

FLOOD DEVASTATED THE BARRIERS OF EPIDEMICS AT DISTRICT RAHIM YAR KHAN

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ABSTRACT

Back ground: Natural disasters are catastrophic events with atmospheric, geologic, and hydrologic origins. Disasters include earthquakes, volcanic eruptions, landslides, tsunamis, floods and drought. Pakistan faced floods in 2010 that began following heavy monsoon rains in the Khyber Pakhtunkhwa, Sindh, Punjab and Balochistan regions of Pakistan. **Objectives:** To evaluate the prevalence of infectious diseases in the flood affectee persons at Bhung, District Rahim Yar Khan in southern Punjab. **Patients and Methods:** This cross sectional study was conducted among the flood affectee at the flood relief camp of Sheikh Zayed Hospital / Medical College, Rahim Yar Khan located at Bhung, Rahim Yar Khan, during the month of September 2010. The data regarding age, sex, education, occupation, geographical origin and nature of disease were obtained from the patients attending flood relief medical camp for health care and was analyzed on SPSS version 14. **Results:** During the study period, 8074 patients were examined. Patients of all ages and both sexes were included. Male to female ratio was 1 to 1.01. The patients ranged from neonates to more than 70 years of age. The children under the age of ten years were 40.99%. Among the flood affectee, the most common diseases in decreasing order of frequency were diarrhoea, RTI, skin infection, eye infection, ear infection and bone trauma. **Conclusion:** Clean water, environmental hygiene and health education with proper and timely medical cover can reduce mortality and morbidity.

Keywords: Flood, Disease Epidemic, Flood Affectee

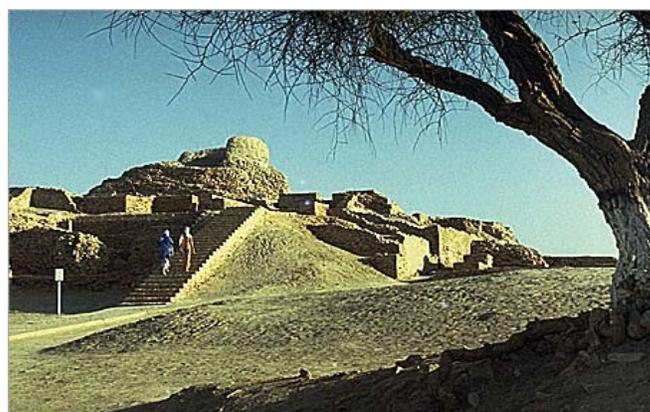
INTRODUCTION

Natural disasters produce serious health, social and economic consequences. During the past two decades, natural disasters have killed millions of people and adversely affected the lives of at least one billion more people, resulting in substantial economic damage.¹ Developing countries are disproportionately affected because of their lack of resources, infrastructure and disaster preparedness systems.² The flood in Pakistan 2010 inflicted havoc from the northwest to the far south of the country, destroying villages, bridges and roads, damaging millions of acres of cropland and displacing millions of people. Floods in the Indus valley are not new to this region. The towering civilizations like Indus Civilization of Mohenjo daro & Harrappa were probably also destroyed by similar floods. Reverine shells can still be found in all areas of south Pakistan proving that the region had been flooded and reflooded for a long time.³ Among the flood victims of this 2010 flood, there were more than 3.5 million children and tens

of thousands of pregnant women, many of whom have given birth in the relief camps. Some 500,000 women were expected to give birth to babies in the flood affected areas over the next six months. According to the United Nations, the number of people displaced by the floods is more than 17 million.

The flood swamped hundreds of villages in the southern province of Sindh before pouring into the Indian Ocean. Present estimates indicate that over two thousand people died and over a million homes destroyed.^{4,5} According to the United Nations, more than 21 million people were injured or left homeless as a result of the flooding, exceeding the combined total of individuals affected by the 2004 Indian Ocean tsunami, the 2005 Kashmir earthquake and the 2010 Haiti earthquake.^{5,6}

Figure : I
Mohenjo Daro cradle of Indus civilization: One of the reasons of its destruction was a massive flood in 1700 BC



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Table I: Top 11 Natural Disasters Reported⁷**Affected People**

| Disaster | Date | Number of People Affected |
|------------|------|---------------------------|
| Flood | 2010 | 21,000,000 |
| Storm | 2007 | 1,650,000 |
| Earthquake | 2005 | 5,128,000 |
| Flood | 2005 | 7,000,450 |
| Flood | 2003 | 1,266,223 |
| Drought | 1999 | 2,200,000 |
| Flood | 1996 | 1,300,000 |
| Flood | 1995 | 1,255,000 |
| Flood | 1992 | 6,655,450 |
| Flood | 1992 | 6,184,418 |
| Flood | 1988 | 1,000,000 |

