A review on Management of cyclone Phailin 2013 in Odisha

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ABSTRACT

Background: *On 12th Oct 2013 Cyclonic storm "Phailin" had caused heavy rainfall and massive flooding in Odisha (a state in India's eastern belt). It had affected more than 13.2 million people. The estimated cost of total damage was Rs. 14373.47 crore including devastation to houses, crops and public properties. The destruction to power supply system, communication system and transport system was of massive degree.*

Objectives: *To assess management of the cyclone "Phailin".*

Methodology: *A cross sectional study was carried out for seven months in and around Berhampur city (the most affected area). Data were collected from primary and secondary sources.*

***Results**: Evacuation and relocation of approximately 1.2 million people could had been possible due to early warning alerts, disseminated four days prior to landfall of Phailin, resulting in the largest evacuation operation of India in last 23 years. A total 21 lives were lost as a result of the cyclone and an additional 23 lives due to severe flash flooding in the aftermath of the cyclone.*

Conclusion: *A comparable cyclone, (Cyclone 05B) hit Odisha with wind speed of about 260 km/h, resulted in loss of more than 10,000 lives in 1999. Early warning using multiple channels of communication and timely action definitely saved many more lives during Phailin. Government cooperation, preparedness at the community level, and lessons learned from Cyclone 05B contributed collectively to the successful evacuation operation, effective preparation activities and impact mitigation. This event exhibits the importance and benefits of effective disaster management. The lesson learnt from this event can act as a guide in the development of plan for management of other similar disasters in future.*

Key words: *Disaster, Cyclone, and Management*

Key message: *With paradigm shift from reactive emergency management to proactive disaster risk reduction, there is more stress on pre-disaster interventions -prevention, mitigation and preparedness. While natural hazards cannot be prevented, measures can be initiated to prevent hazards becoming disasters by making the communities more resistant and resilient.*

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INTRODUCTION

Emergencies and disasters not only affect health and well-being of people , many a times large number of people are displaced, killed, injured, or subjected to a greater risk of epidemics. Considerable economic loss is also there. Disasters cause great harm to the existing infrastructure and threaten the future of sustainable development.

Disasters are as old as human history but the dramatic increase and the damage caused by them in the recent past have become a cause of national and international concern. Events of hydrometeorological origin constitute the large majority of disasters. Earthquakes, storms, and other hazards affect about 65 million people each year in India[1]. Despite the growing understanding and acceptance of the importance of disaster risk reduction and increased disaster response capacities, disasters in particular the management and reduction of risk continue to pose a global challenge. It is observed that disaster of similar magnitude affecting different regions of the world leave different impact. Such differences across countries suggest that some countries prevent and manage disasters better than others. Odisha a state on the eastern coast of India, in view of its geographical characteristics, has encountered flood, cyclone, drought, etc., almost every year. The 482 km long coastline has exposed the state to flood, cyclones and storm surges[2]. The state was struck by a super cyclone in October 1999 in which over 10,000 human lives were lost.

Cyclonic storm Phailin slammed Gopalpur in Odisha at 9.15 pm on 12th Oct 2013, triggering heavy rain fall and strong winds with speed of 200-220 km an hour [3]. It was the strongest cyclone to hit

India in last 14 yrs and the second-strongest tropical cyclone ever to make landfall in India, behind only the 1999 Odisha cyclone [4]. Berhampur, the closest city to the point of landfall suffered devastation triggered by gale winds, with fallen trees, uprooted electric poles and broken walls in various places of the city[5,6] .

This study examines response to disaster Phailin. An analysis of management of various stages of disaster provides insight into the factors affecting disaster management. Building on these insights, the study outlines desirable qualities for effective management of disaster and proposes areas that could be given attention in the future.

Subjects and Methods:

Type of study Cross sectional
Place of study- Ganjam district of Odisha
Duration of study- 7 months (10th Oct 2013 to 9th May 2014)
Method of data collection /Source of data

Primary sources

a) Experience of local people (data gathered while usual conversation with near and dears before, during and after cyclone)
b) Feedback from local people after the disaster (perception of people staying in Berhampur town and its surrounding areas was used as a source of data in this study)
c) Personal observation

Secondary sources

a) Data from newspaper and media (news channels)
b) Data from internet

Sample size and sampling method

Hundred participants from the affected area were chosen randomly by convenient sampling method. Verbal consent of the participant was taken before conducting the survey

RESULTS

A. Management of cyclone phailin

The Very Severe Cyclonic Storm (VSCS) 'Phailin' made landfall at the coast of Odisha near Gopalpur in Ganjam district on October 12, 2013. Eighteen out of the thirty districts in the state were affected by the storm and subsequent floods. The majority damages were due to high speed winds of up to 220 kmph followed by flooding ensued by torrential rains. The observed storm surge was up to about 3.5 m above normal, inundating large areas in the districts of Ganjam, Puri, Khurdha, and around Chilika lagoon. The cyclone left 44 people dead-and affected about 13.2 million people in over 18,370 villages[7,8,9,10].

