areas of relatively different socioeconomic status.

The target population was the pregnant women attending government primary care centres (puskesmas) for ANC services. The sample size of 178 was calculated considering the current level of use of puskesmas in Indonesia for essential minimum number of four ANC visits, power of 80 and a significance interval of .05. A weighted sample was calculated to calculate the number of participants needed from each puskesmas. The weightings were based on activity data showing last year's antenatal patient visits to each puskesmas. On the days of data collection all women of 28 week gestation who attended the participating puskesmas for ANC during were requested to participate in the study.

The research was conducted in Samarinda and Balikpapan. In consultation with the local health representatives, and in order to gather a sample of puskesmas that represented a varying demographic of the study districts, 15 puskesmas were strategically chosen from all of the 46 puskesmas in Samarinda and Balikpapan. Factors such as size, specialty field, catchment area, socioeconomic status of people attending the puskesmas and location were considered during the selection process.

Pregnant women over 28 weeks of gestational age attending the selected puskesmas were requested to participate in this study. The participants were interviewed, after gaining informed consent, immediately after an ANC appointment at the puskesmas. The interview questions enquired into history of care throughout that pregnancy, including timing, frequency and levels of essential care components. The primary variable of interest was adherence to the essential minimum ANC recommendations. The questionnaire included information on number of antenatal visits, time of first visit, membership in insurance schemes, years of education, income, direct/indirect costs incurred, gravidity and parity details, relevant pregnancy history and risk factors, any illnesses during the current pregnancy and distance travelled to the puskesmas.

The data was analysed using SPSS 17 to identify the number of ANC visits to both government and private sector providersand to identify if the women received the recommended essential ANC components as stipulated in the national recommendations i.e. whether the ANC service at the puskesmas included height measurement, weight measurement, blood pressure measurement and abdominal examination, and the timing of the first ANC visit as it is recommended that at least one visit be made during the first trimester.

Table1: Receipt of basic ANC service components

	Height measurement		Weight measurement		Blood pressure measurement		Abdominal examination		All ANC service components received	
	Received	Not received	Received	Not received	Received	Not received	Received	Not received	Received	Not received
Total	60 (33.5%)	119 (66.5%)	148 (82.7%)	31 (17.3%)	146 (81.6%)	33 (18.4%)	140 (78.2%)	39 (21.8%)	37 (20.7%)	142 (79.3%)

Results

182 pregnant women were interviewed over the 3-week data collection period.The data of 179 participants were analysed, due to missing data in 3 interviews.This total included 94 respondents from Samarinda and 85 from Balikpapan.

The median age ofthe participants was 26 years.Median gestational age of the participants was 33 weeks. Just over 37% of participants were experiencing their first pregnancy.For those who had been pregnant before, the mean number of prior pregnancies was 2.

Of the approximately 80% of the participants who disclosed their income to the interviewer, the average monthly household income was approximately 1.6 million Indonesian Rupiah (IDR) ($200AUD). Nearly 37% of participants reported their monthly household income as 1 million IDR or less.

A large majority, 82%,of the respondents had attended school beyond primary school, and more than half of the respondents had obtained some form of post secondary educational qualification

Very few participants stated that they suffered from any co-morbidity.Only 4% of women reported that they suffer from, or have previously suffered from hypertension.

Almost 44% of participants in this study made at least one visit to a private health care provider for ANC care.

Only 20.7% of participants across the both districts received all 4 minimum recommended ANC component services (height measurement, weight measurement, blood pressure test, abdominal examination) during the ANC visitafter which the interview was conducted. Table 1 displays receipt of basic ANC care components. A majority of the women did receive one or more of these component services; however, few received all four.

Of all participants, 89.9% made 4 or more ANC visits by the time they were interviewed in the third trimester of their pregnancy, including the visit when the interview took place. Just over 63% made at least 4 ANC visits to a public or private provider, including 1 in the first trimester of pregnancy. Table 2 demonstrates the statistically significant (using chi-squared test) positive relationship between participants who made an ANC visit in the first trimester of their pregnancy and at least 4 visits throughout the pregnancy, compared to those who did not make a first trimester ANC visit.

Table 2: Minimum recommended ANC visits by ANC visit in first trimester of pregnancy

		Number of ANC visits		
		4 or more visits	Less than 4	Total
First trimester visit	1st visit in 1st trimester	102	4	106
		96%	4%	100%
	1st visit not in 1st trimester	59	14	73
		81%	19%	100%
Total		161	18	179
		90%	10%	100%

About two thirds of women received four visits or more including one in the first trimester. However, only 48.5% of those who did not attend high school received ANC in the first trimester, compared to 76% of those who did attend the high school.

Although not statistically significant, there is a small difference between minimum basic services received at an ANC visit between participants who made an ANC visit in the first trimester and those who did not (Table 3). Seventy-three percent of the participants who received all recommended services also had an antenatal visit in the first trimester of their pregnancy.

Table 3: Recommended minimum ANC service components received by first trimester ANC visit

		Number of ANC visits		
		4 or more visits	Less than 4	Total
First trimester visit	1st visit in 1st trimester	102	4	106
		96%	4%	100%
	1st visit not in 1st trimester	59	14	73
		81%	19%	100%
Total		161	18	179
		90%	10%	100%

There was high variability in the basic services provided to patients during their ANC visit. Not only did the participating puskesmas differ from each other in terms of what ANC component services they provided, but additionally, within each particular puskesmas different women received a different set of ANC service components. That is to say that no puskesmas was found to provide a standard of care (ie. All basic recommended services) to all or most of its patients, nor was there a pattern of services identified between any of the 15 puskesmas where the interviews took place.

Many (43.6%) women attendeda private care provider for at least one ANC visit. Of these participants who made at least one visit to a private health centre, the mean number of private health centre visits was 3.

Discussion

The results of this study needs to be considered within the context of some limitations. As this study recruited participants for interview at the point of service it did not measure the overall utilisation and the unmet need of ANC for women in East Kalimantan. The information about comprehensiveness and quality of ANC for women who do not attend puskesmas and for women who attend only hospitals and/or private physicians needs to be researched in order to obtain a reliabledescription of ANC quality in East Kalimantan. This study however remains important as it provides useful information about quality of care for those who attend the puskesmas and could be used to guide future planning, development, training and monitoring of services at these centres.

The Indonesian Ministry of Heath had set the target of 90% pregnant women to receive 4 or more ANC visits. This study points to that in the two districts, access in terms of number of visits almost reached the target set.It is to be noted that these two districts are city-districts and are not representative of the districts which have larger rural and remote populations.Adequate number of ANC visits, as demonstrated in this study, provides an opportunity to provide quality services to at least those who attend the puskesmas, and improve the health outcomes for those mothers and babies. However, although frequency of access was relatively high, timing of first visit does not meet national recommendation, and receipt of basic essential antenatal service components during an ANC visits was far below the national recommendation.Services provided to pregnant women at puskesmas were highly varied in terms of comprehensiveness of care.

The correlation between making a first trimester visit and receiving all essentialbasic services may reflect a better awareness amongst these women about the needed care, and that they may be in a position to ask/demand the puskesmas staff for the needed care.The income and past pregnancies and deliveries did not appear to have any influence on accessing apuskesmas for ANC during the first trimester of pregnancy. The fact that a relatively larger proportion of women with high school education accessed the puskesmas during the first trimester compared to those who did not attend high school suggests that the information about the need for early visits and the information about the need for a comprehensive set of ANC services is not effectively communicated to those who are socioeconomically disadvantaged. Hence, relatively fewer women are received adequate number of ANC, adequate set of ANC components, and timely access to ANC. Maternal education has been identified as a major predictor of utilisation of ANC services (11). A larger study examining the quality of care across eight Indian states also pointed to the inverse care law, i.e. poorer quality of antenatal care received by the poor and illiterate women who generally need more and higher quality of care (11).

The variability between the 15 puskesmas in term of comprehensive care and lack of standardisation of care could be because of inadequate understanding and lack of active monitoring of services.Considering that essential minimum ANC is easy to define and provide, the fact that many women did not receive such care could in some cases at least be due to lack of motivation of the staff. Harward and Choi has pointed to the concerns about the accountability within Indonesian health services, which according to them, might be due to confusion about roles and responsibilities.This reflects in part on the staff in terms of what service they ought to provide. It could also be a lack of monitoring (2).

The fact that many of the women, who attended government facilities, also visited private health care providersmay reflect that these women consider the quality of puskesmas ANC as poor and/or theyunderstand services at the puskesmaslacks comprehensiveness.In our study there was no significant correlation between income and access to a private health care centre.

Generally the majority of the women who use puskesmas are those who are not privately insured, are of poor economic background,and are often enrolled in the government health insurance schemes for subsidized care. Despite their poor economic background and despite that they have access to low cost care at puskesmas, many women in our study used the services of private medical practitionersin addition to the public services. This service

utilization practice could well be a response to perceived poor quality of care at government centres.It suggests that Indonesian women on limited incomesare left with a difficult decision on the provision of their health care.Pregnant women receive highly subsidisedpublic sector services where the quality and consistency of care appears quite low and for that reason these women also visit private health care providers offering services that may be high cost but perceived as of better quality. It is not known at this point whether the care at private health centres in East Kalimantan is of a higher quality than that at public centres.Current literature from other Indonesian provinces suggests little difference exists between public and private health centres in terms of quality, even suggesting quality of services at public centres is slightly better (2,12).If this is the case, then women in Indonesia may be spending additional household income on private services, but may not be receiving any higher quality care.This points to the need for research about the quality of ANC and PNC in the private sector as well.

Conclusion

The ANC at the government primary care facilities is of inadequate clinical quality, due to the lack of essential recommended services. Service provision in the government sector requires huge sums of money from within the overall scarcity of resources in developing countries; hence, the need for effectiveness and quality care not only from a health outcomes perspective but also from an ethics and economics point of view. The health departments and those involved in managing national safe motherhood initiatives should not be satisfied with the information that a large number of pregnant women may now be accessing ANC from skilled health care providers. Quality improvement measures, including capacity to support and monitor and measures to motivate the trained staff, are necessary if these services are to contribute to better health of mother and babies.

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Original Article

Impact of water, sanitation and health education interventions on health and hygiene behaviors: A study from northern Pakistan

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Abstract

Introduction: Water and sanitation interventions were delivered in the northern areas of Pakistan as a joint venture of the Aga Khan University and the Aga Khan Health Systems Oshikhandass Diarrhea and Dysentery Project (1989-96) followed by the Aga Khan Water, Sanitation, Health and Hygiene Studies Program (WSHHSP). Through these interventions water treatment plants, new pit latrines along with a component of health education were introduced. The objective of the study was to explore perceptions, knowledge and practices of inhabitants of Oshikhandass village in Gilgit related to water quality, latrine use and hand washing following the intervention.

Methods: Through an exploratory study during June-July 2012, six focus group discussions (FGDs) were conducted in various sectors of Oshikhandass supplied by filtered water (intervention area), piped water and mixed water (piped and channel water). The latter two were designated as the non-intervention areas. Participants included mothers, LHWs and youth.

Results: Irrespective of health education by LHWs, residents of both intervention and non- intervention communities had learnt about proper hygienic practices from daily life experiences, parents, teachers and media. LHWs role at best had been that of a positive reinforcement. Despite uniformly good awareness, intervention communities still had relatively better health and hygiene knowledge and practices as compared to non-intervention areas.Conventional practices of water purification such as using gulk as domestic filter cum refrigerator was prevalent. Non-intervention communities, however, knew that accessibility to safe water makes a difference and they would have practiced better hygiene if they had resources. Inhabitants of intervention area commented that the functionality and coverage of the filtration plant was not enough to cater to the needs of the village.

Conclusion: Knowledge alone is ineffective in modifying hygiene related behaviors. Sound context-specific integrated interventions for water and sanitation infrastructure development are much needed.*(Pak J Public Health 2013;3(1):39-44)*

Keywords: Hygiene; Behaviors; Water & sanitation; Interventions; Northern Pakistan.

Introduction

The need for careful selection of water, sanitation, and hygiene interventions is receiving special attention in the context of the UN Millennium Development Goals and targets which aim to halve the proportion of people without sustainable access to safe water and reduce the mortality rate of children under 5 years by two thirds. All 189 UN member states have pledged to meet the Millennium Development Goals by 2015, and the UN General Assembly has given them additional weight by declaring 2005–2015 to be the "International Decade for Action—Water for Life" (1). The worldwide commitment to these goals provides an excellent opportunity to improve health and quality of life through the implementation of appropriate interventions.

