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Research Article

A STUDY ON DISASTER PREPAREDNESS AND RISK REDUCTION: LESSONS FROM 'YAAS' IN BENGAL

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ABSTRACT

Introduction: In May, 2021 'YAAS', 'very severe cyclonic storm' flogged the coastal parts of Bengal disrupted human lives, basic needs and health infrastructure. In midst of COVID-19 pandemic it literally devastated human lives within one year of ravaging super cyclone ('Amphan'). **Aim:** The current work was embarked to assess awareness level of affected people in demographic and preparedness contexts. **Materials and Methods:** a cross-sectional study was conducted among 550 people who attended four health camps once evacuated and sheltered in relief settlements in Patharpratima block in Sundarbans, one of worst affected areas. Demographic, awareness and preparedness data were collected from attendees of the camps and key informants (KI) in the area from mid-June to July, 2021. **Statistical analysis:** data were analyzed with SPSS version 22.0. **Results:** Out of total 550 people, 315 (57.27%) were male, 305 (55.45%) were farmers and 419 (76.18%) dwellers of thatched houses. 56 (10.18%) were detected to have some skin problems, respiratory infection but 169 (30.73%) had various non-communicable diseases and due to disruption of health infrastructure treatment has become irregular. Regarding preparedness, 290 (52.73%) was informed on the disaster beforehand but proper arrangement for their rehabilitation was not done. According to KIs rescue and relief was there but in irregular, inadequate and disorganized manner and strong embankment to be done to fight these hungry tides. **Conclusion:** in the area context because of constant threat of cyclone and flood, area specific and targeted vulnerability measurement, risk reduction and proper mitigation plans are need of the hour.

INTRODUCTION

The United Nations office for Disaster Risk Reduction (UNDRR) has defined disaster as "A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts".[1] These may be natural like flood, cyclone, earthquake, draught, landslide, locust attack etc. or man-made like terrorist attack, either physical or bioterrorism, nuclear plant explosion, war etc.[2] Disasters by their intrinsic and extrinsic nature halt all economic, social, environmental development and annihilate long amassed public and private investments for progress.[2,3]At individual household level the already vulnerable ones are pushed to extreme loosing shelter, productive and social assets, even sometimes income earners and these are intensified by limitation in health care services at time of maximum need.

The cyclogenesis of 'Yash' has been claimed by the scientists to have link with climate change, rising temperature of Bay of Bengal helping 'rapid intensification' of the cyclone.

Climate change as a contributory effect of various human activities has resulted in 7348 globally recorded disasters of which India has 321 following only China with 577 and US 467 occurrences.[4]In midst of COVID-19 pandemic India was hit by six big natural calamities among which there were two big cyclones namely 'YAAS' and 'Gulab' in May and September respectively in 2021 only. As the Bay of Bengal and Arabian Sea generate cyclones, areas in Southern parts of Bengal get victimized by these mainly.[3] With modern cyclone surveillance system INSAT satellite and RADERs installed in many areas the cyclones whatever 'super' it is in nature get captured well before it thrashes the ground.[5]The current disaster management concerns on risk analysis and management emphasizing preparedness and mitigation because disasters are inevitable but their impact can be minimized.[6]

In this backdrop the current study aimed to assess the awareness level of worst affected people of 'YAAS' in context of their demography and preparatory strategies adopted by various governing bodies which are integral part of post-disaster rehabilitation and reconstruction and prevention of future devastation.

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MATERIALS AND METHODS

A descriptive cross-sectional study with mixed-methods approach was conducted from 2nd week of June up to end of July, 2021. This was done among people who lost their almost all mundane in 'YAAS', the cyclonewhich occurred in end of May that year. Sundarbans is located in Southern part of Bengal in the coastal region of Bay of Bengal and is highly endangered and hit by cyclones, waves, shore currents and tidal cycles almost every year.[3,7] The study was conducted in *Patharpratima* block which was selected being one of the worst hit areas of 'YAAS' engulfing hundreds of houses, thousands of acres of cultivated lands, many cattle and human lives. The population was already vulnerable being devastated badly in last year's super cyclone 'Amphan' and passing thorough the overwhelming threat of COVID-19 pandemic. It has maximum vulnerability because of geographic location with habitations even at farthest sea coast. Following forecast of cyclone the families were evacuated and sheltered in settlements erected temporarily or in big buildings situated within the area but somewhat away from seashore and people carried only the most necessary belongings along with. Immediately following the disaster the areas remained water-logged not allowing any entry through roadways. Since the end of June, 2021 health camps were managed to organize in the block with coordinated efforts of a number of voluntary organizations whereby ailments were treated and medicines were distributed free of cost.

