

# Vulnerability Assessment (Structural and non-structural) of health facilities in Odisha

## Major Findings & Recommendations

The key status of the various aspects of the public health centres, possible reasons for the existing condition, the likely impact on the facility during normalcy and in events of floods or cyclone and their remedial measures are summarized below.

## Issues Related to Non-structural Components (Medical)

### **Status**

- 92 % of health centres did not have local resources directory.
- 90% of health centres did not have contact list of the medical, non-medical and other staffs displayed near the entrance.
- At all health centres, no signage within the health centres were evident.
- 97% of health centres were lacking in triage area provision.
- 35% of health centres did not have proper supplies of emergency kits.
- 22% of health centres did not handle bio-medical waste. If handled then the waste is dumped within site and incinerated (52%) This is major risk factor which has a potential to cause much consequences in the post disaster situations.
- At approximately 40% of health centres, key staff were less than essential number stipulated within IPHS guidelines.
- Lack of staff will not only delay the provision of desired medical services but will exaggerate the misery associated with the effect of disaster
- 58% of health centres did not have proper logistic arrangement (shelves & space) for drugs.
- At most of the places quantity of essential medicines was far less than required. (all medicines are kept on ground floor).
- Majority of health centres did not have desired quantity of drugs such as, cap Tetracycline, Inj. ASV doxycycline, Gentian Violet, Anti-allergic Syrup, OT Test Kit, H2s Test Kit.
- Some of health centres were not having Beaching powder, Ciprofloxacin tab, IV fluids, Paracetamol syrup & Anti-diarrheal syrup.

### **Remedial measures**

- Have the list of the people in the locality, have their names and contact addresses listed, train them for basic first aid, sensitized for seeking help during disasters.
- Based on the feasibility, owing to shortage of staff at the facilities, key staff should be identified from each disaster-prone facility and should be sent for refresher training.
- Identification of nodal agencies and key institutions to support OSDMA and the health department in providing capacity building training to the health centres and Set of training modules may be developed.
- Following super cyclone, UNDP in association with OSDMA had facilitated development of village level disaster mitigation and development plans and several capacity building exercises were carried out at the village level. Those plans should be relooked and revised in the current context.
- Health workers currently have CUG numbers and may be provided with smart phones for data transmission and coordination mechanisms during disaster situation.
- Currently in the state there are successful models of online tracking mechanisms for the drug indenting and supply. Even the antenatal mothers tracking system is operational in the state. Incorporating disaster management modules with the existing online drug supply inventory or maternal tracking system would serve a greater purpose.
- Quantity of essential medicines and emergency set should be supplied.
- Provision of signage should be made which at the time of emergency could curtail the rescue activities
- Provision of triage area is essential for prioritizing emergency management based on the severity of their condition at the time of any disaster. This optimizes patient treatment when the resources are limited.
- Knowledge centres may be identified from within the state and outside to provide hand holding support.

## Issue Related to Structural Components

### Dampness

#### Status

- Inside observation of majority of building showed evidence of dampness.
- Dampness was spotted at plinth, slab, in vicinity of wall openings (door window sill) and at junction of slab and wall.

#### Remedial measure

- Damp Proof Course (DPC). Both flexible and rigid material can be used as DPC.
  - Flexible material such as bitumen or asphalt, lead copper and aluminium sheet.
  - Rigid materials such as rich concrete, thick cement mortar and over burnt bricks.
- DPC should be provided at plinth level, parapet wall and window sill.
- Proper design for rain water drainage.
- Ensure adequate ventilation.
- Painting using water proofing admixture for surface treatment.
- Cleaning of affected areas and one or more coats of cement and water mixed in thin consistency with admixture of adhesive gum may be applied over affected walls.
- Plaster should be applied over hairline cracks.

### Debris in the premises

#### Status

- Most buildings have materials, like trees, construction material, old furniture etc., scattered in the surrounding. It can hinder accessibility.

#### Remedial measures

- Regular supervision of debris cleaning activities.
- Proper debris management and segregation of different type of materials.

### Building Drawings

#### Status

- Building drawings were present only at assistant engineer's office and was only available for a few centres.
- General drawing of sub centre and building extension was available at all districts but drawings for CHCs and PHCs were not available.
- Health centres do not have their respective building plans.

#### Remedial measure

- Copies of building drawings should be made available to each health centre to facilitate centre wise disaster management planning.

### Storm Water Drainage

#### Status

- Storm water drainage was not present in many of the centres. In the centres where storm water drainage was present, it is not connected to the main line.

#### Remedial measure

- Storm water drainage system should be provided. (preferably covered).
- Rainwater harvesting, technique of collection and storage of rain water into natural reservoir should be incorporated.
- Retention basin may be used to manage storm water runoff to prevent flooding and downstream erosion, and improve water quality.
- Rainwater re-charge can prevent local water logging.

### Sewage disposal

#### Status

- Septic tanks were present at majority of health centres.
- Sewage was not disposed through properly closed piped system connected to main line in any of the health centres.
- Minimum safe distance from drinking water source was maintained.

