Original Article

Post Flood Health Relief Response: An Experience from AIIMS Patna

Running Title: Post Flood Health Relief

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Abstract

Background: There was unpredictable rain in September 2019 due to which, Patna, the state capital of Bihar, India experienced a devastating flood. There was indiscriminate damage to housing, communication and transport networks, and health facilities; affecting the lives of thousands of people. *Objectives*: To assess the morbidity profile of patients attending the health relief response camps conducted in different regions of Patna by AIIMS Patna team during the post-flood period. *Methodology*: On the direction of Government of Bihar to the administration of AIIMS, Patna, nine flood health relief response teams of AIIMS Patna were formed on the evening of 4th October 2019. All the required logistics were arranged within next 12 hours, and the teams started working from 5th of October 2019 for the next five days. Data were collected regarding age, gender, presenting health problems and history of any chronic diseases using Google forms. The total number of patients attending the camps during these five days were 3511. Real-time data analysis was done using cloud based google sheets. *Results*: In the camp, it was found that the common health problems reported by the cases were of itching (19.2%), followed by cough (14.7%), and fever (11.7%). About 13% (448) cases were having history of chronic non-communicable diseases. Maximum cases reported in our camp were on 8th October 2019, which was 1072 (30.5%). *Conclusions*: Rapid action by government and the health system averted epidemic outbreaks. Maximum cases were of itching in the camps

Keywords: Health relief response, flood, disaster

Introduction

Floods are the most common disasters globally, and were responsible for 53,000 deaths worldwide in the last ten years. A flood causes major loss of both life and property. The resultant disturbance of transportation, communication and unavailability of clean water affects the human health [1]. The onset of a flood results in higher infectious disease burden. Flooding is associated with an increased risk of infection; population displacement, inadequate shelter conditions, degree of overcrowding, consumption of

contaminated water, improper sanitation, underlying health status of population, malnutrition, local disease ecology, and difficulty in access of health care services [2]. Bihar is located in the eastern region of India, it is an entirely land-locked state under the sub-tropical region of the temperate zone. It is bounded by Nepal in the north, and by the state of Jharkhand, India in the south. Rainy season occurs mainly from June to September; with a rain-fall ranging from 1250 mm to 1400 mm. There are two distinct regions which divide Bihar into two parts viz. north of Ganges river and south of Ganges river. Patna lies south of the Ganges river [3]. Being situated on the bank of river Ganges, Patna lies in an area liable to floods as per the flood hazard map (http://bmtpc.org/) of Bihar. Various infectious disease outbreaks have been reported following floods in developing countries, and these outbreaks vary in magnitude and rates of mortality [4].

This year in 2019, during the entire emergency period, the National Disaster Response Force (NDRF) team rescued two persons and evacuated 9490 persons. They provided medical assistance to 5806 needy people in Bihar. A total of 17 relief camps were run across the state on directives of the State Government; displaced people were accommodated in these relief camps [5]. With this background our study aimed to assess the morbidity profile of patients attending the health response camps conducted in different regions of Patna by AIIMS during the post flood period.

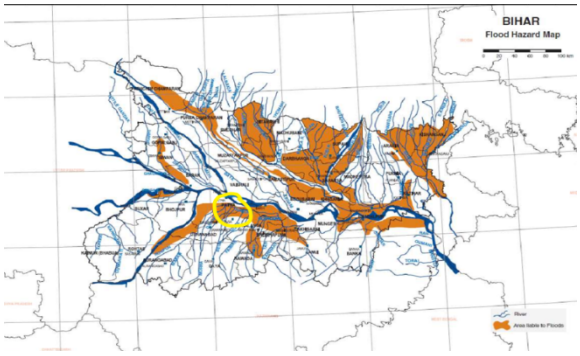

Figure 01: Flood hazard map of the state of Bihar, India showing flood liable areas

Methodology

Study design – Cross sectional study

Study setting – Nine different flood affected areas of Patna district, Bihar

Study duration – 2 weeks

Study participants – All the patients who came to the flood health relief response camp to seek medical advice were included.

Sampling technique – Total enumeration

Data collection - The questionnaire for data collection from the health response camps was developed using an online platform using Google forms. A 'Whatsapp' group of flood response team was formed. The online form link was shared on this group. Data from each camp was obtained through Google form and stored in Google spreadsheet. A dynamic dashboard (which changed with every data entry) was created for real-time data monitoring and to keep a check on patient flow at each mobile health unit.