Health outcomes, especially behaviors relating to hygienic practices, are influenced by socioeconomic interventions like improvement in water and sanitation facilities (2-4). An integrated package of activities aimed at improving water supply and sanitation facilities, providing appropriate hygiene education, and building local capacity for the management of water and sanitation resources is more likely to show significant health benefits than a program that concentrates on one area alone (5-7). Global studies from developed and developing countries have reveled remarkable health improvements from water and sanitation infrastructure development along with a combination of other components such as health education most appropriate to the local context (8-10).

This study explored perceptions, knowledge and practices of inhabitants of Oshikhandassvillage in Gilgit city related to water quality, latrine use and hand washing following an integrated intervention named "Water, Sanitation, Health and Hygiene Studies Program (WSHHSP)" by virtue of which besides health education, water treatment plants and new latrines were introduced.

Methods

The northern areas of Pakistan, recently renamed Gilgit-

Baltistan are a spectacular and remote, mountainous region. Oshikhandass is a village in the east of Gilgit city. It consists of about 800 households with a population of approximately 7000 individuals. 80% of the population depends on agriculture; socio-economic conditions are significantly poorer than in the rest of Pakistan. This village links Bagrot Valley and Jalalabad village to Gilgit city.

Water from glacier melt is the primary source of water; surface or untreated tap water is mainly used for consumption. Sanitation practices historically have included the use of open fields and cattle sheds for defecation (Ghizar District, parts of Gilgit District), or the use of traditional pit latrines entitled “Chaksa or Chukan” (Baltistan, Hunza); human fecal waste is naively exploited as manure for crops including vegetables/fruit without realizing the consequences. During cultivation and rainy seasons, surface water runoff and waste water from agricultural fields ingress into the channels. The main water supply of the village (muddy brown) is through the Bagrot channel (source: Bagrot Glacier). This channel drains into the Gilgit River. There is only one functional water filtration plant in the area which caters to the needs of only one third of the population while the rest of the population relies either on open channel water or a mixed type of water supply (11).

Water filtration plants were provided to different parts of the village in 1992-93 (by the Aga Khan Water, Sanitation, Health and Hygiene Studies Program (WSHHSP), and 2001 (Water and Sanitation Extension Program, WASEP). Recommendations for use of bleach to treat water were made at the time of a cholera outbreak in 1993. This was followed by the introduction in many northern villages, including Oshikhandass, of a new pit latrine (pour-flush) developed by WSHHSP.

The overall aim was to improve potable water supply at village and household level, sanitation facilities and their use, and awareness and practices about hygiene behavior. The health and hygiene education topics addressed (through weekly household & school visits by health workers) included traditional concepts about diseases; promotion of latrine use and the safe disposal of feces; domestic, environmental, and personal hygiene; food preparation, handling, and storage; transmission routes and prevention of waterborne diseases; operation and maintenance of water sources.

This project is thus a novel example of an integrated intervention encompassing components of water supply, water quality, drainage, sanitation, and school- and community-based hygiene education.

Through an exploratory study design, six focus group discussions (FGDs) were conducted in various sectors of Oshikhandass village during June-July 2012. For the purpose of this study we had discussions with residents of all three areas (i) filtered water supply area (WSHHSP intervention) (ii) open water supply area receiving water from open channels (iii) mixed water supply area which has both piped and channel water supply. The latter two were designated as non-intervention areas.

Participants included mothers (3 FGDs, with 26 participants), LHWs (1 FGD, 5 participants) and youth (2 FGDs with 9 participants each including both boys and girls).

Participants of each FGD were contacted by Lady Health Workers who were also serving as research assistants in the project. Mothers and youth who were willing were invited. FGDs were conducted in the project office of the study until thematic saturation was reached or no new information was uncovered.

The FGDs probed participants' knowledge about the benefits of safe water and sanitation measures, access to and use of water and sanitation facilities, and the barriers to better hygienic practices amongst the WSHHSP and non-WSHHSP intervention communities. After transcription key categories and themes from the participants' narratives were developed. Finally, the data were interpreted and are being presented using the respondents' own words as illustrations of a narrative. Specific observations related to health and hygiene behaviors after random selection of households were also done which will be reported in a separate study.

The study was approved by the Aga Khan University (AKU) Ethical Review Committee. Participation in FGDs was voluntary and due care was taken to ensure confidentiality of all participants.

Results

Health education messages

Irrespective of health education by LHWs it seems that residents of both intervention (WSHHP) and non-intervention communities have learnt about proper hygienic practices from daily life experiences, parents, teachers and media. LHWs role at best has been that of a positive reinforcement.

“People like to follow information they acquire from various sources as everyone desires progress. We know about “Commander Safe guard.” (Youth all areas – Oshikhandass)

LHWs on the other hand clearly highlighted during the FGDs that the receptivity of mothers to health

education was variable amongst the intervention and non-intervention areas.

"Practices of mothers from area receiving filtered water are better because they don't have to fetch water from distant places and they listen to us". (LHWs-Oshikhandass)

Awareness about importance of safe water: quantity and quality

The inhabitants of both WSHHSP and non WSHHP areas were equally aware about the importance of safe water supply. They said:

"Oshikhandass is cleaner than many other places due to its green environment; the only issue is unavailability of clean water supply."(Mothers-filtered and mixed water supply area)

"Yes, definitely cleaner than any city. Villages are cleaner; everything is fine except the water." (Mothers -filtered and mixed water supply area)

However there was also the realization in the WSHHSP area that mere installation of filtration plants was not enough:

"Thefiltration plant is no longer working; 150-180 homes get clean water; about 70% of Oshikhandass gets dirty water." (Youth all areas – Oshikhandass)

People from non WSHHSP areas were particularly conscious about their poor water supply:

"Water quality is badly impaired and first filtering and then boiling is an extra burden". (Mother - open channel area)

"Nobody is actually motivated due to lack of resources". (Mother - open channel area)

"We don't have time to follow all that is told because we don't have easy access to clean water and have other domestic responsibilities. We never boil water rather let it stand for some time in traditional Gulk to settle dust particles." (Mothers - mixed and open channel areas)

"We have abundant water from Bagrotenala but we are not satisfied with water quality". (Mothers - open water area)

"We know about cleanliness and importance of wearing clean clothes but from where do we get clean water?"(Mother - open channel area)

Residents of filtered water area (WSHHSP) were found to know exactly about the critical timings of hand washing:

"Before cooking and feeding children, after cleaning children and wash multiple times in heat because of sweat; in cold weather we get lazy because it's too cold; sometimes use Surf to wash hands"(Mother -filtered water supply area)

Realization about proper sanitation facilities

People realized that lack of adequate toilets could be another source of contamination of water in the village:

"Can I tell you one thing? The biggest problem is open flush 'chukan'. I tell people to stop this, but they say that it has more benefit for our crops, so why should we stop?" (Mothers - open water area)

"Garbage isn't a problem, we burn; mostly people don't actually burn, just throw it in the river;" (Youth all areas – Oshikhandass)

Measures for good health and hygiene at community level

All the residents emphasized the need for creating awareness among people and providing them with clean filtered water. There was a general consensus that garbage collection methods are adequate and burning far away from home is an acceptable norm in the village however issue of clean water must be paid urgent attention. Many mothers also appreciated that since the inception of the Oshikhandass Diarrhea and Pneumonia project in 1989, cases of diarrhea and pneumonia have been reduced and children are healthier. The latter will be reported by Rasmussen et al as part of the larger ongoing surveillance study documenting incidence of diarrhea and pneumonia. However non availability of drinking water at their door steps often puts residents in difficult situations compromising their hygienic practices particularly for care takers (mothers) of young children.

"Awareness about safe water is much needed and filtration system is very important"(Mother from filtered watered area)

"Filtration plant for water is most important". (Mother from mixed water supply area)

"I have come here after a long time period of 9 years, so I was avoiding the dirty water and try to use as much less water as possible".(Youth all areas – Oshikhandass)

Discussion

In general, the study revealed a reasonable level of knowledge about importance of health and hygiene behaviors among the study participants belonging to both WSHHSP and non WSHHSP areas. Despite this good level of knowledge, there was a lack of motivation towards good hygienic behaviors (e.g. boiling water, proper hand washing) among residents of non-intervention areas as they did not have access to clean water, had to fetch it from nearby areas with better water supply and were also pressed for time due to other domestic chores. Among all

three sectors, residents of open channel water supply had relatively deficient knowledge and hygienic practices as compared to areas receiving water from mixed source and filtration plant. This finding is supported by other studies conducted in Bangladesh, Uganda and Kenya which show that much of the impact of improved water supply on health is mediated through increased use of water for hygienic purposes. Improvement in water and sanitation facilities have also caused remarkable reduction in incidence of diarrhea and other communicable diseases in many low socioeconomic communities of Bangladesh, East Africa and Guatemala (12-16).

It was evident that conventional practices of water purification such as using *gulk* as domestic filter cum refrigerator was quite prevalent in the community. *Gulk is* a type of pit in which channel water was stored also called gulko or chudong. Usually it is a circular, underground pit about 10 feet deep with a roof made of timber and earth. Such traditional water storage and filtration facilities were also mentioned by Muneeba et al who identified that villagers liked the gulk as they thought that it kept water cooler and cleaner for use(17). However during our study we found a general awareness that storing water in Gulk might lead to further compromising water quality for domestic use in areas where filtration facilities were not available.

Our study reinforces the fact that knowledge alone is ineffective in modifying hygiene related behaviors until accompanied by sound interventions for adequate water supply and environmental sanitation. In East African countries like Kenya and Uganda, it was found that though reliance upon particular types of surface waters was a significant determinant of diarrhea rates, having access to piped water and adequate toilet facility was significantly associated with better health outcomes in terms of diarrhea and other communicable diseases as compared to households using channel water and practicing open defecation (14). This was because despite the increase in the amount of water available per capita in un-piped households, the amount used (just over 20 l/capita/day) is hardly adequate. In particular, un-piped households use less than half the amount of water used by households with piped connections, for bathing, washing dishes, clothes and house cleaning. (18,19)

FGD results emphasized the need for context specific dry sanitation facilities for Oshikhandass which may also fulfill fertilization needs of the soil without compromising environmental sanitation. As a closed-loop system of toilets, which treats human excreta as a resource, processing it on site until free of pathogens and then recycling for agricultural purposes has been cited as effective sanitation measure for many rural communities of the developing world Moreover, such an approach may play an increasingly important part in provision of sanitation facilities in futureespecially given the fact that scarcity of water would become more pronounced (20).

Although better sensitization for critical timing of hand washing was found among WSHHSP communities however hand washing with soap before performing household and feeding tasks was not a common practice among families of intervention as well as non-intervention area. This finding supports those of Curtis and Cairncross which revealed that the effectiveness of hygiene interventions in disease prevention, health considerations may be less effective at motivating people to use them than are other factors at inducing hygienic behaviors, such as the desire to feel and smell clean, and the desire to follow social norms. Therefore, Curtis and Cairncross suggest that the promotion of hand soap as a desirable consumer product may be a more effective dissemination strategy than that of health campaigns (21,22). This marketing strategy has worked in countries like Bangladesh, Burma, Indonesia and Guatemala where the risk of diarrheal disease was significantly decreased in areas where filtration plant was available (23-27). Future studies could incorporate an additional marketing component in health promotion strategies.

Conclusion and recommendations

The paper attempts to present available information on health and hygiene behaviors of people in Oshikhandass where various water and sanitation interventions have been carried out since the last two decades.

The overall findings of this study reinforce the fact that given the good level of knowledge regarding health and hygiene practices, provision of clean water for domestic use has the potential to improve health outcomes. The study also shows that the effectiveness of hygiene education depends on the provision of improved water supply and sanitation facilities. The latter demonstrates that water, sanitation and hygiene interventions interact with one another; however the impact of each may vary widely according to local circumstances. Prioritizing such interventions should therefore be based on local conditions and needs assessment.

FGDs pointed out the need for the provision of appropriate water and sanitation facilities in nearly two thirds of the village, as current water filtration plant and

improved supply is not appropriate to cater to the needs of the entire population; thus restricting people to exercise all they want to put into practice.