The disaster was so severe that it necessitated evacuation of over 983,553 people from the cyclone affected areas to cyclone shelters. Another 112, 241 were evacuated from the flood-affected areas. Activities carried out during preparedness period are depicted in Fig. 1.

Fig. 1: Activities carried out during Preparedness for Phailin

This massive evacuation helped to reduce human casualties; however damage to property, livestock, infrastructure, crops etc. had been extensive. It is estimated that 3.76 lakh houses, 40000 cattle and standing crops in 6.21 lakh hectares of land, had been completely destroyed. There was economic loss of about Rs. 14, 373 crore[2].

The situation in the cyclone affected districts was further aggravated by severe after storm flood making it difficult to reach the relief materials to those areas leading to further deterioration in conditions. However, early warning alerts, disseminated four days before landfall of Phailin, allowed for the evacuation and relocation of approximately 1.2 million people, resulting in the largest evacuation operation of India in last 23 years[8,9,10]. A total of 21 lives were lost as a result of the cyclone and an additional 23 lives due to severe flash flooding in the aftermath of the cyclone[2]. Loss of lives in the case of Cyclone Phailin was minimized by effective early warning communication supported by joint efforts from the community, volunteer organizations, donors, local and national levels of government. There was excellent coordination between agencies which successfully evacuated almost one million people prior to landfall of cyclone Phailin.

Several means of communication were exercised to disperse early warning information. Those were [8]

- Constant news coverage before and throughout the event, including broadcasts of Doppler radar information providing coordinates of location, intensity and timing of impending cyclones,
- Use of email, fax, telephone and print media including text messages and social network media.
- Loudspeakers used in various districts to warn residents of impending danger and to warn fishing boats that were out at sea
- Distribution of satellite phones to representatives in the 14 most vulnerable districts to ensure that warning communications continued during the storm.

Different means and methods of communication were essential to reach a large population. The Indian Army, Navy, Air-Force, National Disaster Response Forces (NDRF) were called to action for emergency and relief efforts, helicopters distributed food rations and the Red Cross emphasized the distribution of safe drinking water as a top priority for those involved in relief efforts[11] (Fig. 2).