The questionnaire comprised of baseline demographic variables, disaster preparedness, receipt of precautionary and preparedness information and readiness. In medical camp assessment of predominant health problems was done. Ethical clearance was obtained from Institutional Ethics Committee (IEC) and upon individual consent 550 people out of those attended the health camps were interviewed after fully explaining them the no-profit-no-gain nature of participation in the current study.With prior permission from district and block health and administrative authorities health camps were organized and from there study participants were selected. Those aged above eighteen years were only considered for participation in the study. People found frail, having any difficulty in hearing and those with mental illness were excluded from interviewing despite willingness from their side. Among the four health camps in *Patharpratima*, in Gangadharpur there were 155, Piprakhali 40, G-plot (Gobardhanpur) 201 and Ramganga 154 participants. Two of the 'Pradhan', head of village level local government called Panchayati Raj Institution (PRI) were selected from two villages with population more than 5000 for key informant interviews (KII).The KIIs were done in view of obtaining detailed information and insight on the ongoing situation, preparedness status of the 'YAAS' as well as any suggestions as 'insider' for chalking out future plan of actions. Data were managed by double entering in the Microsoft excel sheet and checked for consistency. Analysis was done using SPSS version 22.0 and descriptive and inferential statistics was used for data presentation and interpretation.

RESULTS

Among the total 550 participants majority 315 (57.27%) were male. In the temporary settlements all age group people were there. But for the participants age was 44±5.6 years (mean±SD). 392 (71.27%) were Hindu by birth and belief and 365 (66.36%) belonged to scheduled caste.Regarding the educational qualifications, 361 (65.64%) were found to be educated up to primary level, 77 (14.00%) up to class VIII and above, 25(4.54%) were illiterate and rest of the participants were found as just literate. Literacy rate was much lower among females. In respect to occupation 305 (55.45%) were farmers, 61 (11.09%) were fisherman and others stated to have no fixed occupation. They earn their livelihood by doing works as available, like daily wage labor, mason or construction workers and part time sewing also. Females are involved in works like collection of leaves and wood from forest, collection of honey, selling cow dung cakes and various small things like these. More than 3/4th of the participants (76.18%) told that they had 'Katccha' houses with walls made of mud which are very easy to be affected by floods, cyclones or even heavy rainfall and they get so according to the people. Amongthe people staying in the shelters, 502 (91.27%) admitted to hold BPL/AAY card though 254 (46.18%) receive commodities under targeted public distribution system (TPDS) regularly. Regarding various social security schemes, like as old age pension, disablement benefits, widow pension, only 46 (8.36%) of respondents stated to receive any of these in preceding 3 months. [Table 1]

Table 1 Participants' baseline profile (N=550)

Parameter(s)	Category	No (%)
Gender	Male	315 (57.27%)
	Female	235 (42.73%)
Religion	Hindu	392 (71.27%)
	Muslim	158 (28.73%)
Caste	General	105 (19.1%)
	Scheduled caste	365 (66.36%)
	Scheduled tribe and OBC	80 (14.54%)
Educational level	Illiterate	25(4.54%)
	Primary	361 (65.64%)
	Class VIII and above	77 (14.00%)
Occupation	Agriculture	305 (55.45%)
	Fishery as buiseness	61 (11.09%)
	Daily wage labor	184 (33.46%)
Dwelling	'Katccha' house	419 (76.18%)
	'Pakka' house	131 (23.82%)
Holding of BPL/AAY card	Yes	502 (91.27%)
Receipt of social security benefit	Yes	46 (8.36%)

People reported to the health camps had various forms of health ailments. Out of the attendee 169 (30.73%) stated that they were on treatment for non-communicable chronic disease conditions like hypertension, diabetes, heart diseases and so on. Because of closure of existing health care centres their medicine supply has been halted and many have left medicines in houses being in hurry of sudden evacuation. 56 (10.18%) reported with dermatological conditions. 214 (38.91%) attended health camps with fever, cough, common cold etc. Some forms of minor injuries was found among 18 (3.27%), 118 (21.45%) had gastrointestinal infections, diarrhea, 110 (20.00%) attended for some form of weakness, loss of appetite, disturbed sleep etc., 24 (4.36%) women came with gynecological problems. [Table 2]

Regarding disaster preparedness 290 (52.73%) received any form of cyclone warning from various sources as TV, radio, social media, newspaper and it was found to be statistically significant ($p<0.05$). Only 14 (2.54%) people told that there was some form dissemination of information from local

government bodies but it was neither widespread nor adequate and not showed any statistical significance. Rest of the people did not have any structured information but they were asked and presuming any upcoming danger they followed the instruction. Regarding rescue services all of the victims were evacuated beforehand thus avoiding death toll this time. Still in the short-term settlements supply of materials other than basic food items is scarce. [Table 2] Following the forecast villagers took shelters in the settlements by arranging evacuation mostly by selves though there was time-to-time dissemination of warning from panchayat members. Over and above this, despite being a disaster-prone area there is no structured framework for preparation and rapid response. Relief and rescue come every time once the devastation is there and that id also not enough to meet the engulfing need.

Table 2 Patterns of illnesses among attendees of health camps

Illness	No. (%)
Non-communicable chronic diseases	169 (30.73%)
Dermatological conditions	56 (10.18%)
Respiratory tract illnesses	214 (38.91%)
Minor injuries	18 (3.27%)
Gastrointestinal tract infections	118 (21.45%)
Generalized weakness	110 (20.00%)
Gynecological problems	24 (4.36%)

(Multiple responses)

The principal investigator met two 'Pradhan's, who were head of the panchayati raj institution (PRI) of the two affected villages on that block. On interviewing them as key persons they admitted anonymously that disasters are parts of lives of the villagers.