Study tools – Data collection was done regarding age, gender, presenting health problems and history of any chronic diseases.

Statistical analysis – Finally the analysis of data was done using the SPSS (version 21) software. The results were expressed as frequency and percentage of the variables.

We used to generate a daily report once all units got closed for the day.

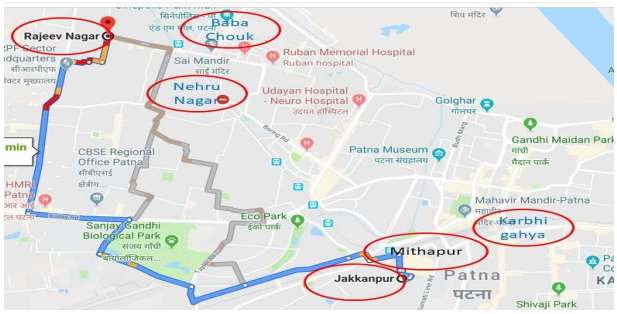

Figure 02: Flood health relief response camps in Kankarbagh and Rajendra Nagar, Bihar, India

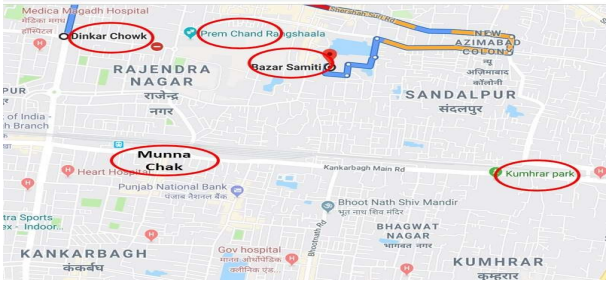

Figure 03: Flood health relief response camps near Kumhrar and Indrapuri, Bihar, India

During the five-day camp, 496 person-days were contributed by AIIMS, Patna staff for flood-hit areas. On the 5th and 6th of October, 2019, patients from 'Bazar Samiti' areas were served from the nearest camp of Vaishali Chowk. Due to some network error data from the area of Rajiv Chowk could not be captured on first day. About 50 cases were treated this day. On later days some teams were merged for better resource allocation in severely affected areas.

Execution Plan of the flood health relief response camp

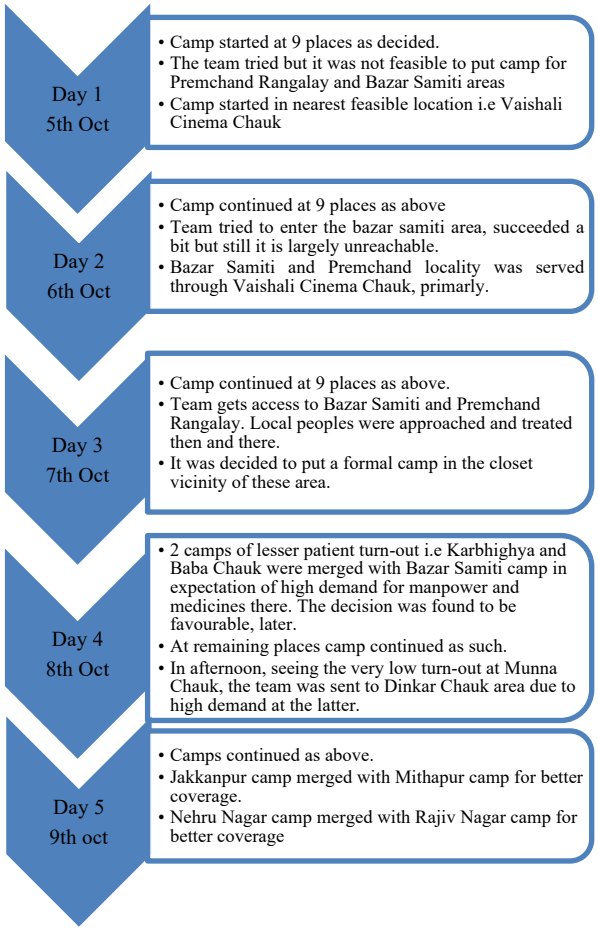

Figure 04: Day-wise schedule of the flood relief health response team

Findings

The relief teams attended a total of 3511 cases, during the five days of health camp. Table 1 shows the date-wise details of number of patients. About 13% (448) cases were having history of chronic non-communicable diseases (diabetes, hypertension, asthma, Chronic Obstructive Pulmonary Disease & hypothyroidism) as shown in table 2. From table 3, it is evident that maximum cases were of itching (19.2%), followed by cough (14.7%), and fever (11.7%). About 6% cases presented with diarrhoea and loose stools, while 5% cases had weakness as their primary complaint.