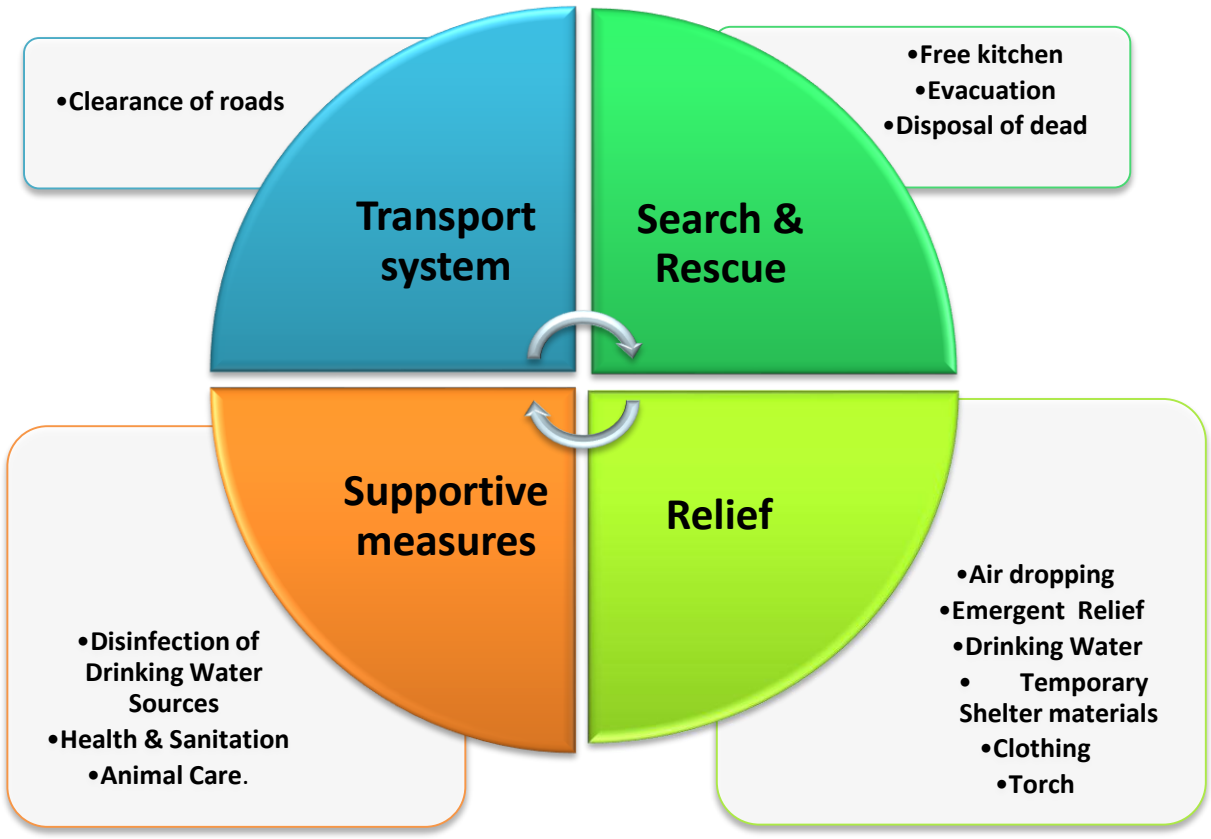

Fig. 2: Response & relief activities after Phailin

Defense, Police, fire personnel helped in evacuation, transportation & relief distribution. CATS(centralized ambulance trauma services), NGOs, The Indian Red Cross Society (IRCS) with the support of the International Federation of Red Cross and Red Crescent Societies (IFRC), Indian Medical Association and other medical association were also involved in restoration activities[8] (Fig. 3). Medical teams were formed for health care delivery. Local Community members were involved in rural area, but it was not that visible in urban areas.

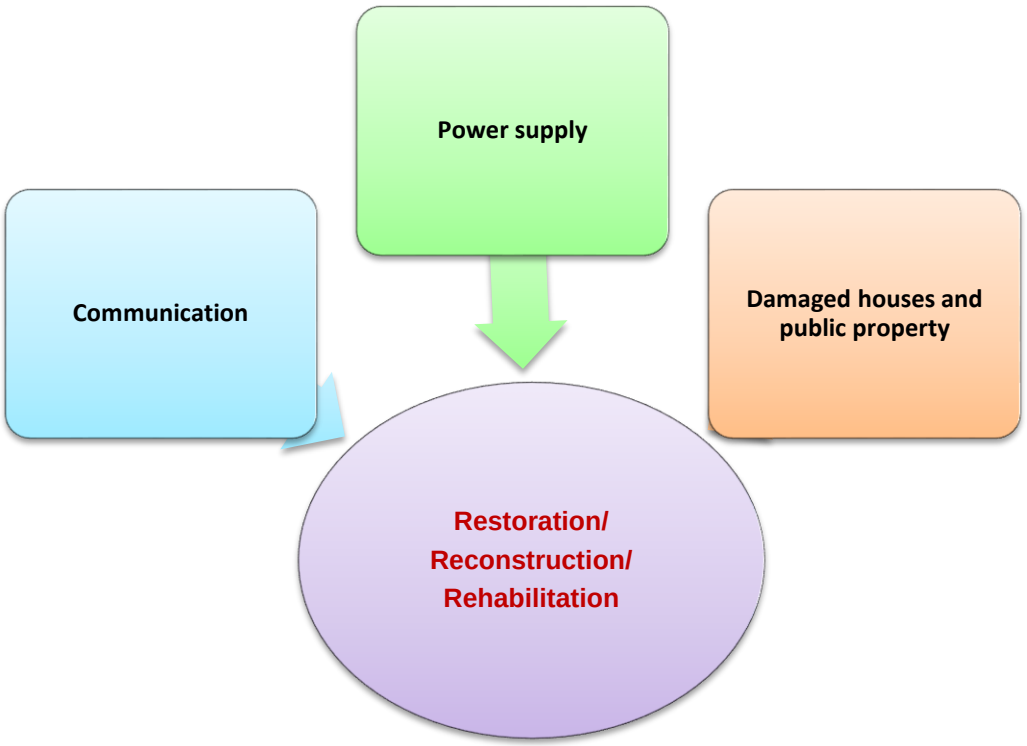

Fig 3: Activities during restoration & rehabilitation phase

The role of cooperation and effective communication between local and national officials was evident during Cyclone Phailin. It was reported that coordination between the local and national levels was "remarkably good," which helped in successful preparedness efforts [12].

There were minor problems related to relief distribution and accessibility in some areas due to submersion of roads and bridges. Similarly there was problem related to restoration of power supply and cleaning of debris. Planning for unexpected massive flood was lacking.

After the super cyclone of 1999, the State Government set up (December 1999) Odisha State Disaster Management Authority (OSDMA) as an autonomous body headed by Chief Secretary [13] .After DM Act, SDMA was established in October 2010 with the Chief Minister as the Chairperson and DDMAs were established in November 2010 with the responsibility of prevention, mitigation and management of disasters. State Executive Committee (SEC) was constituted in December 2010 to assist SDMA.

The office of the Special Relief Commissioner (SRC), Odisha under the Revenue and Disaster Management Department (RDMD), acted as the Secretariat of SDMA. The Special Relief Commissioner took decisions at the time of natural calamities. This existing structure of the state favored effective implementation of guidelines (National and state disaster management plan) during Phailin.

Assessment for disaster Impact was done by World Bank, Asian development bank and European commission. External assistance was also provided by these agencies for disaster reconstruction, mitigation & prevention. Red Cross crescents were also involved in various stages [14].