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Review Article

Climate change and health: Challenges for the health system in Bangladesh

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Abstract

Climate change induced global warming threatens human civilization everywhere. However, some countries are dangerously more vulnerable to climate change. Bangladesh is one of them. Among its many woes, Bangladesh is threatened to lose one-third of its landmass in the coastal belt making 20 to 30 million people homeless. Rising temperature as well as rapid population growth and unplanned urbanization could further aggravate environmental degradation. A country known for natural disasters, climate change is likely to make Bangladesh more prone to floods and cyclones with greater intensity and frequency. Bangladesh needs serious planning to successfully combat the effects of climate change and revamp its health system to face emerging new challenges. Based on an analysis of secondary data the paper presents an overview of the health and human consequences of climate change faced by Bangladesh. *(Pak J Public Health 2013;3(1):45-50)*

Keywords: Climate change; Sea level rise; Eco-refugees; Environmental health; Bangladesh.

Introduction

Since the formation of the Intergovernmental Panel on Climate Change (IPCC) by the United Nations in 1990, climate change—more precisely, the warming of the environment and its possible consequences for human civilization—emerged as a critical debate according to the report published by IPCC in 2001. The United Nations Framework Convention on Climate Change (UNFCCC), adopted at the Rio Summit, called on the industrialized countries to reduce their greenhouse gas emissions to the level of 1990 by 2000. Despite the Kyoto Protocol (1997), the Bali Action Plan of the UNFCCC (Bali Conference in 2007) and other deliberations, UN Member States so far achieved little concrete success. At the 2007 Bali conference a consensus was reached to act on four critical issues within the next few years so that the Kyoto Protocol can be fully realized. These include: mitigation (how to mitigate or reduce/eliminate climate change), adaptation (how affected countries could adapt to climate change), technology development and transfer (how to develop and transfer to developing countries new technologies related to climate change), and finance (how to finance climate change related activities). Intense negotiations at the 2009 Copenhagen Conference of the Parties and other meetings failed to achieve much success (1). Consequently, the challenges of combating the disastrous effects of climate change on human civilization remain largely unanswered. The pathways between climate change and human health is complex (Figure-1) and its impact on health is varied (Table-1). For example, climate change is likely to increase the frequency, intensity and duration of extreme weather events (2). The major impacts of climate change include depletion of water in rivers and canals resulting in scarcity of water and reduced agricultural productivity, increased flooding and heavier rainfall. Climate change causes loss of lives and livelihood, and has major direct and indirect effects on health, such as, spread of vector borne diseases, respiratory diseases, malnutrition, and injuries.

Bangladesh is one of the countries most vulnerable to climate change with serious implications for its people. The paper is intended to provide an overview of the nature and consequences of climate change for Bangladesh.

Methods

The paper is based on an analysis of published and unpublished data/information on climate change in Bangladesh. These include reports of United Nations and other multilateral agencies on climate change/global warming and relevant briefs and position papers. The paper also reviewed official reports prepared by the Government of Bangladesh as well as relevant regional agencies. Articles and research papers published in scientific journals were also reviewed. In short, the paper is a review article based on secondary data.

Results

Located in the North-Eastern part of South Asia surrounded by India on the west and the north, India and Myanmar on the east and by the Bay of Bengal on the south, Bangladesh is one of the poorest countries in the

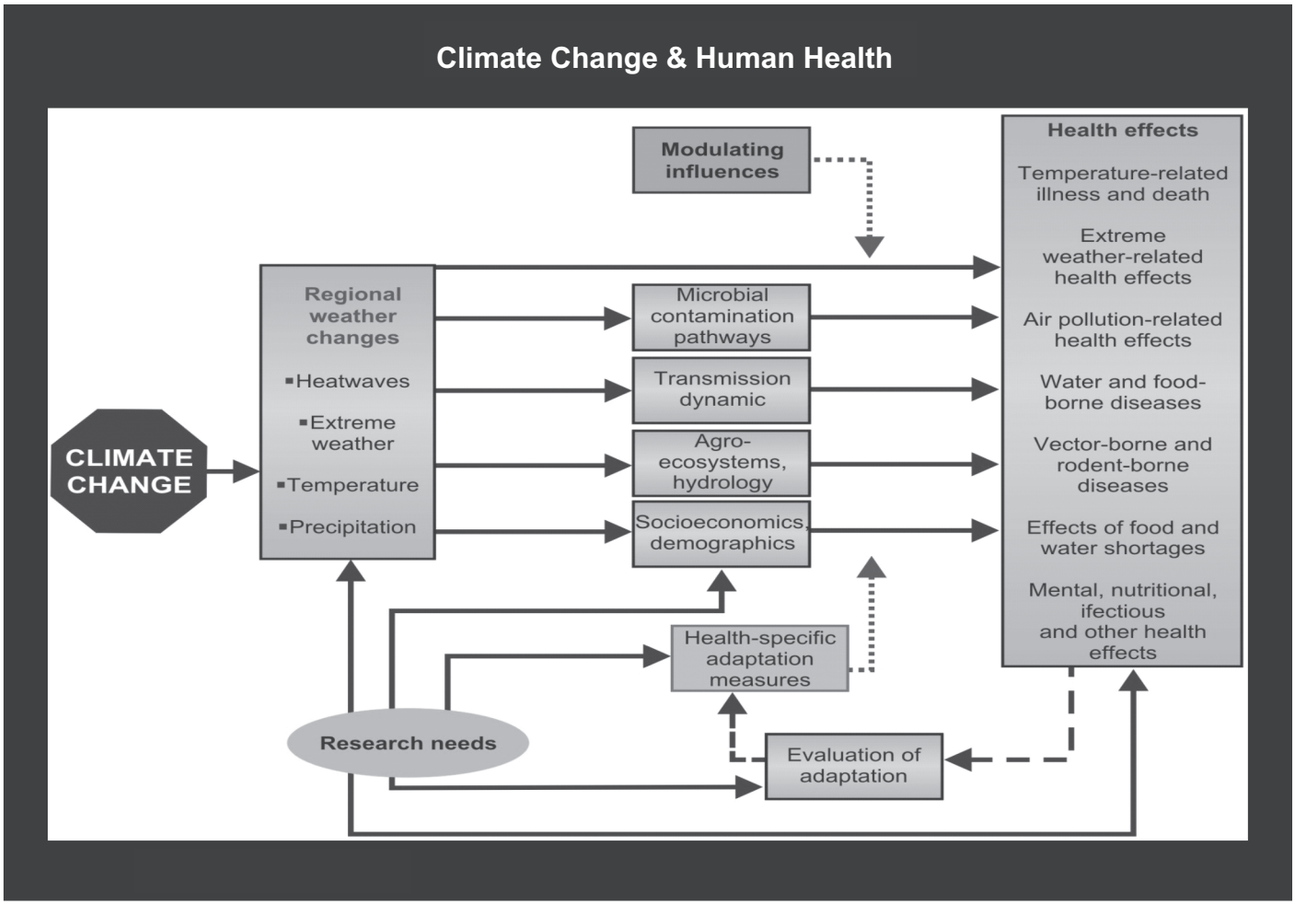

Figure 1: Climate change and human health: Complex pathways (Source: WHO 2003)

Table 1: Potential impacts of climate change on human health (Source: WHO 2008)

Weather events	Impacts
Warm spells, heat waves and stagnant air masses	• heat stroke, affecting mainly children and elderly • Increase in respiratory diseases • Cardio-vascular illnesses
Warner temperatures and disturbed rainfall patterns	• More exposure to diseases like malaria, dengue, Japanese encephalitis and other disease carried by vectors such as mosquitoes, rodents, and ticks.
Heavy precipitation effects	• Increased risk of diseases related to contaminated water (water-borne) and to unsafe food (food-borne). Depletion of safe water supplies and poor sanitation will increase the incidence of diarrhoeal diseases such as cholera.
Droughts	• Malnutrition and starvation particularly affecting children's growth and development. • Reduced crop yields causing stress for farmers and their families (known as psychological stress), who may be unable to pay their debts during extended and repeated droughts.
Intense weather events (cyclones, storms)	• Loss of life, injuries, life long handicaps. • Damaged public health infrastructure such as, health centres, hospitals and clinics. • Loss of life, loss of property and land, displacement and forced migration due to disasters will bring about psychological stress affecting mental health.
Sea level rise and coastal storms	• Loss of livelihoods and disappearance of land will trigger massive migration and cause potential social conflicts, affecting mental health.

region. Per capita GDP at current prices was US $ 423 in 2005 (3). Despite the enormous efforts, poverty remains widespread. During 1990-2005, 50% of the population lived below the national poverty line and 41.3% earned less than $ 1 per day (3). Bangladesh has a tropical monsoon climate with flat alluvial fertile land and tropical climate. The temperature ranges between 7 and 40 degree Celsius. Rainfall is abundant, 119 to 145 centimeters annually. Natural calamities like floods and cyclone are regular phenomena.

With 70% of the population dependent on it, agriculture is the dominant sector of the economy contributing 21% of the GDP. Two-thirds of the land area is under crops, the highest proportion in South Asia. Cropping intensity is also the highest in the region, having increased by 25% over the last thirty years (4). The share of land area under forest cover is the second lowest in the region and decreasing and being significantly degraded.

The vulnerabilities of Bangladesh are manifold including sea level rise, cyclones (intensity/frequency), deeper penetration of saline water, erratic rainfall, floods (greater intensity/frequency), drought (in selected areas), river bank erosion (greater intensity) and food security. They all have consequences for human health.

In Bangladesh, the risk of flooding is predicted to rise by 20% in the next 20-50 years (2). It is estimated that by the year 2030, an additional 14% of Bangladesh will become extremely vulnerable to floods, and currently vulnerable areas will experience higher levels of flooding (4). With limited access to formal insurance, low incomes and meagre assets, poor households have to deal with climate-related shocks under highly constrained conditions (3).

The predicted climate change will exacerbate the existing vulnerabilities, affecting disproportionately the poorer people. Agricultural productivity will be threatened with flooding, drought and increased salinity in coastal areas, leading to famine and malnutrition. Increased salinity is responsible for hypertension, premature delivery due to pre-eclampsia, acute respiratory infection (ARI), and skin diseases (5). Rise in sea level will result in massive dislocation of people. Rapid urbanization along with poor sanitation, inadequate industrial waste management, and air and water pollution will further aggravate and situation.

Although climate change will further aggravate many of the current environmental health issues in Bangladesh (for example, indoor and out door air pollution, scarcity of portable water, poor sanitation and arsenic contaminated water in much of the rural areas), three issues will particularly dominate the future of the country with disastrous implications for health: natural disaster (with greater frequency and intensity), sea level rise, and creeping salinity in water inland.

Bangladesh is a flood prone country. Flooding has become a normal part of its ecology. The flood of 1998 covered two-thirds of the country, over 1,000 people died and 30 million were made homeless. The proportion of children suffering malnutrition doubled after the flood and remained so for a log time (3). A study conducted in 2 flood-affected districts in October 1998 suggests that 98.3% of the respondents developed health problems, or their existing health problems exacerbated during the flood (6).

