

### Critical issues in evacuation planning

Emergencies are unforeseen combinations of circumstances (or their result), that call for immediate action (1). Particularly critical events may require egress or escape of people, away from an area containing imminent or ongoing threats, or hazards to lives and properties. Factors like climate change, population aging and growth, pandemics, or conflicts may adversely affect global disasters' frequency, magnitude, and impact in the future, and careful planning and preparedness are thus essential (2).

To protect people's lives and wellbeing, emergency management agencies may use coordinated evacuation. This is a prime risk management strategy involving the movement of people to a safer



Fig. 1. Main stages of the evacuation process (from (3)).

location and their return, and encompasses up to five stages: Decision, Warning, Withdrawal, Shelter, and Return (Fig. 1) (3).

The present document focuses on a small arbitrary selection of critical issues that must be considered when planning for evacuations. Although here treated separately, these multifaceted topics are in practice nested within an overarching management strategy. Particular emphasis will be given to three broad aspects, relevant across all stages of the evacuation process: 1) Inter-agency collaboration; 2) Users' preferred sheltering-practices; 3) Catering for vulnerable populations.

#### Inter-agency collaboration

Emergency sheltering sites often host personnel from multiple organizations, and with diverse duties and competences. This poses numerous operational and logistic challenges, where the increased vulnerability of traumatized people overlaps with a multitude of common and individual needs. Challenges include the high volatility of the medical and psychological condition of the evacuees', cohort-specific needs (age, gender, culture, religion, ethnicity), or differences in losses and emotional susceptibilities.

These challenges demand adaptive responses, which can not be effectively implemented without coordination and collaboration across agencies, and within an operational framework clearly outlining roles, responsibilities and authorities at all levels (4).

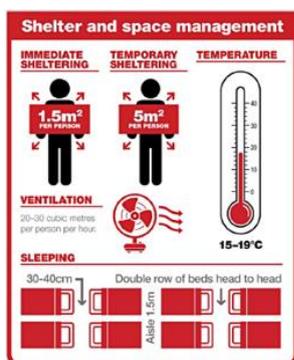


Fig. 2. Example of key indicators (from (5)).

Sharing of information is also critical to ensure camp functioning and effective care. At (crowded) emergency shelters, people's congregation increases environmental health risks (for evacuees and staff), due to increased proximity to potentially adverse physical, chemical, biological, and social factors in the environment. Minimizing this risk requires input from qualified health professionals (e.g., Environmental Health Operators - EHOs) trained in prevention, monitoring, screening, and treatment. EHOs' contribution however must seamlessly integrate the work, policies, and procedures of other organizations with other mandates, in a complementary and coordinate fashion. Examples of successful inter-agency collaborations include that between the Australian Red Cross, and Environmental Health Australia (EHA) (4). This culminated in invaluable tools like the Preferred Sheltering Practices (5), including (measurable) qualitative and quantitative indicators of the sheltering condition (Fig. 2).

#### Users' preferred sheltering practices

Planning for and supply of suitable emergency shelters is essential for a successful evacuation response. Type of shelter and/or arrangement of accommodations within the camp may also be important. Such preparation effort must be done prior to the disaster (e.g., decision stage; Fig. 1), also in anticipation of possible staff and resource shortages that may exacerbate during the emergency.

The significant budget and logistic effort associated with the provision of shelters by local, regional, and national governments requires utmost attention to cost-benefit aspects. To this end, a detailed understanding of the spatial distribution, demographics, needs, and preferences of potential users is crucial, to ensure adequate levels of users' satisfaction and cost-effectiveness. But what approaches

and tools can be used to achieve this? How can we provide answers to relatively complex risk questions, if there are multiple priorities and conflicting constraints?

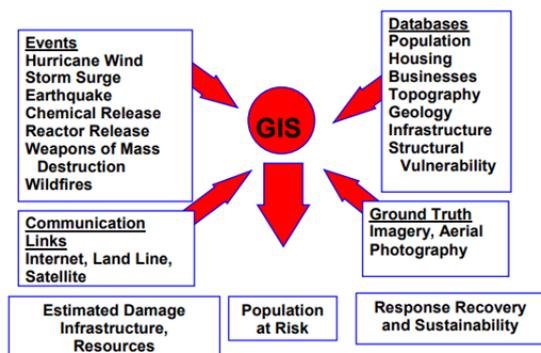


Fig.3. Example of GIS application in disasters and emergency Management (from (6)).

Geospatial modelling and Geographic information Systems (GIS) are computer-based tools that can be used in association with existing databases and demographic registries to support evacuation planning. The idea is to use a computer algorithm to analyse geographical and environmental data, and identify an optimal compromise between various factors of interest. For instance, one can use egress routes, road network, land use, proximity to hospitals, vegetation cover, slope, flood-risk, climate etc., to select the location for a safe, rational, and comfortable evacuation centre (Fig 3). Economic valuation methods are additional tools, that can be used to quantify the value of non-market services or goods, such as emergency shelters. Emergency care providers (NGOs, governments etc.) can use these methods to survey users' preferred sheltering practices and forecast their satisfaction, in strategic cost-benefit analyses (6).

Economic valuation methods elicit an actual monetary-value for sheltering attributes (e.g., privacy, camp arrangement, location, pet-friendliness etc.), based on the evacuees' preferences. Collecting and analysing the data for such studies requires detailed planning and careful considerations on the sample population, and it is potentially lengthy and expensive. However, these insights are crucial in helping decision-makers to allocate budgets for emergency shelters and personal financial assistance, prior to the disaster.

### Catering for vulnerable populations

One of the major challenges during emergency sheltering is balancing common and individual needs. Since addressing this challenge affects the planning and provision of the relief service, adequate consideration throughout the evacuation management process is paramount (Fig. 1).

While common needs like protection, food, rest, lodging, and support (medical, financial, emotional, technical etc.) are shared among all evacuees, others are specific to some individuals or groups, who must be catered for separately, and/or by *ad hoc* interventions.

Examples of the latter category of evacuees include pregnant women, children, persons with disabilities, elderly, migrants, people with non-communicable diseases etc.

Planning and preparedness should start with the early collection of detailed demographic data. This allows the identification of at-risk groups, and understand their needs, spatial distribution, accessibility, connectivity, disaster awareness and preparedness.

While privacy aspects must be considered, availability of comprehensive and up-to-date registries is highly desirable (Fig. 3). This should also include existing facilities potentially suitable as shelters (campsites, churches, stadiums), address and qualifications of health professionals and volunteers.

As previously discussed, sharing of information and clarity in responsibilities, roles, and authorities is also essential throughout the management process (Fig. 1). Administrative efficiency facilitates planning of a broad variety of aspects such as drilling, coaching, staffing, rostering, budget allocation, priority and fairness of relief assistance etc., of both vulnerable and non-vulnerable groups.

It is debatable whether vulnerable groups should be accommodated in separate locations or cared for within generic evacuation centres (7). Setting "*minimum standards of living and care*" can guide decision-makers, but defining responsibilities, indicators, and thresholds (that are clear and measurable), is essential for regulating and monitoring. Ultimately, specific considerations towards at-risk groups are vital throughout the management process, and catering for the two cohorts should be planned separately.

#### References

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