As the flood waters receded, the danger of infection among the flood victims rose. The camps where people took shelter became a potential breeding ground for malaria, cholera, and other gastrointestinal diseases. Most people in these camps complained of infections caused by contaminated water. Several factors that promote disease transmission after disasters interact synergistically, facilitating the occurrence of communicable diseases outbreaks.⁸

Figure II: Picture by Reuters showed gushing water in Swat Valley

Approximately one-fifth of Pakistan's total land area remained underwater due to the flooding.¹¹ Diarrhoeal diseases, hepatitis, measles, meningitis, acute respiratory infection and malaria have been commonly described after natural disasters and conflict situations. Tularemia, Lassa fever, pneumonic plague were mainly described after conflicts. Other diseases including

diphtheria, influenza and pertussis have been less documented in disaster and refugee settings, but have potential to spread rapidly in overcrowded situations.¹² This study had been conducted to evaluate the diseases prevalent among the flood affectee persons, so that the actual statistics could be obtained. It is expected that it would be helpful in planning for reduction and elimination of these infectious diseases.

METHODOLOGY

This study was conducted among the flood affectee persons at the flood relief camp of Sheikh Zayed Hospital / Medical College Rahim Yar Khan at Bhung, Rahim Yar Khan. All the patients who reached the camp, except those having gynaecological problems were included in the study irrespective of age, gender, occupation, residence and comorbid diseases. The data regarding age, sex, education, occupation, geographical origin, nature of disease were obtained by questionnaire. The data was analyzed on SPSS version 16.

RESULTS

During the study period, 8074 patients were examined. Out of these, males were 4003 and females were 4071 (M/F ratio 1:1.01). The range of patients age was from neonates to more than 70 years. The children under the age of ten years were 40.99%. Among these, 21.56% were boys and 19.43% were girls. Teenagers were 1072(13.27%) among whom 509 (6.30%) were males and 563(6.97%) females. Patients in reproductive age group (21 to 50 years of age) were 2407(29.82%), 1179(14.60%) males and 1228(15.22%) females. Patients above the age of 50 attended the camp less frequently. They were 1286(15.92%) in number. Among these 573(7.11%) were males and 712(8.81%) were females. Regarding level of education, 78.48% were illiterate, 17.19% were primary level students and the rest (4.33%) were literate up to matric and above.

Table II: Age and sex wise distribution of patients

| Age | Total (%age) | Male (%age) | Female (%age) |
|-------|--------------|--------------|---------------|
| <10 | 3309 (40.98) | 1741 (21.56) | 1568 (19.43) |
| 11-20 | 1072 (13.27) | 509 (6.30) | 563 (6.97) |
| 21-30 | 1016 (12.58) | 432 (5.35) | 584 (7.25) |
| 31-40 | 739 (9.15) | 368 (4.56) | 371 (4.59) |
| 41-50 | 652 (8.10) | 379 (4.69) | 273 (3.38) |
| 51-60 | 576 (7.13) | 282 (3.49) | 294 (3.64) |
| 61-70 | 541 (6.70) | 211 (2.61) | 330 (4.09) |
| > 70 | 169 (2.09) | 81 (1.01) | 88 (1.08) |
| Total | 8074 (100) | 4003 (49.57) | 4071 (50.43) |

Majority of men and women (96.37%) were laborers, working in agriculture farms on wages. The same number was of poor socioeconomic status. Flood had overwhelmed not only their houses and cattle's but their health also. Diarrhoea was the most common problem of majority of the patients irrespective of age and sex.

Out of 8074 cases, 4787 (59.28%) complained of diarrhoea. Among these, children under the age of ten years were 2280(68.90%), the teenagers were 609(56.81%) and persons of reproductive age were 1440(59.82%). Patients older than 50 years of age who also suffered from diarrhoea, were 454(35.30%) out of 1286. Respiratory tract infections were also a major health problem of these patients. Children under the age of ten years exceeded 1541(46.57%) in number, while it affected 402(37.51%) adolescents. Comparatively it was less common among the reproductive age group, 522(21.68%). The proportions of older persons, above the age of 50 years having RTI was higher, 501(38.95%). Skin infections ranging from scabies, pyoderma, urticaria, frank boils to cellulites and abscess formation were present. They were higher in the extremes of ages. In children, they were 13.68% and 21.78% in old age person. Eye infections including conjunctivitis, trachoma and foreign body ulceration were also more frequent. However, they were relatively high in the age group of 21 to 50 years. Otitis externa and other ear infections were present in 236(7.13%) children under the age of ten years. Among health problems other than mentioned earlier include

snake bite and bony as well as other injuries. These injuries range from 4.08% in early childhood to 4.24% in the age group of above seventy.