Cyclones in the coastal areas, floods and tornadoes are the most recurring natural disasters causing the impoverishment of the victims as well as outbreak of communicable diseases, malnutrition and injuries. A devastating cyclone in 1970 along the country's coastal belt killed more than 500,000 people. Due to early alarm system, cyclones now-a-days do not kill too many people. However, destruction of property and livelihoods remain as severe as ever. The cyclone Sidr of 2007, for example, destroyed crops, trees and poorly-built houses in a vast area along the coastal region in South-Western Bangladesh. More than two years after the cyclone, people still remain homeless. It is predicted that due to the climate

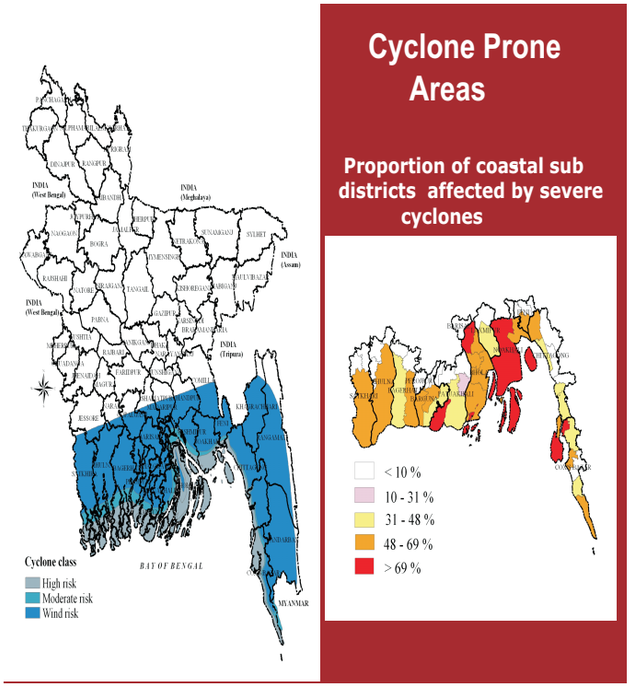

Figure 2: Cyclone prone areas of Bangladesh

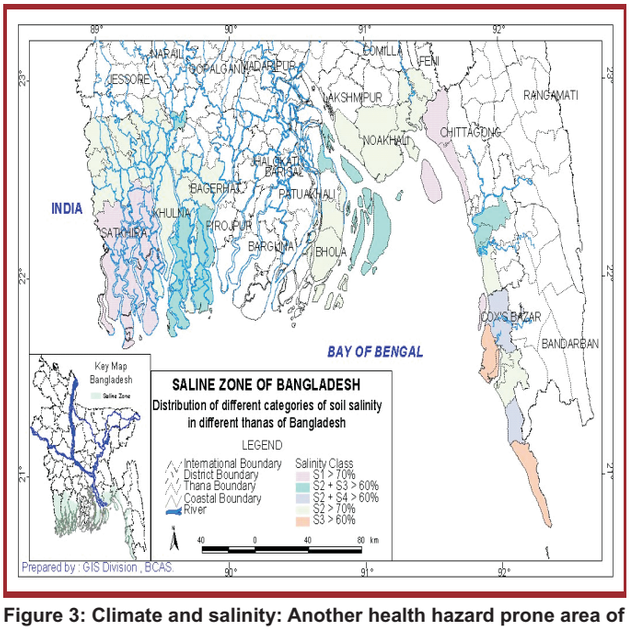

Figure 3: Climate and salinity: Another health hazard prone area of Bangladesh

change, the sea level may rise between 1.5 meters to as high as 6 meters by the year 2100 (1,7). The mega city of Dhaka, with a projected population of more than 20 million by 2025, is only 5 meters above the current sea level. A 1.5 meters rise in the sea level will inundate 22,000 square kilometers of landmass in the coastal belt affecting more than 27 million people. This will produce 20-30 million eco-refugees causing social conflict and mental distress (7). Loss of lives and livelihoods will have tremendous impact on socio-economic and health status of the population.

Water logging and salinity intrusion will adversely affect fisheries, livestock, crop production and human settlement. In the long run, Bangladesh is likely to face depleted water in rivers and canals adversely affecting agriculture.

Sea level rise will also increase salinity of water in certain regions of Bangladesh creating another health hazard. Figures 2 and 3 present the cyclone prone areas and areas that are likely to be affected by creeping salinity. Continued population growth and rapid urbanization will add to the negative impact of climate change on health as they cause or exacerbate environmental degradation and resource depletion.

Over the last few decades, Bangladesh achieved great success in reducing its Total Fertility Rate (TFR) from a high of 6.4 in 1971 to 2.7 in 2006 (8). Nevertheless, if the total fertility rate does not decline further and soon, the population of Bangladesh is projected to double by 2050 and reach a staggering 280 million by the turn of the twenty-first century (9).

Along with population growth, Bangladesh is also faced with rapid urbanization. Urban areas account for much of the production and consumption processes that generate green house gases causing global warming. According to the World Bank report (2007) Bangladesh has one of the highest rates of urbanization in the world. The capital city of Dhaka is one of the fastest growing mega-city (cities with 10 million or more population) and by 2020 it is projected to emerge as the second biggest mega-city with a population of over 21 million. The report also says that Bangladesh is expected to become predominantly urban in roughly three decades. The percentage of the urban population is now over 25% and the growth rate is more than 3.5% per year (10). It is evident that with increased urbanization, the slum population in Bangladesh is also increasing in an alarming rate. According to the World Bank (2007), more than 37% of the urban currently lives in slums.

Urbanization in Bangladesh especially means an increase in the population of its capital city. It is estimated that annually Dhaka receives more than 300,000 new residents. These additional people are mostly the poor often victims of natural calamities like flood, cyclone or river-bank erosion. Climate Change and its impact – from increased floods and cyclones to sea level rise – will further add to the population of Dhaka. Increasing influx of the victims of natural disasters will further add to the growing slum population in Dhaka. By 2025, according to some projections, more than 7 million people in Dhaka – almost 40% of its total population – will live in slums.

This high concentration of population in metropolitan cities poses threats to economic development and service delivery. The poor air quality produced by industries and automobiles exacerbates acute respiratory infections (ARI), which is a leading cause of child mortality, while water pollution increases the prevalence of diarrhea. Access of slum population to safe drinking water and sanitation is also limited, creating pressure for service provision (11). Climate change will further add to the woes of the urban population – particularly the slum dwellers – in Bangladesh.

In this respect particular emphasis must be placed on the massive internally displaced population – 20 million to 30 million – that the climate change will produce for Bangladesh. Most of these internally displaced eco-refugees – primarily from the coastal areas of Bangladesh – will flock to urban areas especially to the capital city of Dhaka. This will add tremendously to the already overcrowded slums of Dhaka. No country ever faced such

a massive internally displaced population and the challenge of resettling them. Climate change, in this respect, will be the most critical challenge faced by Bangladesh (12).

Discussion

Climate change will generate complex new demands on the health system in Bangladesh that is ill-equipped to effectively deal with them. The system suffers from numerous drawbacks. Spending less than 3% of its GDP or about $18 per capita per year on health, Bangladesh has limited resources to deal with increased demands on its health system.

Environmental health, by and large, remains a neglected area within the planning and policy making process of the Ministry of Health and Family Welfare (MOHFW). Though the Program Implementation Plan of the Health, Nutrition and Population Sector Development Program (HNPSDP) highlights the importance of strengthening the health system (13), it gives limited indication on how this objective will be achieved. So far little efforts have been made to clearly identify the worst victims of climate change – those who will be internally displaced or to articulate a comprehensive policy on how to respond to this challenge.

Another critical challenge faced by the health system is scarcity of human resources. Bangladesh is one of the few countries where there are more physicians than nurses and trained midwives, despite the vital role of the latter groups for effective primary health care services (7). According to a recent study Bangladesh had a deficit of 60,000 physicians, 280,000 nurses and almost half a million health technologists in 2007 (14). The deficit must have grown further as the population continues to increase.

Moreover, Bangladesh has very limited number of health professionals trained in environmental health or in climate change. There are few universities or institutes that provide capacity building training in climate change or in disaster management and post disaster rehabilitation and reconstruction. Urgent efforts are needed to fill this gap of trained human resources in climate change, disaster management and post-disaster reconstruction /rehabilitation.

Broadly speaking the country also lacks awareness about climate change and its consequences for health and wellbeing. This particularly so among people most vulnerable to climate change, the rural people and people living in coastal areas. Although climate change has recently emerged as a widely debated issue for the government and the media, the debate remains largely confined to intellectuals and the academia. It has yet to fully reach the masses at large. Moreover, due to lack of meaningful decentralization, local level governments and civil society groups largely remain outside the decision-making process regarding climate change, disaster preparedness and management.

Bangladesh currently does not have a well-organized health care waste management system. Everyday around 15 tons medical wastes are generated in Dhaka city alone (15). These medical wastes are creating environmental risks to human health. Natural disasters like floods (and cyclones) further would aggravate the medical waste problem. It is imperative that the health system dedicates efforts and resources toward establishing and maintaining a coordinated medical/hospital waste management system. Proper enforcement of waste management laws is also needed.

Bangladesh, like many developing countries, devotes little resources for research. So far the importance of research on the environment and climate change has received little attention. More research is needed to fully understand the nature and extent of impact that climate change will have on the health and livelihoods of the people of Bangladesh. Research is also needed to develop appropriate adaptation and mitigation strategies. At the same time research is critical to fully identify the volume and resettlement needs of the eco-refugees that the country will face. Developing appropriate technologies to cope with climate change also requires further research. Clearly greater resources need to be allocated to generate and disseminate knowledge on climate change and health.

Conclusion

It is evident that climate change will have profound consequences for Bangladesh. Sea level rise, more frequent natural disasters like floods and cyclones will bring enormous suffering to the people of Bangladesh. Rapid urbanization and population growth are likely to make things worse. The country is faced with immense loss of lives and livelihoods, massive displacement of people, increased vector borne and water-borne diseases, conflict and psychological stress. Agricultural productivity will be threatened with flooding, drought, urbanization and increased salinity in coastal areas, leading to famine and malnutrition. Food insecurity and malnutrition will rise significantly.

The inherent weaknesses of the existing health system, such as, weak centralized planning process, inadequate human resource, lack of coordination within and across sectors and lack of resources for research and

training, are creating obstacles in effectively responding to the challenges of climate change.

In order to address the challenges of climate change and its impact on health effectively, Bangladesh needs to invest in adaptation (for example, reduced use and wastage of water and energy, development of draught resistant crops), greater mitigation (introducing innovative technologies, new settlement policies), and appropriate human resources and capacity building. Bangladesh also needs not only to raise the awareness of people at large on climate change but also to launch behavior change communication programs to help people modify their behavior, life style and adapt to climate change.

The challenges of climate change should also encourage Bangladesh to work close with its development partners, noon-government organizations and at the same time further strengthen the collaboration of various government departments. A unified high-level leadership within the government, greater resources for research and greater involvement of local governments, NGOs and the private sector would be critical for Bangladesh in effectively face the challenges of climate change.

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Review Article

Gender dimensions of climate change

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Abstract

Climate change is not gender neutral, but gender responsive. Women's historic disadvantages—their limited access to resources, restricted rights, and a muted voice in shaping decisions—make them highly vulnerable to climate change. Addressing the threat of climate change is a current global priority and there are important gender perspectives in all aspects of climate change, the paper outlines key linkages between climate change and gender focusing on adaptation and mitigation policies and practices. It emphasizes the need to include women in developing and implementing mitigation strategies, both to ensure their full participation in these processes and their effectiveness in addressing the 'bigger picture' of climate change and its human impacts. The paper suggests some practical steps required to achieve more equitable, appropriate climate change policies and programmes in gender lens. The paper has six sections. Section II reviews the relevant literatures on gender and climate change. The links between gender and environment are explained in section III. Section IV analyses the gender dimensions of climate change. The strategies to mitigate climate change effects on gender are explained in section V. The last section recommends three pronged the approach to tackle climate change and reduce its adverse effects.*(Pak J Public Health 2013;3(1):51-9)*

Keywords: Climate change; Gender; Environmental health; India.

Introduction

Climate change refers to any long-term change in the statistical distribution of weather patterns, whether in terms of changes in average conditions (more/less rainfall, higher/lower temperatures), or in the distribution of events around the average (extreme weather events such as floods or droughts) (1). The adverse effects of climate change are becoming increasingly evident now-a-days: increasing in the average temperature; changes in the intensity, timing, and geographic distribution of rainfall; an increase in the frequency of drought and flood; and sea level rise (1,2). These negative impacts will have adverse effects on agricultural productivity, biodiversity and ecosystem services. The overall impacts of climate change on agriculture are negative and threatening global food security (3-5).

It is possibly the greatest challenge that humanity has yet faced and its impacts will be differently distributed among different regions, generations, age, classes, income groups, occupations, and genders. Being a global phenomenon, developing countries are more vulnerable to the adverse effects of climate change mainly because of low income and dependence on natural resources by a large section of the population for their livelihoods.

Climate change (environmental changes) is rooted in social-economic and cultural processes (production, consumption, distribution, economic status, sex, culture and so on) and associated power structures in the society. It is not only technical in nature, but also has political and socio-economic aspects with implications for development policy and practice. Gendering of social processes and institutions, and the dominance of values, attitudes, behaviours and culture influenced significantly to the environmental challenges and the formulation of policies to address them. Climate change is not gender neutral, but gender responsive. Women's historic disadvantages—their limited access to resources, restricted rights, and a muted voice in shaping decisions—make them highly vulnerable to climate change (6). In this connection, this paper attempts to analyse and explores the actual and potential relationships between gender and climate change, and the impact of climate change on gender.

