



Chapter 2: Minimum Standards in Water Supply, Sanitation and Hygiene Promotion

How to use this chapter

This chapter is divided into six main sections: Hygiene Promotion, Water Supply, Excreta Disposal, Vector Control, Solid Waste Management and Drainage. Each contains the following:

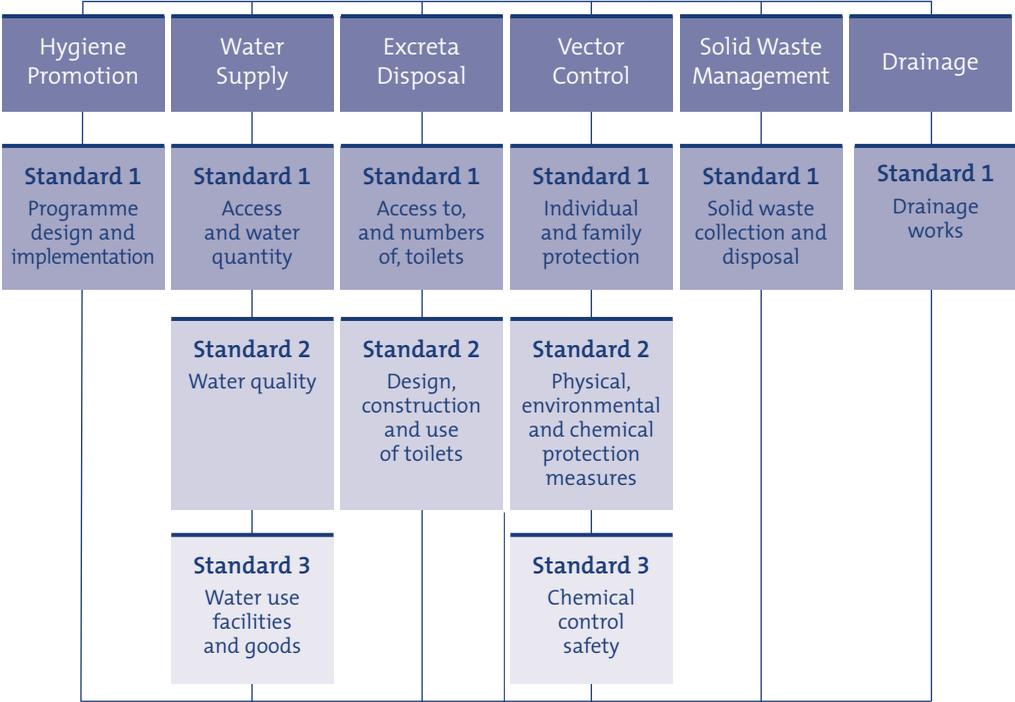
- *the minimum standards*: these are qualitative in nature and specify the minimum levels to be attained in the provision of water and sanitation responses;
- *key indicators*: these are ‘signals’ that show whether the standard has been attained. They provide a way of measuring and communicating the impact, or result, of programmes as well as the process, or methods, used. The indicators may be qualitative or quantitative;
- *guidance notes*: these include specific points to consider when applying the standard and indicators in different situations, guidance on tackling practical difficulties, and advice on priority issues. They may also include critical issues relating to the standard or indicators, and describe dilemmas, controversies or gaps in current knowledge.

The appendices include a select list of references, which point to sources of information on both general issues and specific technical issues relating to this chapter.

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Water Supply, Sanitation and Hygiene Promotion



Appendix 1
Water and Sanitation Initial Needs Assessment Checklist

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Introduction

Links to international legal instruments

The Minimum Standards in Water, Sanitation and Hygiene Promotion are a practical expression of the principles and rights embodied in the Humanitarian Charter. The Humanitarian Charter is concerned with the most basic requirements for sustaining the lives and dignity of those affected by calamity or conflict, as reflected in the body of international human rights, humanitarian and refugee law.

