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Decision support system for the provision of emergency sanitation

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HIGHLIGHTS

- We developed a DSS to select and plan for faecal sludge management in emergencies
- The DSS is useful for planners to make decisions in relatively short time
- The DSS is designed as a computer-based program that can easily be modified
- The DSS is user-friendly and can be operated offline
- Preliminary validation of the DSS shows that it can provide realistic results

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ABSTRACT

Proper provision of sanitation in emergencies is considered a life-saving intervention. Without access to sanitation, refugees at emergency camps are at a high risk of contracting diseases. Even the most knowledgeable relief agencies have experienced difficulties providing sanitation alternatives in such challenging scenarios. This study developed a computer-based decision support system (DSS) to plan a sanitation response in emergencies. The sanitation alternatives suggested by the DSS are based on a sanitation chain concept that considers different steps in the faecal sludge management, from the toilet or latrine to the safe disposal of faecal matters. The DSS first screens individual sanitation technologies using the user's given input. Remaining sanitation options are then built into a feasible sanitation chain. Subsequently, each technology in the chain is evaluated on a scoring system. Different sanitation chains can later be ranked based on the total evaluation scores. The DSS addresses several deficiencies encountered in the provision of sanitation in emergencies including: the application of standard practices and intuition, the omission of site specific conditions, the limited knowledge exhibited by emergency planners, and the provision of sanitation focused exclusively on the collection step (i.e., just the provision of toilets).

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1. Introduction

This study describes a computer-based decision support system (DSS) developed for selecting the most suitable sanitation alternative for emergency situations. The sanitation alternatives suggested by the DSS were defined considering a sanitation chain approach (that is, each sanitation alternative includes excreta disposal, collection, conveyance, treatment, and final disposal or reuse). The computer-based DSS will contribute to ensuring a sustainably operated and maintained sanitation response in emergencies.

Natural and anthropological disasters may lead to the displacement of large numbers of people into temporary settlements or camps. The temporary camps are often overcrowded and contain rudimentary shelters, inadequate safe water and sanitation provision, and a high

potential exposure of people (camp residents) to disease vectors. The majority of diseases causing mortality and morbidity in displacement camps (e.g., cholera, diarrhoea, worms, skin irritation, and eye-irritation, among others) have a strong correlation with the state of the sanitation provision at the camps. Without a proper sanitation provision, people living in the displacement camps are at a high risk of contracting diseases.

The word 'sanitation', as well as 'environmental sanitation' could be broadly defined to refer to maintenance hygienic state of certain living environments. This translates into range of activities such as human excreta disposal, household wastewater disposal, vector control as well as solid waste management. However, in the context of emergency where the humanitarian aim is to meet basic sanitation and where the major concern is disease preventions, the word 'sanitation' is considered to have the strongest ties with human excreta disposal and management. Thus for this reason, this study discusses 'sanitation' as excreta disposal management.

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