The paper has six sections. Section II reviews the relevant literatures on gender and climate change. The links between gender and environment are explained in section III. Section IV analyses the gender dimensions of climate change. The strategies to mitigate climate change effects on gender are explained in section V. The last section concludes the paper.

Literature review

The field of climate change was dominated by the biophysical scientists and researchers, but in recent years social scientists and researchers have more engaged in

climate change researches because of its deep relations with social, economic, cultural and political aspects of human being. As climate change is a multi-dimensional phenomenon, it is not easy to separate the climatic and non-climatic factors which affect the environment, society and the livelihood of the human being.

Despite plethora of research works in climate change, little research, programming, national policy-making and in the international negotiations have done on the links between gender and climate change (7-15). These links encompass the gendered effects of climate change, gendered contributions to the problem, and gendered responses to it, at local, national and international level.

Climate-related shocks and stresses are adding pressure to the already precarious livelihoods of marginalised peoples experiencing poverty and a range of other constraints in the global south - and will increasingly do so with progressive climate change (16). The gender and climate change literatures indicate that women are disproportionately vulnerable to climate change, because they are more likely to be found in the poorest sections of society, have fewer resources to cope, and are more reliant on climate-sensitive resources because of the gender division of labour. They tend to have lesser access to livelihood resources and hence more limited capacity to participate in climate change adaptation processes – although they should be treated as active agents rather than victims (16).

The gender and climate change literature reveals some commonalities. Recently, it has been recognised that women will be disproportionately affected by climate change compared to men, because women and men have differing roles, resources, rights, knowledge and time with which to cope with climate change (9,10,13,17-19). Further, women are relatively more reliant on climate-sensitive livelihoods (13).

Women representation and their active involvement in the general policy formulation that to especially in climate change policy and decision making are miniscule from the local to the international level. United Nations Framework Convention on Climate Change (UNFCCC) decisions and mechanisms are gender-blind and link to sustainability is lacking (12). It is found that women are representing and participating in climate change policies in a small number of countries(20,21).

Vulnerability to environmental degradation and natural hazards is articulated along social, poverty, and gender lines. Just as gender is not sufficiently mainstreamed in many areas of development policy and practice, so the potential impacts of climate change on gender relations have not been studied, and remain invisible. Despite the difficulties of prediction, it is clear that the impacts of climate change will be gendered, and that these require further research (9).

1. Thoughts of linking gender and environment

In an extensive review of research on gender and environmentalism, Blocker and Eckberg (22) grouped the existing hypotheses and findings in to five specific areas based on the characteristics used to link gender and environmental concerns. They are (i) economic growth orientation; (ii) concerns about health and safety; (iii) parenthood status; (iv) trust in science and technology; and (v) environmental knowledge. We have added another hypothesis to link gender and environment, i.e., patriarchal thought. Let us get a detail explanation about the above six hypotheses.

Patriarchal thought: Women are identified as being closer to nature and men are being closer to culture. Nature is seen as inferior to culture; hence women are seen as inferior to men (23). Violence against nature is treated as violence against women.

Economic growth orientation: Men are more involved in the marketing activities than women. More involvement in the marketing activities favors more economic growth. Environmental economics literatures argue that there is an inverse relationship between economic growth and environmental protection. Therefore, the favorable orientations towards economic growth of men are associated with lower level of environmental concern.

Concerns about health and safety: Women are more concern about the health and safety of the family members than men. More concern about health and safety leads higher levels of environmental concern.

Parenthood Status: The traditional “female” roles of women in the family are homemakers and childrearers. These caring and nurturing roles of women show their friendliness towards environment and its protection. Conversely, the traditional “father” roles of men with children are expected to be more oriented towards market as well as economic growth and less toward environmental concern.

Trust in Science and Technology: Past research suggests that women are more likely than men to oppose new, potentially risky technologies (24). It is also found that women are to more distrustful than men of science and technology, low levels of trust are positively related to

environmental concern.

Environmental Knowledge: It is found that men are likely to be knowledgeable about technical environment issues; this knowledge is linked to less concern with environmental damage. But debates are going on the literature that whether greater knowledge is generally related to lower concerns or higher concerns about environmental damage.

2. Impacts of climate change on women and men

According to the Intergovernmental Panel on Climate Change (IPCC), the impacts of climate change will fall disproportionately upon developing countries and the poor persons within all countries, and thereby exacerbate inequities in health status and access to adequate food, clean water, and other resources. These impacts also are / will be differently distributed among different regions, generations, age classes, income groups, occupations, gender, elderly, and the indigenous people. Human Development Report 2007/08 categorically stated that "Gender inequalities intersect with climate risks and vulnerabilities. Women's historic disadvantages — their limited access to resources, restricted rights, and a muted voice in shaping decisions — make them highly vulnerable to climate change." The detailed impacts of climate change on gender are explained below.

a. Impact of climate change on the health of men and women

Climate change is increasing and will increase threats to human health through a range of mechanisms like direct effects of hazards such as heat waves, floods and storms, and more complex pathways of altered infectious disease patterns, disruptions of agricultural and other supportive ecosystems, and potentially population displacement and conflict over depleted resources, such as water, fertile land and fisheries (25).WHO (26) estimates that as many as 140,000 additional deaths are caused each year by the effects of global warming. Climate change places additional burdens on women's health and have a triple effect on women: (i) they are affected because of special physical vulnerabilities, (ii) because of their caring roles in families, and (iii) because the additional work which is required due to depletion of environmental conditions may lead to health damage (27).

The health consequences of climate change include heatwaves and increased hot weather; windstorms and tropical cyclones; Sea-level rises, heavy rain and flooding; drought; higher rates of malnutrition due to food shortages, increased respiratory disease where air pollution worsens and water-borne disease due to water pollution.

There is evidence that more women than men died during the 2003 European heat wave (28). In the United States of America, elderly men seem to be more at risk than women in heat waves, and this was particularly apparent in the Chicago events of July 1995 (29,30). Men may also be more at risk of heatstroke mortality because they are more likely than women to be active in hot weather (31). Waterborne and vector-borne diseases like malaria will also increase in a warmer world. Pregnant women are twice more attractive to malaria carrying mosquitoes than non-pregnant women. Moreover, pregnancy reduces women's immunity to malaria, making them more susceptible to infection and increasing their risks to illness and secondary diseases, too. Anaemia which can result from malaria infection is responsible for a quarter of maternal mortality (32).

Women and children are 14 times more likely to die than men during a disaster (33). In May 2008, Cyclone Nargis came ashore in the Ayeyarwady Division of Myanmar in which 1,30,000 people dead or missing in the aftermath, 61 per cent among them were female (34). In the 1991 cyclone disasters which killed 1,40,000 in Bangladesh, 90 per cent of victims were women (33). During the 2006 tsunami, more women died than men in Indonesia and Sri Lanka, male survivors outnumber female survivors by 3 or 4 to 1 (35) because in Sri Lanka, swimming and tree climbing are taught mainly to boys, which helped them survive and cope better than women when the waves of the tsunami hit.

Dev, Subbarao, Galab and Ravi (36) observed the health risk patterns in three Indian states. They found that risks have become worse when they are climate related. In the relatively more developed state like Karnataka, the incidence of health risk is due to the incidence of drought whereas in a relatively poorer state like Orissa health risk is due to prevalence of malaria. In Madhya Pradesh, the health risk is because of weather risks.

a. Impact of climate change on gender through disasters

Neumayer and Pluemper (37) studied the specific vulnerability of girls and women with respect to mortality from natural disasters and their aftermath in 141 countries over the period 1981 to 2002 and found that gender differences in deaths from natural disasters are directly linked to women's economic and social rights. It is also evidenced that in inequitable societies, women are more vulnerable to disasters; for example, boys are likely to receive preferential treatment in rescue efforts and both

women and girls suffer more from shortages of food and economic resources in the aftermath of disasters (37).

There are clear gender differences in the prevention of disasters (e.g. early warning systems don't get through to women), in emergency response (e.g. different risk reduction strategies and different needs), and in the reconstruction phase (e.g. gender differences in migration) (27). The workload of women as family caregiver increases two to three times leading to exhaustion and illness during and after natural disasters. Studies have shown that they are more likely to become victims of the domestic and sexual violence following disasters. At the time of catastrophe, the burden to nurture the family, especially young children, with daily essentials is often largely borne by women. Aguilar (33) remarks during emergencies, women are less likely to have access to information about assistance than men.

Women not only suffer during disaster but also in the post-disaster period. Generally, men focus almost exclusively on productive activity, including agriculture and waged income and women take the charge of physical and psychological health, economic opportunities, and their children's welfare in the post-disaster period. The shortfall of resources like water and fuel wood or the role of care-giver in post-disaster-situations may increase women's workloads (27). Girls and boys have to take on more tasks in the household and don't have time to attend schools and study at home. This will destroy their future life.

b. Impact of climate change on gender through migration

Migration is used as a coping mechanism and a strategy of last resort for sustaining life from the effects of climate change. Climate change is already forcing people from their homes, whether in response to disasters such as hurricanes, or more gradual changes such as drought which affects their access to basic needs such as food and water. Pakistan is one of the world's most vulnerable countries to drought, and climate change. Between 1998 and 2002, Balochistan province was affected by severe drought, in which three quarters of all livestock died and more than a quarter of the region's population was displaced38.It is estimated that by 2050 one in every 45 peoplein the world will have been displaced by climate change39. Climate change related migrations have a greater impact on women. It has been estimated that women constitute up to 80 per cent of global refugee and displaced populations, and typically in emergencies 70-80 per cent of those needing assistance are women and children (33).Based on these figures, Haigh and Vallely (38) estimated that of the current 26 million climate refugees, up to 20 million are female.

Migration brings disadvantages for both women and men but where women are left to manage in men's absence; research has shown some positive (40) and negative outcomes in terms of challenging gender inequalities. The positive outcomes is the rise in the number of female-headed households while men are away working can have empowering impacts in terms of increasing women's control of household resources and decision-making power, as well as improving their economic status through the receipt of remittances (41). On the other hand, the negative outcome is the absence of working male family members can increase women's burden of agricultural labour and oblige them to assume yet more responsibilities but without equal access to the financial, technical and social resources that men may have (42).

c. Impact of climate change on gender through agriculture

In the agricultural sector, rural women in developing countries are the primary producers of staple food, a sector that is highly exposed to the risks that come with drought and uncertain rainfall (43). They grow, process, manage and market food and other natural resources and are responsible for raising small livestock, managing vegetable gardens and collecting fuel and water. However, statutory and customary laws often restrict women's property and land rights and make it difficult for them to access credit and agricultural extension services. Recent evidence demonstrates that women are experiencing the severe effects of weather-related hazards – such as erratic monsoon patterns, unseasonal temperatures, flooding and extended periods of drought.

Whether involved in agriculture or not, women in both developed and developing countries have a key role as providers of food for their families, and so the effects of climate change either directly on food production, or indirectly on food prices, are of particular relevance to women (38).

Loss of biodiversity due to climate change can multiplied insecurity among women because many rural women in different parts of world depend on non-timber forest products for income, traditional medicinal use, nutritional supplements in times of food shortages, and a seed bank for plant varieties needed to source alternative crops under changing growing conditions. Thus, loss of biodiversity challenges the nutrition, health and livelihood of women and their communities (44-46).

d. Impact of climate change on gender through water stress and water insecurity

Women are largely responsible for water collection and more sensitive to the changes in seasons and climatic conditions that affect water quantity and accessibility which makes its collection more time-consuming. UNDP (43) reports that in northern Kenya, the increased frequency of droughts means that women are walking greater distances to collect water, ranging from 10 to 15 kilometres a day. This confronts women with personal security risks and imposes an immense physical burden. Research in sub-Saharan Africa has shown that women and girls spend a total of 40 billion hours per year collecting water, which is equivalent to a year's worth of labor by the entire workforce of France (43).