Everyone has the right to water. This right is recognised in international legal instruments and provides for sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses. An adequate amount of safe water is necessary to prevent death from dehydration, to reduce the risk of water-related disease and to provide for consumption, cooking, and personal and domestic hygienic requirements.

The right to water is inextricably related to other human rights, including the right to health, the right to housing and the right to adequate food. As such, it is part of the guarantees essential for human survival. States and non-state actors have responsibilities in fulfilling the right to water. In times of armed conflict, for example, it is prohibited to attack, destroy, remove or render useless drinking water installations or irrigation works.

The Minimum Standards in this chapter are not a full expression of the Right to Water. However, the Sphere standards reflect the core content of the Right to Water and contribute to the progressive realisation of this right globally.

The importance of water supply, sanitation and hygiene promotion in emergencies

Water and sanitation are critical determinants for survival in the initial stages of a disaster. People affected by disasters are generally much more susceptible to illness and death from disease, which are related to a large extent to inadequate sanitation, inadequate water supplies and poor hygiene. The most significant of these diseases are diarrhoeal diseases and infectious diseases transmitted by the faeco-oral route (see Appendix 4). Other water- and sanitation-related diseases include those carried by vectors associated with solid waste and water.

The main objective of water supply and sanitation programmes in disasters is to reduce the transmission of faeco-oral diseases and exposure to disease-bearing vectors through the promotion of good hygiene practices, the provision of safe drinking water and the reduction of environmental health risks and by establishing the conditions that allow people to live with good health, dignity, comfort and security. The term ‘sanitation’, throughout Sphere, refers to excreta disposal, vector control, solid waste disposal and drainage.

Simply providing sufficient water and sanitation facilities will not, on its own, ensure their optimal use or impact on public health. In order to achieve the maximum benefit from a response, it is imperative to ensure that disaster-affected people have the necessary information, knowledge and understanding to prevent water- and sanitation-related disease, and to mobilise their involvement in the design and maintenance of those facilities.

In most disaster situations the responsibility for collecting water falls to women and children. When using communal water and sanitation facilities, for example in refugee or displaced situations, women and adolescent girls can be vulnerable to sexual violence or exploitation. In order to minimise these risks, and to ensure a better quality of response, it is important to encourage women’s participation in water supply and sanitation programmes wherever possible. An equitable participation of women and men in planning, decision-making and local management will help to ensure that the entire affected population has safe and easy access to water supply and sanitation services, and that services are equitable and appropriate.

Links to other chapters

Many of the standards in the other sector chapters are relevant to this chapter. Progress in achieving standards in one area often influences and even determines progress in other areas. For a response to be effective, close coordination and collaboration are required with other sectors. Coordination with local authorities and other responding agencies is also necessary to ensure that needs are met, that efforts are not duplicated, and that the quality of water and sanitation responses is optimised.

For instance, where nutritional standards have not been met, the urgency to improve the standard of water and sanitation increases, as people's vulnerability to disease will have significantly increased. The same applies to populations where HIV/AIDS prevalence is high or where there is a large proportion of older or disabled people. Priorities should be decided on the basis of sound information shared between sectors as the situation evolves. Reference to specific standards or guidance notes in other technical chapters is made where relevant.

Links to the standards common to all sectors

The process by which an intervention is developed and implemented is critical to its effectiveness. This chapter should be utilised in conjunction with the standards common to all sectors, which cover participation, initial assessment, response, targeting, monitoring, evaluation, aid worker competencies and responsibilities, and the supervision, management and support of personnel (see chapter 1, page 21). In particular, in any response the participation of disaster-affected people – including the vulnerable groups outlined below – should be maximised to ensure its appropriateness and quality.