Discussion

Floods are caused by natural factors or by a combination of natural and human factors. Risk from a flood is the probability of loss, this can be expressed as: Risk = Hazard x Vulnerability [6, 7]. The hazards of flood depend on the magnitude of flood depth, velocity, and duration. Vulnerability may be defined as the conditions determined by physical, social, economic, and environmental factors, which increase the susceptibility of a community to the impact of hazards. If flood water enters the habitation of people and infrastructure, then the vulnerability of people and infrastructure is liable for harm and damage. In urban areas impact of floods are significant in terms of economic losses, both direct and indirect. This is due to high density of population, large impervious areas, clogged of drainage systems, high economic value of property and infrastructure, etc. Better flood emergency response mechanisms help reduce potential secondary losses. While in rural areas, the damages due to floods are mostly direct – in terms of loss of agricultural production. In our study it was found that the commonest complaint of cases were itching, followed by cough. In a similar study done after Chennai floods the most common cases were of acute respiratory infections, followed by gastroenteritis [8]. The results of a study done in Pakistan by Ahmad *et al.* showed that the distribution of infectious disease cases presented to relief camps were gastrointestinal cases (acute diarrhoea) – 30%, skin and soft tissue infection (33%), eye infection (Conjunctivitis) – 07%, ear, nose and throat infection (05%), respiratory tract infection (21%), and suspected malaria (4%) [9]. In another study done in Taiwan by Lin *et al.* there was a higher percentage of female cases (66.7%) than males (33.3%). Whereas, in our study more percentage was of male cases (70.6%) [10]. In a study done in Nepal by Kafle *et al.* it was found that waterborne infectious diseases and mental disorders were prominent diseases during the post-flood period [11]. However, in our study no mental disease case was reported. Our study was done only in some of the flood relief health response camps in certain areas of Patna district. The health response camps were arranged immediately after the flood and no follow-up health response camps were held in the same area.

We conclude from the study that there were large number of cases of itching and fever, but there was no need for hospitalization for any of these cases. Some cases also had a history of chronic non-communicable diseases. Also, there was no epidemic of dengue or cholera or other waterborne diarrhoeal diseases. It is important to provide health relief response camps during floods, however basic sanitation and hygiene should also be maintained.

Ethical Approvals

Declaration of Helsinki have been followed throughout the study.

Conflict of Interest

None declared

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References

1. Menon et al. Study of morbidities in a flood relief camp: observations from kerala 2018. European Journal of Pharmaceutical and Medical Research 2018;5(11):443-445
2. Watson JT, Gayer M, Connolly MA. Epidemics after Natural Disasters. Emerg Infect Dis 2007;13(1):1-5.

3. Government of India, Ministry of Micro, Small and Medium Enterprises, BIHAR STATE PROFIE, 2015-16 http://dcmsme.gov.in/dips/state_wise_profile_16-17/Bihar%20%20State%20Profile.pdf [Last accessed on 31/01/2020]
4. Ministry of Home Affairs Disaster Management Division (National Emergency Response Centre) Situation report on Flood/Heavy Rain fall as on 30th September, 2019 at 1800 Hrs. https://www.ndmindia.nic.in/images/gallery/Situation%20report%20as%20on%2030.09.2019%20at%201800%20Hrs.pdf[Last accessed on 31/01/2020]
5. Mondal NC, Biswas R, Manna A. Risk factors of diarrhoea among flood victims: A controlled epidemiological study. Indian J Public Health 2001;45:122-127.
6. Srikantha Herath, Geographical information systems in disaster reduction, Institute of Industrial Science, The University of Tokyo, Japan; 2001.
7. Tingsanchali T, Keokhumcheng Y. Flood damage functions for surrounding area of Second Bangkok International Airport, Proceedings, International Symposium on Urban Safety of Mega Cities in Asia, Phuket, Thailand, November, 2006; p. 291-300.
8. Angeline N, Anbazhagan S, Surekha A, Joseph S, Kiran PR. Health impact of Chennai floods 2015: Observations in a medical relief camp. Int J Health Syst Disaster Manage [serial online] 2017 [cited 2018 Oct 6]; 5: 46-8. 7. Available from: http://www.ijhsdm.org/text.asp?2017/5/2/46/213887 [Last accessed on 01 feb 2020]
9. Z, Khan AA, Nisar N. Frequency of infectious diseases among flood affected people at district Rajanpur, Pakistan. PJMS, 2011; 27: 866-9. Available from: http://www.pjms.com.pk/index.php/pjms/article/view/975. [Last accessed on 01 feb 2020].
10. Lin C, Chen T, Dai C, et al Serological investigationto identify risk factors for post-flood infectious diseases: a longitudinal survey among people displaced by Typhoon Morakot in TAIWAN BMJ Open, 2015; 5: e007008. doi: 10.1136/bmjopen- 2014-007008.
11. Kafle KR, Dahal RK, Khanal SN. Postdisaster epidemiological assessment of Koshi flood 2008, in Nepal. Int J Health Syst Disaster Manage 2016;4:15-24