Changed run-off patterns and glacial melt due to climate change will add to ecological stress, compromising flows of water for irrigation and human settlements in the process (43). Depletion of natural resources and agricultural productivity could place additional burdens on women who will have to spend more time for collecting plants and cultivating their crops for subsistence and local markets (27).

e. Strategies to adopt and mitigate climate change effects on gender

Work on gender and climate change has largely focused on adaptation to extreme climate events and mitigation of the causes of climate change. "Adaptation refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate change." It involves adjustments to decrease the vulnerability of communities and regions to the impacts of climate change and variability. On the other hand, mitigation is about preventing or limiting the occurrence of climate change. As such, mitigation focuses on tackling the causes of climate change: the increase of greenhouse gases (GHGs).

a. Adaptation

The fundamental goal of adaptation strategies is the reduction of the vulnerabilities to climate induced change in order to protect and enhance the livelihoods of poor people. Experience shows that vulnerability is differentiated by gender. Adaptation to climate change or indeed climate variability is dependent on issues such as wealth, technological power, access to information, all of which are major problem areas for women. However, women can be key agents of adaptation and mitigation to climate change. The possible gender impacts of climate change and gender adaptive strategies and recommendations for possible policy interventions to safeguard health, especially of women are given in table 1.

Gender sensitive adaptation strategies for climate change will be more effective if made with a participatory decision-making process. To facilitate this, decision makers need to increase female participation in all areas of decision-making relating to adaptation to climate change and incorporate their knowledge into adaptation strategies, ensuring that warning systems / vital information on weather alerts and cropping patterns reach all members of the community; shelters take into account the needs of women and so on.

The effectiveness of gender sensitive adaptation policy for climate change can be judged from the following three examples. (i) After the 1999 Orissa cyclone, most of the relief efforts were targeted at or through women, giving them control over resources. Women received relief kits, including house-building grants and loans, resulting in improved self-esteem and social status. (ii) Similarly, following a disastrous 1992 flood in Pakistan in the Sarghoda district, women were involved in the reconstruction design and were given joint ownership of their homes, promoting their empowerment (47). (iii) After Hurricane Mitch in 1998, La Masica, Honduras surprisingly reported no deaths. A disaster agency had provided gender-sensitive community education on early warning systems and hazard management six months earlier. Women were able to assume responsibility for continuously monitoring the early warning system, a role traditionally performed by men. As a result, the municipality was able to evacuate the area promptly when Hurricane Mitch struck (48).

b. Mitigation

From initial section of this paper, it is understood that women performs many environmentally related works as a producer, a consumer, and a family caregiver. She has greater role than men in mitigating the climate change challenges. She can act as an agent of change. The adverse effects of climate change can be mitigated if women will be concerned, well-informed, trained, educated, and awaked. The potential areas where women can reduce the negative effects of climate change are energy use; search of alternative energy – renewable energy; afforestation, joint forest management (JFM) and reforestation; recycling and waste minimization; active in clean development mechanism (CDM), carbon credits etc.

Table 1: Gender, adaptive strategies and interventions

Impact of climate change	Gender dimensions (examples)	Gender-sensitive adaptive strategies (examples)	Possible interventions beneficial to both women and men (examples)
Increase in infectious diseases	Women constitute the majority of those who take care of the sick (both as household caregivers and as front-line health workers). Women often lack, or have less access to, health services.	A gender perspective must be incorporated into infectious disease analysis and research to target policies and programmes. Collected data must be disaggregated by sex, age, socioeconomic status, education, ethnicity and geographical location, where appropriate. An understanding of gender and its implications for health and health- seeking behaviour should be incorporated into training of health professionals and development of health-sector responses.	Ensure better availability and access to, and support by, health systems for both women and men, but especially for women, given their care giving roles. Support outreach activities, using gender-sensitive information, education, and communication strategies and materials for advocacy and training. Promote childcare facilities and other approaches to support women's care giving role, while trying to transform related gendered roles and norm.
Scarcity of water Salination of water Increase in arsenic Flooding	Health problems, especially for women and girls who have to walk long distances to fetch water Increase in work burden, which implies less time to access health-related resources such as education and economic resources	Promote water-saving practices that take into account the different uses and roles related to water for women, girls and men Address salination and arsenic contamination of water, proposing specific actions that consider the different patterns of exposure and impacts on women and men Counter social stigma attached to the effects of arsenic poisoning on women and men	Ensure affordable drinking water, taking into account the different roles and needs of women and men Empower women and facilitate their equal participation in management of water resources at national, regional and grassroots levels Appropriate technologies for assuring potable water closer to where families live Strengthen forestation and water-harvesting mechanisms, considering the different roles, needs and impacts on women and men Promote women's rights to own land and ownership of land use certificates Effective implementation of water policies that consider women's and men's different needs and roles for water use, provision and consumption Ensure equitable access to resources also in relation to payments for environmental services
Mortality through extreme weather events	Socioeconomic status, age and social gendered norms influence the risk of injury and death Women are vulnerable due to gender norms that dictate acceptable proper behaviours (e.g. not learning how to swim, not going out alone) Men's vulnerability because of gender norms that promote risk-taking	Provide safe shelters and homes for both women and men Training on gender-sensitive disaster risk reduction and early warning systems Promote programmes that facilitate men to seek help for psychosocial problems Empowerment of women to strengthen their capacity to question and change harmful behavioural norms that put them at risk in the case of extreme events	Gender-sensitive disaster preparedness Gender-sensitive early warning systems Ensure women's participation on equal basis in all policy and programme cycles Target women and men differently in communication campaigns and health-promotion strategies, taking into account their gender norms and roles Adopt strategies at all levels of programming to change norms and practices that prevent women or men from appropriate responses and coping mechanisms in situations of natural disasters
Decreased income-generating and credit opportunities after extreme weather events	Women working in informal sector are also affected Increase in household expenses Out-migration of males Feminization of poverty, especially in urban/peri-urban areas Risk of malnutrition related to loss of income	Save on expenses or money for lean periods for both women and men Promote alternative income-generating activities	Proper and accessible credit facilities, both formal and informal, for women Establish market linkages that consider different patterns of consumption of women and men Vocational training for women and men Promote social security and other safety nets among people working in the informal sector, both women and men
Change in agricultural production Decrease in fishery stocks	Increase of work burden Calories/micronutrients deficiencies	Involve women and men in conservation of biodiversity	Training on agricultural extension for both women and men Better nutrition supplements for needy families Marketing facilities Land rights for women
Other indirect health impacts following extreme weather events: Increased burden of work and responsibility, especially on women and girls Increased anxiety, fears and intra-household tension Increased rates of suicide among men in cases of drought suicide among men in cases of drought	Suicide rates are higher, due to weaker or non-existent and effective social networks, among men Greater social responsibility on women to cater for family needs such as water and food	Promote programmes that facilitate men to seek help for psychosocial problems Empower women to enhance their capacities to look after themselves and their families and specifically to use available social and other networks to cope with increased burdens and tensions	Target women and men differently in post-disaster relief, taking into account gender norms, roles and relations

(Source: WHO, 2011)

Raty and Carlsson-Kanyama (49) studied the gender differences in energy consumption patterns and greenhouse gas emissions among single households in Greece, Sweden, Norway and Germany and found that the average single man consumed more energy than the average single woman in all four countries. The largest difference in absolute energy use between single men and single women was in the category of transport (primarily due to cars). In the study, average single man spent more money on vehicles and fuel than did the average single woman. Men also spent more money on buying cars and other vehicles than did women, resulting in higher indirect energy use by men. Women on the other hand consistently used more energy than men in consumption categories such as food, hygiene, household effects and health, although the differences were small.

Women are engaged in a number of activities such as brick-making, charcoal-making waste management and agro-processing where energy efficiency can lead to CO2 mitigation and their role in mitigation in these areas can be vital. The development of CDM through carbon sequestration from afforestation and reforestation can also be done by poor rural women. Women in urban areas can implement energy efficiency programmes at the household level - lighting, the use of appliances et cetera while women in rural areas may be encouraged to use biomass and biogas (for fuel generation), and switch to solar energy. Mitigation efforts over the next two to three decades will have a large impact on opportunities to achieve lower stabilisation levels and resulting long term equilibrium temperature changes.

Conclusion

Climate change is unavoidable but we can reduce its adverse effects through adaptation and mitigation strategies. It is also gender sensitive and responsive. So, for adaptation and mitigation of adverse effects of climate change, a gender responsive approach is necessary.

Secondly, climate change was initially conceived as a scientific and technical issue, expanding bases of knowledge have made it clear that the impacts are much broader; climate change is, in actuality, a socioeconomic problem. Thus, in order to fully understand and deal with climate change, it is crucial to consider the related social, economic, political and cultural aspects. Therefore, policy makers have to deal with climate change issues from both gender perspectives as well as social, economic, political and cultural perspective.

There are structural differences between men and women through, for example, gender-specific roles in society, work and domestic life. These differences affect the vulnerability and capacity of women and men to adapt to climate change. To tackle the climate change issues and reduce its adverse effects a three pronged approach is suggested. First, gender inequalities in terms of access to land, control over resources, ability to command and access paid labour, capacity, and strategies for income diversification, as well as time spent on agricultural or forestry-based activities may be addressed. Second, a gender sensitive adaptation policy may be adopted by increasing female participation in climate change-related decision making and initiatives; and providing relevant education, training and information to women regarding all vital information on weather alerts and cropping patterns. Third, a gender sensitive climate change mitigation strategy by proper training and education for energy use, afforestation, recycling and waste minimization, and use of CDM. In fact, threes three strategies need to happen simultaneously and synergistically and in gender-aware ways if the adverse effects of climate change are to be averted and the existing impacts dealt with before things get any worse.

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Review Article

Examining the impact of climate change through a gender lens in developing countries: building a case for Pakistan

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Abstract

Climate Change has occurred globally due to an unprecedented increase in the concentration of Green House Gases in the atmosphere due to human activity. As a human generated and worldwide process, global climate change is a significant addition to the spectrum of environmental health hazards. In the early 1990's there was very little awareness regarding the risks posed to human health as a result of global climate change. This was partly due to the general lack of understanding of how a disruption in the ecological and biophysical systems might pose serious threats to the long term health of populations. This was clearly reflected in the content of the first major report by the United Nation's Intergovernmental Panel on climate change, where only a few paragraphs touched upon the impact of climate change on human health. However, much has changed since then, with policymakers beginning to focus more on the potential risks to human population health due to climate change. South-East Asia is home to millions of the most vulnerable people and natural disasters on average kill more women than men, explained by the low socio-economic disparity between genders in developing countries. Gender roles assigned to women put them at a disadvantage and this article examines the impact of climate change through a gender lens from developing countries such as Bangladesh, Nepal, Ghana and Senegal. With this backdrop and policy directions for promoting and protecting women's health a case for Pakistan has been built. *(Pak J Public Health 2013;3(1):60-4)*

Keywords: Women's health; Climate change; Environmental health; Developing countries.

Introduction

Climate change has occurred globally due to an unprecedented concentration of greenhouse gases(GHG) in the atmosphere (1). Global climate change (CC) is a significant addition to the spectrum of environmental health hazards affecting human health via pathways of varying scale and complexity. Although Pakistan's contribution to these emissions is amongst the lowest in the world (i.e. 0.8% of the total GHG emissions) it has been declared one of the most vulnerable countries to be affected by these changes by the German Watch (2). Climate change impacts are evident in Pakistan ranging from some areas where there is a depletion of water resources to other areas which have been affected by unprecedented floods. The changing weather patterns and hence adverse effects on agriculturehave a direct impact on economy and local communities. Additionally, there are potential implications of climate change on the health and safety of vulnerable population groups.

Over the past two years, Pakistan also has experienced severe floods especially the mega floods of 2010 which affected the lives of 20 million people, out of which 85% were women and children (3). From a health-security perspective, many women and children were left vulnerable due to the fact that the small number of female relief workers was not enough to cater for all of their demands (4).

During natural disasters women are cut off fromhealth services and family planning commodities, which collectively affect their health outcomes. Pakistan already has a high maternal mortality rate (276per 100,000 live births) (5) and for many women this disruption in the supply of contraceptives during natural disasters gives rise to a wave of unwanted pregnancies(6).

The rationale for this article is that gender roles assigned to women in Pakistan put them atan additional disadvantage when faced with natural disasters. Policymakers and health professionals need to be sensitised to this correlation and through this commentary a platform for discussion and debate can be initiated to put women's health higher on the policy agenda. A review of relevant literature from the past two decades was undertaken using PubMed and Google Scholar.