Vulnerabilities and capacities of disaster-affected populations

The groups most frequently at risk in emergencies are women, children, older people, disabled people and people living with HIV/AIDS (PLWH/A). In certain contexts, people may also become vulnerable by reason of ethnic origin, religious or political affiliation,

or displacement. This is not an exhaustive list, but it includes those most frequently identified. Specific vulnerabilities influence people's ability to cope and survive in a disaster, and those most at risk should be identified in each context.

Throughout the handbook, the term 'vulnerable groups' refers to all these groups. When any one group is at risk, it is likely that others will also be threatened. Therefore, whenever vulnerable groups are mentioned, users are strongly urged to consider all those listed here. Special care must be taken to protect and provide for all affected groups in a non-discriminatory manner and according to their specific needs. However, it should also be remembered that disaster-affected populations possess, and acquire, skills and capacities of their own to cope, and that these should be recognised and supported.

The Minimum Standards

1 Hygiene Promotion

The aim of any water and sanitation programme is to promote good personal and environmental hygiene in order to protect health. Hygiene promotion is defined here as the mix between the population's knowledge, practice and resources and agency knowledge and resources, which together enable risky hygiene behaviours to be avoided. The three key factors are 1) a mutual sharing of information and knowledge, 2) the mobilisation of communities and 3) the provision of essential materials and facilities. Effective hygiene promotion relies on an exchange of information between the agency and the affected community in order to identify key hygiene problems and to design, implement and monitor a programme to promote hygiene practices that will ensure the optimal use of facilities and the greatest impact on public health. Community mobilisation is especially pertinent during disasters as the emphasis must be on encouraging people to take action to protect their health and make good use of facilities and services provided, rather than on the dissemination of messages. It must be stressed that hygiene promotion should never be a substitute for good sanitation and water supplies, which are fundamental to good hygiene.

Hygiene promotion is integral to all the standards within this chapter. It is presented here as one overarching standard with related indicators. Further specific indicators are given within each standard for water supply, excreta disposal, vector control, solid waste management and drainage.

Hygiene promotion standard 1: programme design and implementation

All facilities and resources provided reflect the vulnerabilities, needs and preferences of the affected population. Users are involved in the management and maintenance of hygiene facilities where appropriate.

Key indicators (to be read in conjunction with the guidance notes)

- Key hygiene risks of public health importance are identified (see guidance note 1).
- Programmes include an effective mechanism for representative and participatory input from all users, including in the initial design of facilities (see guidance notes 2, 3 and 5).
- All groups within the population have equitable access to the resources or facilities needed to continue or achieve the hygiene practices that are promoted (see guidance note 3).
- Hygiene promotion messages and activities address key behaviours and misconceptions and are targeted for all user groups. Representatives from these groups participate in planning, training, implementation, monitoring and evaluation (see guidance notes 1, 3 and 4 and Participation standard on page 28).
- Users take responsibility for the management and maintenance of facilities as appropriate, and different groups contribute equitably (see guidance notes 5-6).

Guidance notes

1. **Assessing needs:** an assessment is needed to identify the key hygiene behaviours to be addressed and the likely success of promotional activity. The key risks are likely to centre on excreta disposal, the use and maintenance of toilets, the lack of hand washing with soap or an alternative, the unhygienic collection and storage of water, and unhygienic food storage and preparation. The assessment should look at resources available to the population as well as local behaviours, knowledge and

practices so that messages are relevant and practical. It should pay special attention to the needs of vulnerable groups. If consultation with any group is not possible, this should be clearly stated in the assessment report and addressed as quickly as possible (see Participation standard, page 28 and the assessment checklist in Appendix 1).

