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DESIGN TO EVACUATE:
Evacuation Guidelines for Persons with Disability

Evacuation of disabled persons or elderly is a very sensitive issue & taking their opinion is vital, says Dr Nirmita Mehrotra

1.0 INTRODUCTION:

By the time adults have lived through six or more decades, they have probably experienced more than one disaster. Many older adults can be an asset during a disaster, calling upon their prior experience, wisdom, and mental resilience to survive, help others, and provide reassurance to those who are frightened or depressed by the events. In 2011, disability in India was defined through seven categories. Today, The Rights of Persons with Disabilities Act 2016, provides 21 categories of disability. Considering the lack of recent data, experts question whether these figures are sufficiently accurate, The World Health Organisation (WHO) estimates that that 15% of the world's population is disabled, with 2-4% experiencing severe impairment. These impairments could be Physical, Cognitive, Visual or other types calling for assisted evacuation of these people during disasters.

Persons with disabilities have following basic evacuation options:

1. **Horizontal evacuation:** using building exits to the outside ground level or going into unaffected wings of multi-building complexes.

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2. **Stairway evacuation**: using steps to reach ground level exits from the building.
3. **Stay in Place:** unless danger is imminent, remaining in a room with an exterior window, a telephone, and a solid or fire-resistant doors
4. **Refuge area**: Generally the safest area of refuge are pressurized stair enclosures common to high-rise buildings, and open air exit balconies. Other possible areas of refuge include fire rated corridors or vestibules adjacent to exit stairs.
5. For an isolated and contained fire, a person with a disability may not have to evacuate.

2.0 UNIVERSAL DESIGN

Universal design becomes utmost important for a building, to incorporate safe evacuation plan for all occupants**.** Everyone, even the most able-bodied person, passes through childhood, periods of temporary illness, injury and old age. By designing for this human diversity, we can create things that will be easier for all people to use". The preliminary objective of universal design is to conduct the kind of arrangements that aim not to adapt the individuals to the physical space, but rather to adapt the space to the individuals. Accordingly, the duty of designers is to build the kind of activity spaces that can meet the differing user needs in the best way possible.

National accessibility standards exist, called the "Harmonised Guidelines and Space Standards for Barrier Free Built Environment for Persons with Disability and Elderly Persons". Published by the

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Ministry of Housing and Urban Development. They were last updated in 2016, compiling three previous sets of standards into one document and include the following categories:

1. Universal design elements in buildings
2. Access to toilet facilities
3. Level changes
4. Signage for Universal Accessibility
5. Fire evacuation
6. Alighting and boarding areas in Evacuation Maps
7. Transport and road planning
8. Adapted housing
9. An access audit checklist

Older adults are more vulnerable than younger adults during a disaster because they are more likely to have impaired physical mobility, diminished sensory awareness, chronic health conditions, or social and economic limitations that interfere with their ability to get prepared for evacuation in case of disasters. Older persons who are hard of hearing or cognitively impaired might have trouble understanding information or following directions. It is important to follow with them steps as mentioned below-

1. Communicate nature of emergency.
2. Discuss needs and preferences for evacuation (Horizontal & vertical)
3. Ensure clear path of travel

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4. Orient and inquire
5. Notify emergency personnel.