Community volunteers were seen as true owners of community safety and resilience during Phailin. Community is the first responder to any kind of disaster situations and building the capacity of the community and other stakeholders holds the key to primary Disaster Management Initiatives. In recognition of this principle, Disaster Risk Reduction (DRR) Programme was implemented by OSDMA in Orissa. Government of India and UNDP has formulated DRR Programme with an objective of strengthening the institutional arrangements to undertake disaster risk reduction activities at various levels to develop preparedness for recovery[15,16]. The results of such investment or the fruits of such hardwork were visible during Phailin. The Indian

Red Cross Society's (IRCS) strength was also seen in community mobilization, which was a result of years of investment in community- based disaster risk reduction activities.

The 1999 Super Cyclone had made stakeholders to understand the importance of Prevention, Preparedness and Participation in managing disasters. Odisha State Disaster Management Authority (OSDMA) with financial support from government and other sources including World Bank had taken significant initiatives for providing multipurpose cyclone /flood shelters at strategic locations for the vulnerable communities (handbook final)[11,12,17,18,19]. The Odisha government, with support from the World Bank National Cyclone Risk Mitigation project, had spent US$ 255 million on increased disaster preparations including building shelters, evacuation planning, conducting drills , strengthening embankments and building pucca house within 5 km coastline (since its inception in 2011)[8,15,16].

B. Perception of People Affected

Perception of the affected people regarding management of various issues during disaster was studied and gap analysis was carried out (Fig no 4, 5 & 6).

There was overall satisfaction regarding measures taken for management of cyclone Phailin like timely warning, mass evacuation, arrangement at shelters, prompt response in clearing roads and restoring communication. Media played a great role in creating awareness. There were 44 NGOs, who had extended their helping hands during this disaster. People praised 108 for its efficient services even during cyclone. The coordination observed during each stage was said to be excellent. Forest dept. collected woods from fallen trees. Though power restoration took long time, some private agencies made arrangement for inflatable lights in busy areas of Berhampur town. All officials worked day and night for about 2 to 6 months, to restore things back to normal stage. There was no reported incidence of sexual abuse during this period. Gender equity was given due importance in all phases of disaster management starting from evacuation, stay at shelter to cash for work scheme.