- 2. *Sharing responsibility:*** the ultimate responsibility for hygiene practice lies with all members of the affected population. All actors responding to the disaster should work to enable hygienic practice by ensuring that both knowledge and facilities are accessible, and should be able to demonstrate that this has been achieved. As a part of this process, vulnerable groups from the affected population should participate in identifying risky practices and conditions and take responsibility to measurably reduce these risks. This can be achieved through promotional activities, training and facilitation of behavioural change, based on activities that are culturally acceptable and do not overburden the beneficiaries.
- 3. *Reaching all sections of the population:*** hygiene promotion programmes need to be carried out with all groups of the population by facilitators who can access, and have the skills to work with, different groups (for example, in some cultures it is not acceptable for women to speak to unknown men). Materials should be designed so that messages reach members of the population who are illiterate. Participatory materials and methods that are culturally appropriate offer useful opportunities for groups to plan and monitor their own hygiene improvements. As a rough guide, in a camp scenario there should be two hygiene promoters/community mobilisers per 1,000 members of the target population. For information on hygiene items, see Non-food items standard 2 on page 232.
- 4. *Targeting priority hygiene risks and behaviours:*** the objectives of hygiene promotion and communication strategies should be clearly defined and prioritised. The understanding gained through assessing hygiene risks, tasks and responsibilities of different groups should be used to plan and prioritise assistance, so that misconceptions (for example, how HIV/AIDS is transmitted) are addressed and information flow between humanitarian actors and the affected population is appropriate and targeted.

- 5. *Managing facilities:*** where possible, it is good practice to form water and/or sanitation committees, made up of representatives from the various user groups and half of whose members are women. The functions of these committees are to manage the communal facilities such as water points, public toilets and washing areas, be involved in hygiene promotion activities and also act as a mechanism for ensuring representation and promoting sustainability.
- 6. *Overburdening:*** it is important to ensure that no one group is overburdened with the responsibility for hygiene promotional activities or management of facilities and that each group has equitable influence and benefits (such as training). Not all groups, women or men have the same needs and interests and it should be recognised that the participation of women should not lead to men, or other groups within the population, not taking responsibility.

2 Water Supply

Water is essential for life, health and human dignity. In extreme situations, there may not be sufficient water available to meet basic needs, and in these cases supplying a survival level of safe drinking water is of critical importance. In most cases, the main health problems are caused by poor hygiene due to insufficient water and by the consumption of contaminated water.

Water supply standard 1: access and water quantity

All people have safe and equitable access to a sufficient quantity of water for drinking, cooking and personal and domestic hygiene. Public water points are sufficiently close to households to enable use of the minimum water requirement.

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Key indicators (to be read in conjunction with the guidance notes)

- Average water use for drinking, cooking and personal hygiene in any household is at least 15 litres per person per day (see guidance notes 1-8).
- The maximum distance from any household to the nearest water point is 500 metres (see guidance notes 1, 2, 5 and 8).
- Queuing time at a water source is no more than 15 minutes (see guidance note 7).
- It takes no more than three minutes to fill a 20-litre container (see guidance notes 7-8).
- Water sources and systems are maintained such that appropriate quantities of water are available consistently or on a regular basis (see guidance notes 2 and 8).

Guidance notes

- Needs:** the quantities of water needed for domestic use may vary according to the climate, the sanitation facilities available, people's normal habits, their religious and cultural practices, the food they cook, the clothes they wear, and so on. Water consumption generally increases the nearer the water source is to the dwelling.

Simplified table of basic survival water needs		
Survival needs: water intake (drinking and food)	2.5-3 litres per day	Depends on: the climate and individual physiology
Basic hygiene practices	2-6 litres per day	Depends on: social and cultural norms
Basic cooking needs	3-6 litres per day	Depends on: food type, social as well as cultural norms
Total basic water needs	7.5-15 litres per day	

See Appendix 2 for guidance on minimum water quantities needed for institutions and other uses.

- Water source selection:** the factors that need to be taken into account are the availability and sustainability of a sufficient quantity of water; whether water treatment is required and, if so, the feasibility of this; the availability of the time, technology or funding required to develop a source; the proximity of the source to the affected population; and the existence of any social, political or legal factors concerning the source. Generally, groundwater sources are preferable as they require less treatment, especially gravity-flow supplies from springs, which require no pumping. Disasters often require a combination of approaches and sources in the initial phase. All sources need to be regularly monitored to avoid over-exploitation.
- Measurement:** measuring solely the volume of water pumped into the reticulation system or the time a handpump is in operation will not give an accurate indication of individual consumption. Household surveys,

observation and community discussion groups are a more effective method of collecting data on water use and consumption.