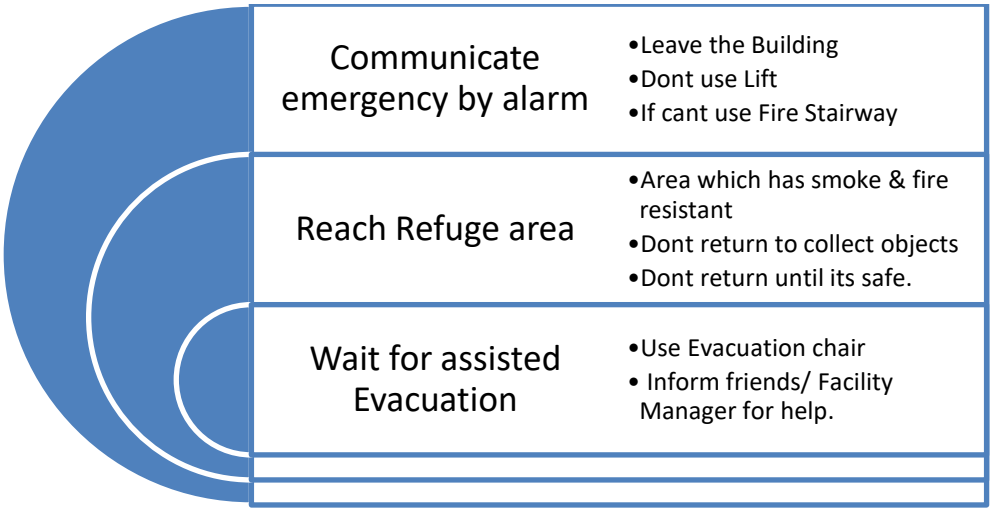

Fig 1.0 Fire Evacuation through Accessible Escape Routes

3.0 AN ACCESSIBLE MEANS OF EGRESS:

People with disability does not always get an accessible means of egress, out of a building. This becomes a crucial issue in case of high-rise buildings. In a typical disaster, people return home and resume their regular lives as quickly as possible. However, recent disasters, such as the September 11, 2001, terrorist attacks and Hurricanes Katrina and Rita in 2005, have made emergency planners aware that not all disasters are over in a few days or weeks and people with pre-existing chronic health conditions are vulnerable to adverse effects if they do not receive their usual medical treatment during the disaster recovery phase.

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An accessible means of egress has best been defined as a "continuous and unobstructed way of egress travel from any point in a building or facility that provides an accessible route to an area of refuge, a horizontal exit, or a public way". I like to think of it as a way out for all occupants, regardless of their abilities (Lee Wilson 2021). Buildings need signage to identify the accessible means of egress, including exit routes and exit doors.

This includes following components-

- Accessible routes, including horizontal exits, and ramps
- Internal and external exit stairs
- Evacuation lifts - The use of exit stairways, in conjunction with stairway evacuation devices (i.e. evacuation chairs) could also be a reasonable solution if an evacuation lift is not provided
- Platform lifts
- Refuge Areas

Source: Egress Designs Pty Ltd (2021)

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Signage for Accessible Facilities Source: MoUD Guidelines 2016

Presently, there is gap in putting signage of accessible egress routes and differentiating them from other escape routes. This protects members of the community with a disability, (sensory or mobility disabilities) to the risk of being delayed in their ability to evacuate a building or being entrapped within a building that has been evacuated. The use of exit stairways, in conjunction with stairway evacuation devices (i.e evacuation chairs) could also be a reasonable solution if an evacuation lift is not provided When they are provided an accessible means of egress it is generally only due to being able to evacuate, via the same accessible entrance they came in through when they entered the building. This restricts some occupants from evacuating safely unless they are on an entry level at the time of the emergency alarm.

Table 1.0- **Principles of Universal Design for Evacuation Planning**

Objectives	Methodology
1. Equitable Use:	1a. Provide the same means of use for all users: 1b. Avoid segregating or stigmatizing any users 1c. Make provisions for privacy, security, and safety equally available to all users 1d. Make the design appealing to all users

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2. Flexibility in Use:	2a. Provide choice in methods of use 2b. Accommodate right-or left-handed access and use 2c. Facilitate the user's accuracy and precision 2d. Provide adaptability to the user's pace
3. Simple and Intuitive Use:	3a. Keep simple & 3b. Eliminate unnecessary complexity 3c. Accommodate a wide range of literacy and language skills 3d. Arrange information consistent with its importance 3e. Provide effective prompting and feedback
4. Perceptible Information: Communicate based user's sensory abilities	4a. Use different modes of communication 4b. Keep communication Simple. 4c. Maximize "legibility" of essential information 4d. Provide compatibility with a variety of techniques or devices used by people with sensory limitations
5. Tolerance for Error:	5a. Arrange elements to minimize hazards and errors: 5b. Provide warnings of hazards and errors. 5c. Provide fail safe features. 5d. Keep vigilance
6. Low Physical Effort:	6a. Allow user to maintain a neutral body position. 6b. Use reasonable operating forces with minimum fatigue 6c. Minimize repetitive actions. 6d. Minimize sustained physical effort
7. Size and Space for Approach and Use: Appropriate size and space for all	7a. Clear line of sight to important elements 7b. Make comfortable reach for all components 7c. Accommodate variations in hand and grip size. 7d. Adequate space for the use of assistive devices or personal assistance