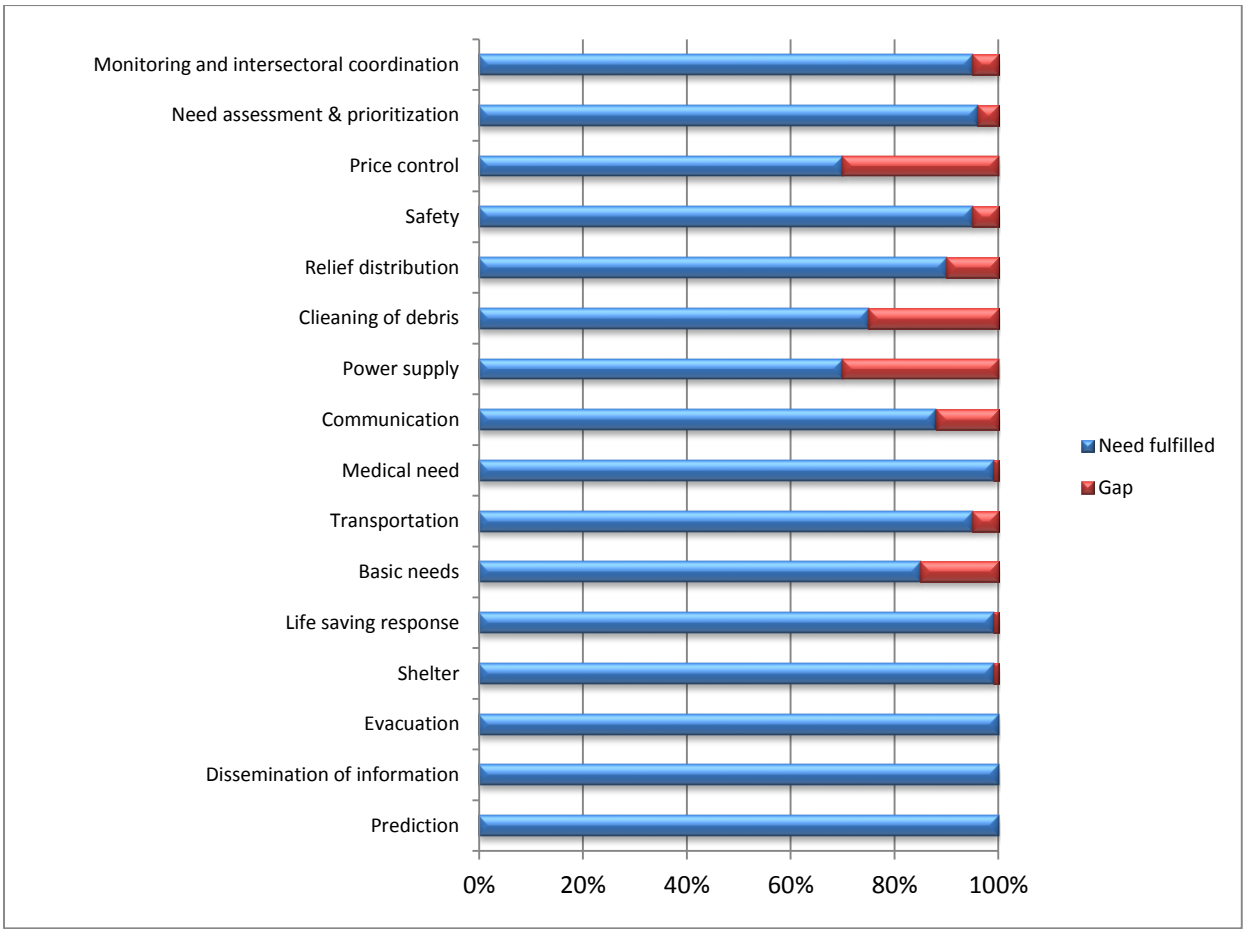

Fig. 4: Gap Analysis in Urban area

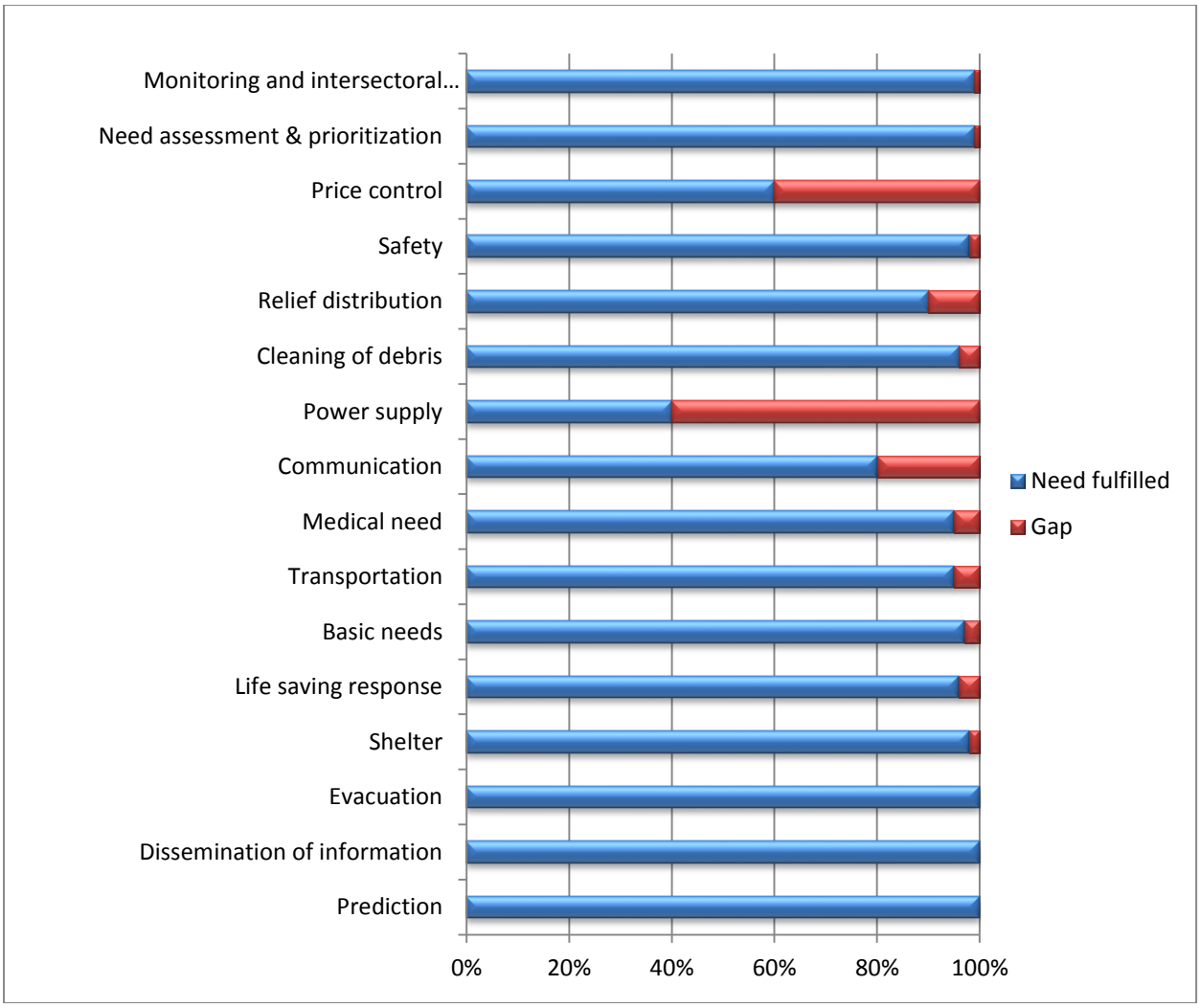

Fig. 5: Gap analysis in rural area

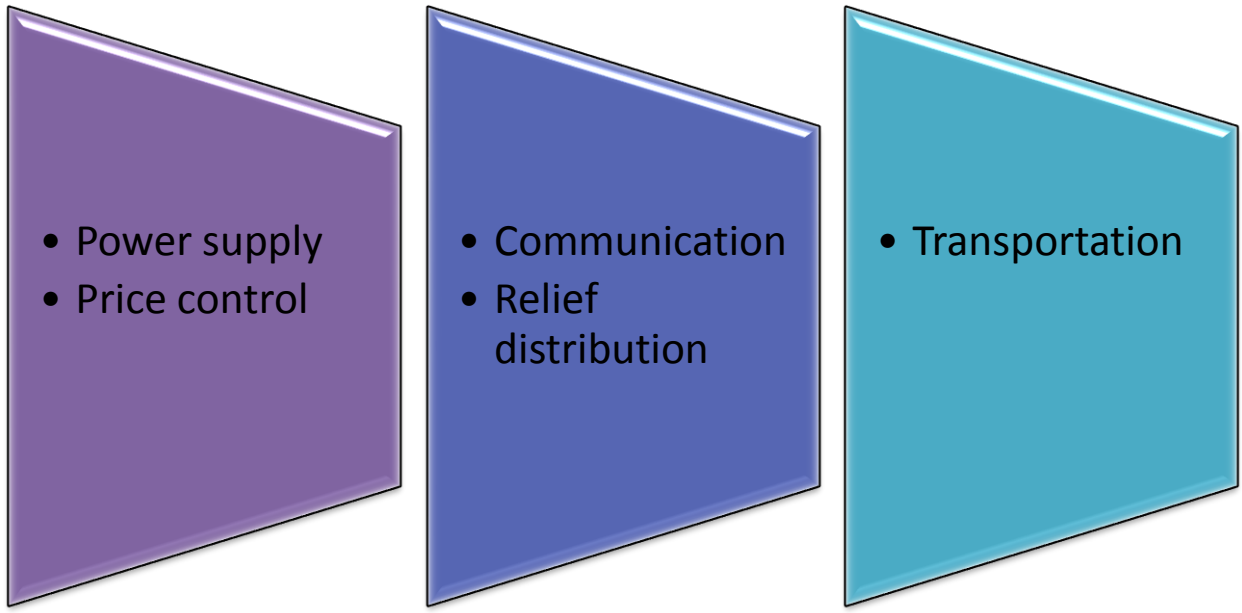

Fig. 6: Common problems after phailin

Problems in Management

Some of the minor lacunae identified from perception of people are mentioned below.

Arrangement for electricity:

"Power restoration took much longer time, temporary power supply for 2 to 4 hrs was given after 15-18 days and permanent restoration took 1 month in town area and 2-4 months in village areas." "Restoration of electricity supply took about 4 months in some areas. Restoration was done in phase wise manner, so in some areas corrective actions took one month but in interiors it took 3 to 4 months." "Arrangement for alternative source of electricity supply could have been done. At least govt. could have achieved some control over the rate/ price charged for generator. People charged Rs 1000 for one hr of generator usage, Rs 50 for mobile charging per hour. Generator from outside could have been hired."

Relief distribution:

"Relief in the form of Rupees 500, Rice 50 kg and Kerosene 3 to 4 lit was distributed to each member of the town, irrespective of socio economic status and damage caused. So the actual benefit reaching to deserving persons got diluted."

"ID card was supposed to be shown to the distributing authority to get relief, as ID card was absent with many people who really needed relief could not get it. Anganwadi workers or local authority could have helped in this matter."

"Govt. has done a lot. But nasty local politics in some areas caused some dissatisfaction among community members. PRI members were asked to prepare the list of beneficiary for distribution of relief or money for repair of damaged house. In some areas names of nears and dears were included instead of name of real beneficiary. This mindset needs to be changed."