Gender and climate change

Gender and roles assigned by the society are key factors in determining the adaptive capacity and vulnerability to health impacts of climate change. Across the developing world, it is predominantly the poor rural (as well as poor

urban women) who are responsible for domestic water collection, food preparation and food security. This alone emphasises the role of women and their vulnerability to the climate they live and work in.

A study conducted on water and drought management in Vietnam revealed that 74% of the study respondents believed that women are more seriously affected by drought then men, water resources are getting farther away and collecting water from distances takes its toll on women's health (7). Research findings from one hundred and forty-seven countries have revealed societal norms and gender roles are more responsible for vulnerabilities of women with respect to natural calamities (8).

Rising temperatures in climate change are associated with an increased incidence of malaria, which is already responsible for more than 1 million deaths each year globally (9). Pregnant women are more vulnerable to malaria and twice as "appealing" to the malaria carrying mosquitoes, due to increased blood flow to their skin(10). Maternal malaria is a leading cause of spontaneous abortion, still birth and low birth weight (6).

In many parts of the world, especially in Asian and Latin American countries, women are generally not taught how to swim due to cultural reasons linked with modesty, which seriously reduces their chances of survival during floods (11). In 1991, a major cyclone in Bangladesh was responsible for a death rate of 71 women per 1000, as compared to 15 men per 1000 (12). Flooding is the most widespread climate induced disaster and has huge implications in terms of loss of human life and livelihood, as well as human health (13).

For the first 20 years when climate change garnered international attention, gender issues were not even on the agenda. When it comes to decision making about climate change, women have remained invisible until recently. At the Eighth Conference of Parties to the United Nations Framework Convention on Climate Change in 2002, the participants finally acknowledged that women are more vulnerable to the impacts of climate change (14).

It is encouraging to announce that Pakistan recently launched its first Climate Change Policy (15), where a small section was designated to "health" and issues arising in response to climate change, however, this policy has failed to address and recognise the gender dimension of climate change.

Progress of developing countries for women and climate change

Lessons can be learnt from other developing countries that have used a policy approach to address women's health and the environment. There are examples where Asian and African governments have focused on legislation for the protection of women and the environment they live and work in (16). In 2008 the "Women's Environment and Development Organization (WEDO)" made a commission of five partners to undertake research regarding the impact of climate change on vulnerable groups of women. These countries included Bangladesh and Nepal in Asia and Ghana and Senegal in Africa (12).

Natural disasters in Bangladesh affect women disproportionately as they remain under-represented in the national economy and overburdened with home duties (12). During such disasters, there are rare economic opportunities for women, increased vulnerability for violence, harassment, lack of privacy and more health and mortality risks particularly for expecting and lactating mothers. Despite these vulnerabilities there are a number of coping strategies e.g. cutting down on certain scare foods, fuels, medicines, supplies, building shelter for children & elderly in emergency situations and replacing livestock (6,12). In 2005, Bangladesh completed its National Adaptation Programme of Action (NAPA) in which women are presented as victims of climate change (17). NAPA is under implementation however, specific guidelines on women's participation as stakeholders, leaders or agents for change are not forthcoming (16).

With respect to Nepal, the "Dalit" women (sometimes referred to as the untouchables) are some of the most deprived people in the country, shunned for both their caste and gender status. They are highly vulnerable to natural disasters by increasing their already heavy workload and having little or no access to disaster relief (18). From a policy perspective, the Nepalese Government is developing a National Climate Change Policy (19). Workshops and seminars have been implemented to educate the population on climate change with many women actively participating. However, there is a need for more training and skill development of women given the changing modern trends of the agricultural settings (19).

With respect to Senegal, more than 70% of women have a livelihood that is related to agriculture and in fisheries the percentage is as high as 90%(12). Climate changes and natural disasters make work more difficult in these sectors for women as yields are reduced and there are fewer buyers. From a policy perspective, a national Committee on Climate Change (COMNAC) was set up by the Senegal government. It employs women in leadership positions and therefore plays an important role in helping to

mainstream gender issues into climate change policy. This women-led team helps in the capacity building of women across the country to adapt to climate change and to find solutions at the local level for sustainable results (16,19). Although Senegal has adopted a number of policies for the reduction of gender inequality and discrimination unfortunately the efforts have had little impact on poor rural women who are over-burdened by changing requirements of fishing and agriculture.

The other African country affiliated with WEDO is Ghana where environmental threats affect women more as they are looked through a gender-neutral lens. These environmental threats include land erosion, excessive heat, rains, severe dry winds, decreased natural resources and lesser crop yield. Women in Ghana work twice as much as men but their labour goes largely unpaid. They are also under- represented in most sectors of the economy e.g. business or politics, and therefore receive little attention when it comes to the misery they face during natural disasters. In Ghana, there are decreased economic opportunities for women, increased vulnerability, domestic violence and increased health and mortality risks (12).

From a policy perspective, the Government of Ghana took a special initiative in 1992 with the establishment of a new Ministry of Environment, Science & Technology to review policies and projects related to climate change. Under the ministry, Ghana's women's organizations have mobilised to promote the capacity of women and address risk reductions during disasters (16).

Women's health in Pakistan

From a women's health perspective there have been several surveys conducted that present many key indicators e.g. the first National Nutrition Survey in 1985(20), the second National Nutrition Survey 1990-94 (21), the first Demographic and Health Survey in 2007 (22), the Health Indicators of Pakistan (23) and the most recent 2011 National Nutrition Survey (24).

The main finding from the last national nutrition survey in 2011 is that a quantum leap has not been achieved over the past twenty years in terms of improving the nutritional status of women of child bearing age (24).There have however been some gains with the iodine status and some improved practices in breastfeeding (24).Collectively these surveys provide baseline data that can be used for the development of policies and corresponding interventions to promote the health and well-being of all females. A major gap in data is related to adolescent girls, which is needed for prevention and promotion initiatives.

There are compounding factors that have affected food availability in certain regions of Pakistan, e.g. natural disasters and internally displaced persons. Collectively these events have affected food security which includes safety, affordability and nutritional value (24). Food insecurity resulting from climate change has additional implications for women in terms of their unique nutritional needs during pregnancy and lactation (6).

Policies in Pakistan that focus on women

From a national perspective, Pakistan's Ministry of Health developed five-year health plans from 1947 until 1990 when the first National Health Policy was developed (25), followed by a second policy in 1997(26), a third in 2001 (27), and the most recent in 2009/11 (28). The first three national health policies provided specific policy objectives (with several action points) related to women's health via the lady health workers program. The last national policy (2009) included women's health and the environment that they live in under “primary and preventative health care programmes”(28).

A milestone in public health policy occurred in 2004 when the first National Action Plan for the Prevention of Non-communicable Diseases and Health Promotion in Pakistan (NAP) was launched(29,30). This action plan provided a platform to focus on NCDs and women's health (29).

Since the 18th Amendment to the Constitution in 2010 (31) there have been important developments in terms of the country's health systems and the potential for a focus on women's health. At a provincial level, the Technical Resource Facility (supported by AusAid and Department for International Development) has been working in partnership to develop health sector strategies.

To date, each province has taken its own approach to develop their Provincial Health Policy e.g. in Punjab the newly developed Planning Commission-1, is attempting to integrate women's health into the Lady Health Worker program, the immunisation program and also the Maternal, New-born and Children's Health (MNCH) program.This new approach has resulted in an “Integrated Maternal, New-born and Children's Health Program” (IMNCH) (32). The other provinces and regions are undertaking similar efforts.

Building a “gender-sensitive” case for Pakistan

A gender sensitive policy doesn't merely imply “adding-on women,” it implies addressing issues which are being faced by the marginalised sector, hence socially constructed roles for women increases their vulnerability to natural disasters. It is important to acknowledge that

women are not only vulnerable to climate change but can also be “effective agents of change” in terms of mitigation and adaptation.

The gender dimension of climate change, or in other words climate justice needs to be highlighted. Men and women contribute differently to the causes of climate change, they are affected differently, react differently to disasters and present different solutions.In many countries and cultures women are at the forefront of the injustices caused by climate change. To improve the overall health status of women in Pakistan, there needs to be a focus on delayed marriages, appropriate child spacing and reduced fertility rate(24). Accumulatively these factors can support the education and empowerment of women and enhance their health status.With a better health status women can have a better chance of survival during extreme environmental changes.

From a health systems lens (33), following building blocks can be addressed to enhance the promotion of women's health, the promotion of a cleaner and safer environment and how to maintain a healthy life within the reality of climate changein Pakistan:

Service Delivery: a greater focus on thepromotion of women's health through equal education opportunities, good nutrition and family planningservices (34).

Health Workforce: a well-trained workforce in women's health (employing more female health workers particularly during disasters(35).

Information Systems:a co-ordinated surveillance system accessible to public health professionals that addresses women's health issues and climate change.

Medical Products and Technologies:a system for accessing affordable women'shealth related supplements and fortified foods; integration of private sector facilities with national systems for policy planning (23). Provision of family planning commodities at the right time and the right place.

Health Financing: a financial system to support out-of-pocket interventions and community-based initiatives; proportionate budgetary allocation for women's health given that 85% of the population use primary health care services (36).

Leadership and Governance: a greater focus on developing leadership and governance skills to keep women's health high on the policy agenda (37).

Pakistan has launched its first National Climate Change Policy, within which the dimensions of gender in climate change have been mentioned and dually acknowledged. However, time alone will tell whether it will have any impact translating policy into action. There is a need for greater inter-sectoral collaboration to put women's health and the environmental determinants of health (via climate change) higher on the policy agenda. Women's voices must be heard and their priorities supported as part of climate justice.

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Short Communication

Revitalizing primary health care in the post MDGs scenario by addressing social and environmental determinants of health: The Aga Khan University's urban health program

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Summary

The Millennium Development Goals have accelerated efforts to meet the needs of the World's poorest. Responding to new challenges in the post 2015 development agenda, Primary Health Care (PHC), in addition to providing a basic package of services, would entail addressing socio-economic status, redistribution of resources and health system development. The Aga Khan University's Urban Health Program (UHP) serves as a model that demonstrates this approach. The UHP draws strength from the WHO CSDH Conceptual Framework for Action on the Social Determinants of Health (SDH) with social development activities encompassing four key aspects: community development, water and sanitation, education and income generation. The UHP operationalizes these components as objectively measureable indicators and serves as a model of comprehensive PHC ensuring that the focus on SDH is kept foremost insteadof efforts being limited to a part of the health sector. UHP in its next phase will evolve as an example of involvement of community structures and academia in collecting, analyzing and benchmarking information related to socio economic determinants of health. *(Pak J Public Health 2013;3(1):65-8)*

Keywords: Primary health care; Millennium Development Goals; Social determinants of health; Environmental health.

Introduction

The eight Millennium Development Goals (MDGs) – which range from halving extreme poverty to halting the spread of HIV/AIDS and providing universal primary education, all by the target date of 2015 – form a blueprint for national and international action and have stimulated efforts to meet the needs of the World's poorest. New challenges such as sustainable development, continuing conflicts, human rights, rising inequality and demographic pressures would however need to be considered in the post 2015 development agenda. Primary Health Care (PHC) will also need strengthening in both the developing and developed world in order to be able to meet the aspirations set by the MDGs.

Since its proclamation in 1978, the most perilous of changes in the approach towards PHC has been the adoption of “Selective Primary Health Care” as opposed to the concept of “Comprehensive Primary Health Care”. The concept of selective PHC was widely accepted on the basis of cost effectiveness and vested interests as a key strategy of the 1990s neoliberal health reforms for low and middle-income countries (1). This selective model does not take into account the socioeconomic needs of communities (MDG 1) and has failed to provide an adequate response to the health related goals of the developing world (MDG 4, 5 & 6) (2).

In the post MDGs scenario, PHC in addition to providing a basic package of services, would entail addressing socio-economic status, redistribution of resources and health system development (3). This is particularly important because across the world, the health status of populations adheres to a “social gradient”, i.e. a higher socioeconomic level defines better health. It is therefore imperative that the global community builds on the current MDGs and moves beyond meeting basic human needs in order to promote dynamic, inclusive and sustainable development.

WHO recognizes the role of universities as being catalytic in “mobilizing energies to improve the cause of health of the disadvantaged” (4). As institutions of “higher learning, research and community participation”, universities, particularly health sciences institutions, are in a key position to develop new health care models that promote equity, social justice and human development (4). Such involvement of academia to demonstrate prototypes for further scale up will be all the more important in the post MDG era.