Table 1: Number of cases attending the camps according to locations (n=3511)

	Dates					
Team Location	Oct-5	Oct-6	Oct-7	Oct-8	Oct-9	Grand Total
Baba Chauk	48	30	60			138
Bazar Samiti Chauk	26	102	60	406	116	710
Dinkar Chauk	38	84	77	108	103	410
Jakkanpur	19	23	39	61		142
Karbighaiya	34	38	80			152
Kumhrar Park	68	74	94	62		298
Mithapur	39	42	37	70	67	255
Munna Chauk	40	23	37	16		116
Nehru Nagar Chauk	28	83	87	79	122	399
Rajiv Nagar Chauk		52	98	121		271
Vaishali Cinema Chauk	36	135	119	149	181	620
Grand Total	**376**	**686**	**788**	**1072**	**589**	**3511**

Table 2: Cases with non-communicable diseases during 5 days of camp

Case	**Frequency**	**Percentage (%)**
Diabetes	132	3.7
Hypertension	218	6.2
Asthma/COPD	42	1.2
Hypothyroidism	56	1.6
Total	448	12.7%

Table 3: Gender wise distribution of patient complaints (n=3511)

	Gender		
Primary Complaint	**Female (%)**	**Male (%)**	**Grand Total (%)**
Abscess	3 (0.08%)	11 (0.31%)	14 (0.39%)
Backache	33 (0.93%)	55 (1.56%)	88 (2.5%)
Breathlessness	18 (0.51%)	32 (0.91%)	50 (1.4%)
Chest Pain	14 (0.39%)	39 (1.11%)	53 (1.5%)
Cough	145 (4.12%)	374 (10.6%)	519 (14.8%)
Diarrhoea	54 (1.53%)	162 (4.61%)	216 (6.2%)
Dizziness	25 (0.71%)	50 (1.42%)	75 (2.1%)
Dysentery	10 (0.28%)	18 (0.51%)	28 (0.8%)

Fever	119 (3.38%)	294 (8.37%)	413 (11.7%)
Headache	49 (1.39%)	89 (2.53%)	138 (4%)
Injury	14 (0.39%)	74 (2.1%)	88 (2.5%)
Itching	142 (4.04%)	533 (15.18%)	675 (19.2%)
Pain abdomen	67 (1.9%)	105 (2.99%)	172 (4.9%)
Pain-Generalized	60 (1.7%)	105 (2.99%)	165 (4.7%)
Pain-Localized	89 (2.53%)	192 (5.46%)	281 (8%)
Rash-Generalized	13 (0.37%)	13 (0.37%)	26 (0.7%)
Rash-Localized	13 (0.37%)	30 (0.85%)	43 (1.2%)
Swelling	12 (0.34%)	38 (1.08%)	50 (1.4%)
Taenia Infection	11 (0.31%)	27 (0.76%)	38 (1.1%)
Ulcer/Wound	22 (0.62%)	82 (2.33%)	104 (3%)
Upper Respiratory Tract Infection	23 (0.65%)	26 (0.74%)	49 (1.4%)
Urinary Tract Infection	2 (0.05%)	6 (0.17%)	8 (0.2%)
Vomiting	19 (0.54%)	26 (0.74%)	45 (1.3%)
Weakness	74 (2.1%)	99 (2.81%)	173 (5%)
Grand Total	**1031 (29.4%)**	**2480 (70.6%)**	**3511 (100%)**

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