"Relief could not reach to some areas as those areas were totally cut off due to flood. In some places there was only dry food available in shelter home as arrangement for adequate cooked food could not be made due to flood. Cooked food could have been served after 24 hrs, but there was no such arrangement in some shelters, how long one can depend on dry food like chuda and gud."

Price control:

"Some control over price of potato, candles, generator, mobile charging could have been achieved by govt. interference. Price during those days was: Potato-Rs 50 /kg, Candle-Rs-90/packet. Some people because of panic state purchased food stuff in huge amount and kept in store, thus leading to increased demand and shortage."

Complacency:

"Free cooked food at shelter homes was available, so people didn't work and enjoyed free food and stay. People didn't vacate the shelter homes until repair of their own damaged house, electrification of their area. Prolonged stays of people in shelter homes increased financial burden of govt. and hampered education in areas were schools were acting as shelter homes."

Cleaning of debris:

"Though highway was cleared within no time, it took 15 days to clean the streets, no worker was available, as some people were busy in repairing their own house, and some were lazy as they were getting free food in shelter homes. Things were done taking help from External agency (Bhubaneswar and Rourkela municipality)."

"Wastes of the streets were cleaned in rural area by local community members by MNREGA Scheme. But cash for work didn't work in town area, may be due to lack of knowledge about the scheme to local public. Group meeting could have been conducted to disseminate information about the scheme."