Source: Adapted from

4.0 REFUGE AND RESCUE:

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It may not always be possible to safely evacuate during a fire emergency. One gets quickly caught by heat, smoke and toxic gases, requiring seeking refuge and shelter-in-place until rescued by emergency responders. Many of the buildings are designed in a way, so that occupant can exit horizontally into another building or an area of refuge such as a stairway. It is important to familiarize with the locations of these areas, to get prepared for an emergency. Person with a mobility impairment may be trapped within a building and unable to continue their evacuation independently. In sprinkler protected buildings or if refuge area is not available, occupant may remain in a room with an exterior window, a phone, and fire-resistant doors unless danger is imminent. Person with a mobility impairment may be trapped within a building and unable to continue their evacuation independently. Therefore, every building should have fire resistant and smoke resistant areas, or refuge area where person with disability can wait safely till, they get required assistance.

5.0 ASSISTANCE FOR WHEELCHAIRS USER:

Assisting Persons with restricted mobility during evacuation may be helped as below-

1. Enquire, if the person needs assistance before acting and explain what needs to be done.
2. A wheelchair is part of the user's body space and it should be respected. Never maneuver it without user's permission.
3. Understand operational instructions of the chair.
4. Ensure locking the brake when transferring the person in or out of the chair.

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5. Check life support system before moving the person.
6. Be cautious in attempting to lift an individual from a wheelchair.
7. Avoid narrow doorways and openings, stairs, bumpy surfaces, and wet floors
8. Position the person in the safest place possible according to the emergency, preferably a designated “Refuge areas”.
9. Alert emergency personnel of the person’s location.
10. Explore if, wheelchair user might be able to walk with the assistance.

6.0 CONCLUSION:

Every building should have fire resistant and smoke resistant areas, or refuge area where person with disability can wait safely till, they get required assistance. Planning for emergency evacuation starts with assessment of vulnerability, determining escape routes and the areas compartmentalized for smoke and fire resistance. It is equally important to develop evacuation procedure which are inclusive and accessible to all. Occupants with special needs and those who can not comfortably or safely evacuate due to temporary or permanent disability, should be given more time to comprehend the crisis & be a collaborative responder with assistance to undertake evacuation.

REFERENCES:

- Barrier Free Environments, Edited by Michael J. Bednar, University of Virginia.
- Guidelines for Safe and Barrier free Built Environment for Elderly & Disables, Central Public Works Department (CPWD) Ministry of Urban Affairs & Employment, 1998

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Disabilities Studies,
Special Education & Rehabilitation.

- Harmonised Guidelines and Space Standards for Barrier free Built Environment for elderly and Disables, Ministry of Urban Development, 2016.
- The World Health Organization, 'World Report on Disability'.
- 'Disability at a Glance 2019: Investing in Accessibility in Asia and the Pacific — Strategic Approaches to Achieving Disability-Inclusive Sustainable Development.
- CABE Foundation: Resources', CABE Foundation, 2020, https://www.cabefoundation.com/p/resources.html.
- Qianl, M. and Guo, W. (2012), "Discussion on the fire safety design of a high-rise building", Procedia Engineering (Elsevier Ltd), Vol. 45, pp. 685-689. https://leewilson.com.au/2014/09/05/an-accessible-means-of-egress/
- https://www.loyola.edu/department/emergency-preparedness/persons-with-disabilities

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