### **Remedial measures**

- Maintenance is the most crucial factor that determines lifespan of a septic system.
- Septic tanks should be cleaned regularly.
- Minimizing water usage during periods of heavy rainfall will reduce the potential for system malfunction.
- Toilets should be designed in such a way that it should have self-cleaning velocity.

## **No Ramps**

### **Status**

- Majority of health centres does not have ramps.

### **Remedial measures**

- Both stairway and ramp should be incorporated in building drawings.
- Provision of ramps will increase the ease of access for people with disability and health centres conducting deliveries.

## **Roof (Construction, Condition, Truss roof)**

### **Status**

- Flat roof or monopitched roof at majority of health centres.
- There were deteriorations on roof slab caused by weathering and ageing such as flaking of plaster and corrosion of bars.
- Truss roof frames were not securely connected to walls by anchor bolts and base plates and there was no proper roof cladding. (at health centres where truss roof exists)

### **Remedial measures**

- Hip type of roof is best shape to resist wind force. This is the strongest type with all sides of the roof sloped. If gable roofs are used than high-pitched roof should be used to improve wind resistance. Avoid a low-pitched roof.
- Hip roof with the pitch in 25° to 40° range has best record of wind resistance.
- A cement concrete layer should be overlaid to strengthen the slab.
- Reinforcement should be replaced or additional support to slab should be provided by using I- beams.
- Avoid large overhangs as high wind force build up under them. Roof eaves can be limited to 18 - 20 inches. If overhangs are desired, then they should be braced by ties held to the main structure.
- Roof overhangs for verandah, terraces and balconies should be designed as separate construction rather than extensions of the main roof of the building. As they can break-away from the main roof structure without damaging the rest of the house.
- Long-span roof sheets should be used.
- If galvanized sheets are used, 4mm thickness is recommended.
- At ridges, eaves and overhangs, provide fixings at every two corrugations. At all other locations, provide fixings at every three corrugations at maximum spacing.
- Screws hold better than nails so screws should be used and screws should go into the purlins at least 50 mm. Use large washers under the screw heads to prevent the roof sheets from tearing when pulled upward by high winds.
- If nails are used, then it should have wide heads and long enough to bend over below the lath.
- For sheeted roofs, a reduced spacing of bolts, 0.75 of that admissible as per IS:800, recommended. For normal connections, J bolts may be used but for cyclone resistant connections U bolts are recommended. Properly connected M.S. flat can be used as reinforcing band in high suction zones such as roof corners.
- The corrugated sheeting should be properly overlapped at least two and half corrugation to prevent water from blowing under the seam. Spaces between the sheeting and the wall plate should be closed to prevent the wind from getting under the sheeting and lifting it. This can be done by nailing a fascia board to the wall plate and rafters.
- For roof frame, to reduce wind induced vibration of the roof in cyclonic regions, it is recommended that all members of the truss and the bracings be connected at the ends by at least two rivets bolts or welds.

## **Toilets Facility**

### **Status**

- Few of the centres where toilets were present were not functioning properly while some of the health centres did not have toilets facility.
- Doors of majority of toilets facility were damaged.
- Lack of community toilets throughout all surveyed locations.

### **Remedial measure**

- Building drawing should include provision of toilets at all the health centres.
- Septic tank should be constructed and if septic tanks are present then it should be cleaned regularly.
- Sewer line should be connected to toilets.

## Electrical system

### Status

- In many of the health centres, electrical system was in poor condition and there were no protective measures.
- Most of the sub centres does not have alternate source of electricity.
- Emergency source of electrical system was not tested regularly in most of health centres.
- At many places, alternate source has been funded by RKS or staff.

### Remedial measures

- Source- Building should have supply of electricity from two sources i.e. from main power line and alternate source, alternate source may be generator or DG set followed by battery.
- Capacity of alternate source – This source should start automatically in seconds and cover 70% of critical area. There should be monthly inspection of this electric source.
- Condition- It should be placed in secured place elevated from ground.

## Doors and windows

### Status

- Damages were evident on doors and windows in many of the health centres.

### Remedial measures

- Damaged doors should be replaced or repaired by fixing with ply or wooden battens.
- Door frame should be tightly secured to the wall.
- Doors and windows must be protected by covering or bracing. Shutters can protect windows from most wind-blown debris.
- For glass panes - Strengthened by pasting thin film or paper strips. This can introduce some damping in the glass panels and reduce their vibrations.
- Opening can be made robust by reducing panel size to smaller dimensions.
- A proper locking function should be present at every opening.

## Building Envelope (including outside walls and facing)

### Status

- Presence of cracks (both hair line and major) was evident on building envelope around all the health facilities.

### Remedial measure

- Plaster should be done over hair lines cracks.
- Grouting needs to be done over cracks greater than 3mm.
- Provision of high consistency material should be made.
- Minimum 7 to 10 days curing is required and there should be less time in placing and finishing of work.

### NOTE

- 52% of building unit have past structural and architectural damages.
- 27% of building unit have poor effect after modification.
- As a repairing or patchwork new flooring tiles were evident in majority of buildings while other structural deformations are partially repaired.