We discuss the Aga Khan University's (AKU-Karachi) Urban Health Program (UHP) as a case study of addressing social and environmental determinants of health through the application of a comprehensive PHC approach.

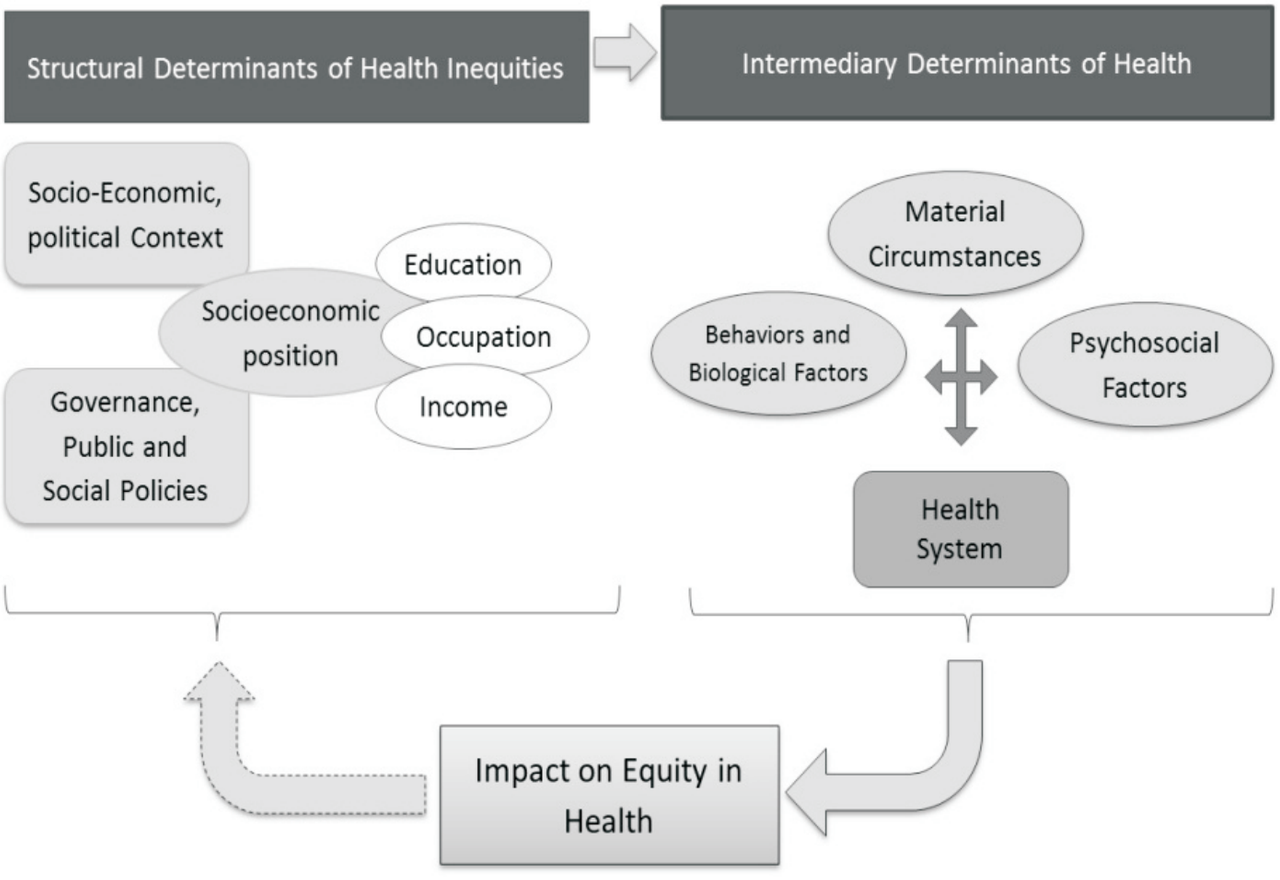

Figure 1: Structural determinants of health and intermediary determinants of health inequities. (Source: WHO, 2008)

The Current UHP Model of comprehensive primary health care

The UHP is AKU's flagship program to improve the health and socio-economic status of target populations in peri-urban squatter settlements in Karachi through health, social development, education, and research interventions within an integrated health system. The aim has been to promote the development of an equitable and sustainable health care system that embraces the basic needs of the under privileged and underserved segments of the populations in partnership with communities, government and NGOs.

In 2008 the World Health Organization's (WHO) Commission on Social Determinants of Health (CSDH), proposed a "Conceptual Framework for Action on the Social Determinants of Health" to promote positive change in health status by tackling the socio-environmental determinants (literacy, water, sanitation, employment, etc.) of health through changes in policy and practice (5).The framework highlights the role of primary health care (PHC) as the basis for a health system that addresses critical underlying social, environmental, economic, and political determinants of ill health (6). The WHO CSDH Framework (figure 1) validates the four UHP components of health, social development, education and research and provides the direction for strengthening UHP in its future phases of implementation.

The UHP model in post MDGs era

Social development activities have been a core component of UHP since 1996. These activities encompass four key aspects: community development, water and sanitation, education and income generation (figure 2). UHP efforts have initially focused on community mobilization and capacity building to strengthen community based organizations (CBOs), training community volunteers including community health workers. This has resulted in improved health status, increased female literacy, improved water and sanitation conditions, and greater self-sufficiency through micro-credit and income generation schemes in UHP target communities in Karachi (7).

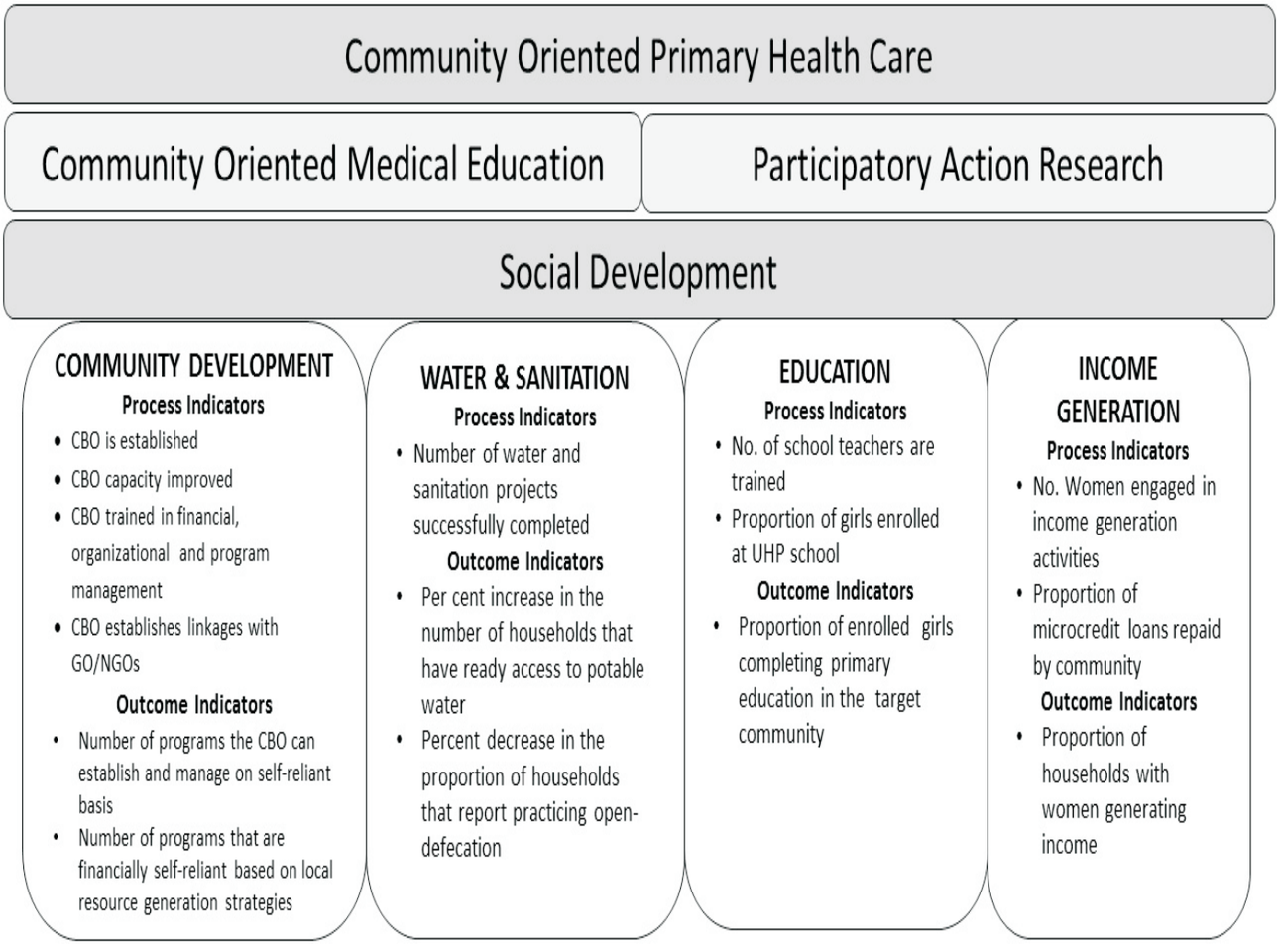

Figure 2: UHP components and indicators to track social development in UHP target communities.

The UHP's Social Development component promotes female education through establishment of schools; contributes towards povertyreduction through its skill building and income generation schemes for women; undertakes community development through establishing, strengthening and partnering with community based organizations (CBOs) and supports research on the social determinants of health to inform healthy public policy. To date all of UHP's efforts have been rather anecdotal. In UHP's new phase (2012-2017) however, the latter have been incorporated as objectively measureable indicators to track progress against planned outcomes related to SDH (figure 2).

UHP will now monitor, measure trends and analyzethis information to guide evidence-based policies; additionally UHPs surveillance system will not only identify the health gap and the gradient in health, but will also disaggregate data according to socio-economic indicators referenced in Figure 2.

Conclusion

The SDH discourse clearly shows how most health inequities are not caused by a lack of access to healthservices, but by the influence of inequalities in other sectors such as housing, occupation, education or income (8). PHC and SDH also both identify disempowerment and alienation of marginalized groupsin society as a major obstacle to achieving health equity, and call for both processes andresponses that address the inequitable distribution of power.

There is widespread acknowledgement that reducing health inequities through a revitalized PHC will not be successful if the Alma Ata principle of acting across and beyond the health sector is again ignored. A specific driver for renewed interest in PHC is stalled progress in

several priority public health targets, including the health-related MDGs. Weakness of health systems has been identified as a barrier to health progress, but inattention to SDH has also played a critical role, underlining the interdependence of health system development with improvements in other sectors if inequities are to beaddressed.

If a revitalized PHC is to be the key approach to organize society to minimize health inequities and respond to people's expectations about their health, action on SDH has to be a major constituent strategy. Priority public health targets, such as the health-related MDGs, require both addressing SDH and reforming health systems based on PHC. Recent examples of progress on health inequities show the importance of both health system reform and action on broader social development, keenly informed byhealth gaps (9,10). Most of all, it will require ensuring that the broad focus of PHC and SDH is kept foremost in policy instead of the common historical experience of efforts being limited to a part of the health sector. In this regard, in the immediate aftermath of devolution of the health sector, the first author attended the “National Consultation on Social Determinants of Health” arranged by the Planning Commission with WHO collaboration in Bhurban in 2012. Establishing national benchmarks and targets for key socio-economic indicators and involving community structures and academia in collecting and analyzing information came out as key recommendations. UHP can serve as a model to materialize this ambition.

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About LEAD Pakistan

Leadership for Environment and Development (LEAD) Pakistan is a non-profit organization, working to create and sustain a global network of leaders, who are committed to promote change towards patterns of economic development that are environmentally sustainable and socially equitable. LEAD Pakistan was established in 1995 and since then it has evolved into one of the most dynamic development sector organizations in Pakistan. Today LEAD Pakistan carries out a range of activities, from Leadership Development, Creating and Nurturing Networks, Poverty Alleviation, Policy and Action Research, all interwoven with dynamics for formation of Social Capital and Public Policy Engagement. It establishes partnerships with organizations having similar mandates of moving the sustainable development agenda forward.

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