DISCUSSION

Epidemics in flood affected areas are due to water-borne and vector-borne disease.⁶ The lives of millions of Pakistan's flood victims were endangered due to the outbreak of epidemic diseases. Pakistan's Health Ministry sent a red alert to the World Health Organization (WHO) for starting an emergency treatment against the diseases which were spreading fast, as the flowing polluted water mixed tap and well water with sewerage and other contaminated water sources.⁷

Pakistan has great geographical similarities with Bangladesh, which is also prone to severe flooding. There were extensive floods during the monsoons of 1988, 1998 and 2004 in Bangladesh. During these periods, 25-50% of Bangladesh was submerged, resulting in the destruction of infrastructure, contamination of water and epidemics of diarrheal illness.⁸ Similar percentage of Pakistan area was under water during the flood 2010.⁹

Crowding, inadequate water and sanitation and sudden population displacement increased the risk of communicable disease transmission.¹¹ The presence of large numbers of cattle bodies in the disaster-affected areas also contributed to disease outbreaks.^{12,13} The mixing of fatal chemical and explosive substances from various sources in flood water enhanced the diarrhoea epidemic. It was found in the present study that out of 8074 patients, 4787

Table III: Disease Pattern and distribution among Patients in percentage n=8074

| Age in years | No. of patients | Diarrhea | RTI | Skin infection | Ear infection | Conjunctivitis eye infections | Injuries and Other Health problems |
|--------------|-----------------|----------|-------|----------------|---------------|-------------------------------|------------------------------------|
| <10 | 3309 | 68.90 | 46.57 | 13.68 | 7.13 | 9.07 | 4.08 |
| 11 -20 | 1072 | 56.81 | 37.51 | 11.38 | 1.37 | 7.74 | 5.67 |
| 21 -30 | 1016 | 67.32 | 25.29 | 12.89 | 0.04 | 6.39 | 2.39 |
| 31 -40 | 739 | 43.43 | 17.18 | 07.17 | 1.31 | 21.23 | 6.04 |
| 41 -50 | 652 | 67.33 | 21.19 | 06.91 | 0.67 | 19.29 | 4.40 |
| 51 -60 | 576 | 32.29 | 29.16 | 17.21 | 0.23 | 09.67 | 3.98 |
| 61 -70 | 541 | 39.37 | 41.96 | 19.74 | 2.17 | 15.35 | 4.24 |
| >70 | 169 | 32.54 | 62.13 | 21.78 | 1.39 | 11.89 | 3.41 |

(59.28%) suffered from diarrhoea.

Floods can potentially increase the transmission of water-borne diseases and vector-borne diseases.¹⁴ It was estimated that about 36,000 people had been affected by the breakout of cholera.¹⁵ Similar results were found in WHO verdict.¹⁶ During flood-associated epidemics, *Vibrio cholerae* is the most commonly identified cause of diarrhoea and Rotavirus the second most frequently identified flood-associated pathogen. Other causes of diarrhea are enterotoxigenic *Escherichia coli*, *Shigella*, and *Salmonella*.¹⁷

Similar results were found in an outbreak of diarrhoeal disease after flooding in Bangladesh in 2004 which involved >17,000 cases. *Vibrio cholerae* (O1 Ogawa and O1 Inaba) and enterotoxigenic *Escherichia coli* were isolated.¹⁸ A large (>16,000 cases) cholera epidemic (O1 Ogawa) in West Bengal in 1998 was attributed to preceding floods¹⁹ and floods in Mozambique in January-March 2000 led to an increase in the incidence of diarrhoea.²⁰

Crowded living conditions of the flood affectee facilitated the transmission of communicable diseases. Acute respiratory infections (ARI) were a major cause of illness among displaced populations, particularly in children <10 years of age. It was found in present study that 46.57% of children under the age of ten years suffered from acute respiratory infections (ARI). ARI accounted for the highest number of cases and deaths among those displaced by the tsunami in Aceh in 2004 and by the 2005 earthquake in Pakistan.^{21,22}

Vector borne diseases pose a great danger to human health as well. The crowding of infected and susceptible hosts and enhancement in breeding places were all risk factors for vector borne disease transmission.²³ Dengue transmission is influenced by meteorological conditions, including rainfall and humidity and that enhance breeding of mosquitoes. Malaria outbreaks in flooded areas are a well-known phenomenon as well.²⁴

CONCLUSION

Disasters, like floods, open the doors to communicable and infectious diseases. These become a major public health problems, especially in developing countries like Pakistan, necessitating an appropriate and coordinated

response from national and international communities. These outbreaks may be avoided by appropriate planning and intervention. The most important step is rapid epidemiological assessment for public health planning and resource allocation. We can reduce the mortality and morbidity by providing adequate shelter, sanitation, water and food safety and appropriate surveillance. Immunization and health education are also strongly required. Early warning system and interventional strategies should be improved. Adequate shelter and sanitation, water and food safety, appropriate surveillance, immunization and management approach as well as health education are strongly required for the reduction of morbidity and mortality.

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