Death prevention in post cyclone area:

"Though only 3 deaths were reported during cyclone, but more no of deaths were noticed afterwards due to electrocution, flood and other causes. This could have been prevented by proper awareness regarding safety measures in post cyclone period."

Coordination and basic needs:

"Intersectoral coordination was excellent in pre cyclone period, but it was somewhat lacking in some areas in post cyclone period in town area (Municipality)."

"Supply of drinking water was arranged after few days of cyclone in town area, people suffered a lot as there was no electricity and no arrangement for water supply for a prolonged duration in some parts of town area."

Compensation for loss:

"Most of the farmers have till date not received any compensation for their damaged crop."

Communication:

"Though Bsnl mobile network was operational in some areas, rest all mobile network became non-functional and took 2 -4 days to function."

Safety:

"There were somewhat increase in incidence of chain snatching, some people took advantage of lack of electricity in this situation."

Health:

"Some people could not reach hospital because of flood." "Some people suffered due to non-functional status of ventilators in ICU for a small time period."

Perception of persons involved in rescue and relief:

"Some areas were totally cut off, so rescue team could not reach those areas as there was 3ft water on roads connecting those areas .Even boats can't work as they need minimum 5 ft of water to work."

"There was problem in relief distribution due to lack of information about requirement and availability of stock in various places. In some places there was excess of relief materials, in some places it was deficient. Communication network was totally non-functional. Excess material got spoiled /damaged due to flood. Blockage of roads and flood worsened the situation, otherwise there was sufficient stock of relief material and proper planning for distribution of the same was made before impact of cyclone."

"Devastation was less severe in areas having dense plantation of coconut trees, may be coconut trees were responsible for slowing the wind velocity"

Prioritization of problems was done and root cause analysis for important problem was carried out and recommendations made accordingly.

C. Swot Analysis

SWOT analysis of disaster management system of Odisha was carried out and the results are reflected in Table no 1.

Table 1: SWOT Analysis of OSDMA

Strength	**Weakness**
• Existence of OSDMA,DDMA and district disaster management plan • Existence of state disaster management fund • Large work force • Good coordination with national and local authority • World Bank and GOI financial support for mitigation projects. • Good tracking mechanism (cyclone detection & hazard prediction by IMD) • Adequate mobilization of resources • Adequate mobility • Adequate rescue items, restoration equipment, vehicle & relief material • Presence of strong leadership in the coordination mechanism. • Back and forth communication mechanism linking different layers of responsibilities and responses (village community – block administration/ NGOs – district – state). • Integrated responses possible due to intersectoral coordination. • Setting of minimum standards in reconstruction and rehabilitation measures. • Ongoing trainings and mock drill for capacity building. • Dedicated, motivated and skilled staff of coordinating dept.	• Round the clock control room not available • Lack of state disaster mitigation fund • Channelling of recovery funds through the coordination mechanisms affected the dynamics between local civil society institutions. • The supply did not reach the end users in time in some areas. This indicated misuse of relief funds. • Late receipt of funds that too insufficient (compensation for damaged houses, crops lost etc.) • Fixing deadlines for mitigation and restoration work leading to quality compromise • Lack of existence of any govt. insurance policy to provide compensation for crop lost or houses damaged.
Opportunity	**Threats**
• Local and national level support is good • Involvement of NGO • External funding • Good political commitment • PRI support adequate • Strong government structure • Experience of Odisha super cyclone • Guidance from experienced resource persons • Existing capacity of active local NGOs in handling disaster responses. • Financial support from GOI and World bank for mitigation works	• Vulnerability of the state and district to cyclone due to long coastline • Illiteracy and poor socio economic status of people residing in coastline area • Panchayat institutions weak in some areas • Political issues involved in relief aid • Complacency and lack of ownership/ community involvement in some areas

DISCUSSION

A comparable cyclone, Cyclone 05B, hit Odisha in 1999 with wind of up to 260 km/h, but had a much more than 10,000 lives were lost [8]. Early warning and response activities for Phailin exhibited major improvements over those performed during Cyclone 05B in 1999 due to the evaluation and inclusion of lessons learned [20].

Cyclone Hudhud pounded the coastal districts of Andhra Pradesh and Odisha with heavy rain and winds of almost 200 kmph in October 2014(exactly one year after cyclone Phailin). Early warning alerts, evacuation operation again saved lives. Experience of Phailin lead to better planning and management of Hudhud by state govt. There were total three deaths in Odisha. All himax street lights were either lowered by inclining it or by removing the bulbs .Food grains and other consumables were distributed by public distribution system to get a check on price. Govt interference by raid to discourage black marketing and setting maximum price limit for basic consumables like potato, candle etc prevented monopoly and unusual price hike in local market. Similarly risk pooling by micro insurance scheme initiated by European mission gave some relief to farmers [21].Death in Andhra Pradesh during Hudhud was 61 where as it was only three in Odisha[22]. ODRAF team (having experience of work during Phailin) from Odisha was sent to Andra Pradesh for rescue, relief and restoration. Visakhapatnam, Srikakulam and Vijayanagaram have encountered damages to infrastructure, communication, shelter and livelihoods.