"These cyclones, floods come and go every year; the dwellers of these villages are indeed very poor, far away from even basic life amenities and they loss their properties whatever meagre it is. Relief comes from various sources but due to some reasons these are not at all adequate" one of them told.
The other one said "if some permanent solution like high storied buildings were constructed then it could be of some help."'There is huge need of constructing strong embankments to prevent tides and salt water to engross the paddy fields, ponds etc." He told "villagers can fight with cyclone but they are undone with this sea water".

Table 3 Sources of 'YAAS' forecast for the victims (n=304)

Parameter(s)	No. (%)	X^2
Mass media	109 (19.82%)	0.04
Social media	181 (32.91%)	0.03
Governmental sources	14 (2.54%)	0.09

The 1st 'Pradhan' added "what I feel if the houses are made of brick then it will be better able to withstand the sea waves". He added "my brother and his family in another village have to stay for past one week in the rescue centre near the panchayat office. Their house is inundated and many people there are spending days in river banks". From his experience of staying in some other disaster prone place, he himself practices to keep a 'run away' kit ready to move in any situation.

Both of them agreed up on few things like disaster preparedness should be far before warning signals reach rather from times when there is nothing like this. They also emphasized on overall improvement of socio-economy of their people so that there will be harm mitigation.

DISCUSSION

Disasters, especially the natural ones are often unavoidable. South 24 parganas has been earmarked as very high vulnerability zone by National Disaster Management Authority (NDMA) of Government of India.[8]But with prior effective preparedness and after-response,hazards can be even halted to be disaster and the impact can also be downplayed.[9]Because of geographic location the Tropic of cancer is more prone to major disaster. This is inhabited by more than ½ of the global population over the developing nations mostly. Repeated thrush of these disasters creates impediments towards progress of the nations and many of them are destined to remain within 'developing' category.[6]

For disaster management India has amultidisciplinary, multi sectoral and multilevel system designed to work at national, state, district and sub-district levels with risk reduction as a must-have component since planning phase and chalking strategies.[10]Along with this community people have developed their own specific survival and coping strategies and methods.[9]There is requirement of reduction of hazards and vulnerability as primary mitigation and preparedness as secondary mitigation strategies.[11]Still it is mention worthy that disaster management is always 'learning by doing' and taking lessons from past. In the case study from team having firsthand experience in management of flash flood in 'leh' in Ladakh in Northern India 2010 caused collapse of houses, many deaths, disruption of telephone line, rail tracks, roadways, airports, hospitals and almost all lifelines.[12] In earthquake in Bhuj, Gujarat 21 out of 25 total 25 districts were affected with demolition of over 250 villages.[10]Study by Randhawa A *et al*. on 'Fani' post-cyclone affecting Odissain 2019 revealed more than 705 of victims received warning signals which is somewhat higher than current study. But Bengal could manage better and prompt relief services than them.[13]Bengal has repeated hitsfrom severe cyclonic storm like 'Aila' in 2009 affecting 9.3 million people and damaging infrastructure, transportation and communication.[14]In 2020 there was 'Amphan' very severe tropical cyclone called as 'costliest' ever due to its widespread destruction tolling Rs.1.47 billion.[15] The socio-demography of deceased and survivors was comparable in these with negligible variation in some basic characters. Over the nature of disasters the natures of ailments differ. In the current study the key informant interview (KII) was conducted which has extracted many missing links between relief flow from authority and its arrival and utilization at victims' points. Local bodies have tremendous role although the post-disaster including arranging for shelters for the affected families and in between especially in the vulnerable areas like current one in consonance with district and state authorities.[16, 17,18]The hungry tides of Sundarbans along with coincidental full moon tide battered thousands of households, uprooted million of its inhabitants, breached several places of embankments and resultant ingress of sea water. The findings and suggestions from 'insiders' and in context of the great distress out of the calamity can be future cornerstone of disaster management plans.

CONCLUSIONS

Despite being a disaster-prone place there is paucity of exploration of level of preparedness, risk communication and risk reduction in the state of West Bengal. Still asthe current

study was carried out in a limited geographic area and population, extrapolation towards broader community is somewhat compromised.

To solve this perennial problem there is need of long-term planning, adopting strategies that will minimize the impact of climate change suited to the region. During the dry timesarea-wise 'mock-drill' sessions should be organized on evacuation, rescue etc. so that people themselves will be empowered on self-preparedness. Adoption of concept of 'run away' bag can be popularized so that evacuation can be hastened with lesser after-disaster suffering. Bio-restored areas through mangroves has shown evidences of effectiveness far over concrete ones as seen in aftermath of cyclone 'Amphan' which should be taken as an eye opener. Besides these capacity building and designated cadre for earmarked programmes for disaster management, record keeping for past ones to learn lessons from those, strengthening of information and communication system for better risk reduction and extensive campaigning for public awareness especially in vulnerable areas are of utmost necessity for disaster sustainable and cost-effective disaster management.

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