The thunderstorm in Bihar on 22/04/15 had claimed to be taken 55 lives in the affected districts [23]. Timely detection of the hazard by early warning system could have saved these lives, as the reported wind speed was only 65 km/hr.

Early warning using multiple channels of communication and timely action saved many lives during phailin. Government cooperation, preparedness at the community level, and lessons learnt from Cyclone 05B contributed to the successful evacuation operation, effective preparedness activities and impact mitigation.

Chief Secretary, Odisha State Disaster Management Authority was awarded ICHL(International Conference on Humanitarian Logistics) Award 2013 for outstanding action during Phailin management. Chief Minister, Odisha, Sri Naveen Patnaik was honoured by United Nations for successful management of cyclone Phailin.

SUGGESTED INTERVENTIONS TO SOLVE THE PROBLEMS

Adoption of some newer initiative in mitigation strategy

- The electric poles should be erected strongly to avoid falling (Strong concrete base of about 5-10 ft can be constructed to give support). The electrical department should keep alternate mechanism ready, so that the power supply can be resumed early after cyclone. Underground fiber optic electric cable can be planned for cyclone vulnerable town areas.
- The mobile towers should be erected strongly and need to be well designed to face the cyclone storm so that the mobile network can work during and after cyclone. The low submersible bridges connecting to the seashore villages (if any) should be demolished and a high flood level bridges need to be constructed so that no villages will remain inaccessible during cyclone or flood.
- Proper drainage channel in water logged area.
- Construction of more dams to avoid flood.

Planning and coordination for preparedness

- Sufficient dry food like chuda, gud, biscuits, and cooked food items like rice, dal etc. should be kept ready at inaccessible pockets well before the cyclone so that no people shall face any difficulty/hunger during cyclone.
- Sufficient candles, match box, first aid boxes, halogen tablet, kerosene, fire woods/gas, drinking water (pouches/bottles), child food, animal food etc. should be kept ready to avoid any type of difficult situations during cyclone.
- Fire brigade, ambulance, health team should be kept ready near vulnerable sea store villages likely to be effected severely due to cyclone.
- 24 hours control rooms should be made functional well before the cyclone and all information should be communicated to all officials of the localities every time.
- The fisherman shall be alarmed well before the storm not to go into the sea, keep their boat and nets safely before storm to avoid damages.
- Survey should be done involving AWW/ANM/ASHA for identifying beneficiary for relief distribution(especially for those who don't have ID card)

Awareness by meeting and public addressing system-

- Awareness regarding cash for work scheme, safety measures for prevention of electrocution during restoration phase need to be created, similarly steps should be taken to spread the

message to not store huge amount food stuff like potato, onion (thus increasing its demand and price) and importance of ID card and involvement of community to own responsibility in precyclone period (to overcome complacency and maintain safety).

- Awareness regarding use of text message for communication.

Opening of state mitigation fund

- The state should take initiative to open state mitigation fund instead of depending on external agencies for mitigation related projects.

Mobilization of resources

- Control over price of things related to minimum basic needs should be done by mobilization of resources from neighbouring districts, states and use of public distribution system.
- Odisha being a natural disaster prone state there is a need for strengthening the Disaster management by diverting adequate GDP for diqster mitigation
- Untied funds should be provided and made readily available in Core local cyclone prone areas under a disaster Management sub Committee headed by Gram Panchayat/ Panchayat samhiti / Muncipality Level.

Planning for flood

- As timely information about high speed wind flow was provided by IMD, the authorities were able to plan for management of cyclone. However flood of this magnitude was not foreseen. So, the authorities were not able to manage flood properly. Hence preparedness for flood should be an integrated part cyclone management plan.

Provision of govt. insurance policy to farmers

- There is no govt. insurance covering compensation for crops lost or houses damaged, though the area comes under high risk zone for cyclone and flood. Govt should take some initiatives in this regards.

Routine activity

- Inclusion of disaster related awareness message in school curriculum in cyclone risk zones to develop disaster management culture and to improve morale of people to take ownership in such situation (by community participation).Similarly insurance for public properties can also be planned for risk pooling.

CONCLUSION

Continued early warning efforts could have similar positive results in the future, when accompanied by good communication and adequate preparation, impacts of disasters could be mitigated or even prevented. There were minor problems related to restoration of power supply, distribution of relief in inaccessible areas and cleaning of debris. Proper planning, awareness activities and area specific innovative mitigation measures can overcome all these difficulties. The lessons learnt from this event can act as a guide for development of better plan for management of other similar disasters in future. The team effort manifested during this disaster can act as a role model for working in field of severe environmental hazards in future. Studies of larger magnitude in different discipline need to be carried out to find out gaps and amicable solutions for the same. This event exhibits the importance and benefits of effective disaster management. Development and stable economic growth in spite of occurrence frequent earthquake in Japan and repeated cyclone in Bangladesh reflect the same.

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