4. **Quality and quantity:** in many emergency situations, water-related disease transmission is due as much to insufficient water for personal and domestic hygiene as to contaminated water supplies. Until minimum standards for both quantity and quality are met, the priority should be to provide equitable access to an adequate quantity of water even if it is of intermediate quality, rather than to provide an inadequate quantity of water that meets the minimum quality standard. It should be taken into account that people living with HIV/AIDS need extra water for drinking and personal hygiene. Particular attention should be paid to ensuring that the water requirements of livestock and crops are met, especially in drought situations where lives and livelihoods are dependent on these (see Appendix 2).
5. **Coverage:** in the initial phase of a response the first priority is to meet the urgent survival needs of all the affected population. People affected by an emergency have a significantly increased vulnerability to disease and therefore the indicators should be reached even if they are higher than the norms of the affected or host population. In such situations it is recommended that agencies plan programmes to raise the levels of water and sanitation facilities of the host population also, to avoid provoking animosity.
6. **Maximum numbers of people per water source:** the number of people per source depends on the yield and availability of water at each source. For example, taps often function only at certain times of day and handpumps and wells may not give constant water if there is a low recharge rate. The rough guidelines (for when water is constantly available) are:

250 people per tap	based on a flow of 7.5 litres/minute
500 people per handpump	based on a flow of 16.6 l/m
400 people per single-user open well	based on a flow of 12.5 l/m.

These guidelines assume that the water point is accessible for approximately eight hours a day only; if access is greater than this, people can collect more than the 15 litres per day minimum requirement. These

targets must be used with caution, as reaching them does not necessarily guarantee a minimum quantity of water or equitable access.

- 7. Queuing time:** excessive queuing times are indicators of insufficient water availability (either due to an inadequate number of water points or inadequate yields of water points). The potential negative results of excessive queuing times are: 1) reduced per capita water consumption; 2) increased consumption from unprotected surface sources; and 3) reduced time for water collectors to tend to other essential survival tasks.
- 8. Access and equity:** even if a sufficient quantity of water is available to meet minimum needs, additional measures may be needed to ensure that access is equitable for all groups. Water points should be located in areas that are accessible to all regardless of e.g. sex or ethnicity. Some handpumps and water carrying containers may need to be designed or adapted for use by people living with HIV/AIDS, older and disabled people and children. In urban situations, it may be necessary to supply water into individual buildings to ensure that toilets continue to function. In situations where water is rationed or pumped at given times, this should be planned in consultation with the users. Times should be set which are convenient and safe for women and others who have responsibility for collecting water, and all users should be fully informed of when and where water is available.

Water supply standard 2: water quality

Water is palatable, and of sufficient quality to be drunk and used for personal and domestic hygiene without causing significant risk to health.

Key indicators (to be read in conjunction with the guidance notes)

- A sanitary survey indicates a low risk of faecal contamination (see guidance note 1).
- There are no faecal coliforms per 100ml at the point of delivery (see guidance note 2).
- People drink water from a protected or treated source in preference to other readily available water sources (see guidance note 3).

- Steps are taken to minimise post-delivery contamination (see guidance note 4).
- For piped water supplies, or for all water supplies at times of risk or presence of diarrhoea epidemic, water is treated with a disinfectant so that there is a free chlorine residual at the tap of 0.5mg per litre and turbidity is below 5 NTU (see guidance notes 5, 7 and 8).
- No negative health effect is detected due to short-term use of water contaminated by chemical (including carry-over of treatment chemicals) or radiological sources, and assessment shows no significant probability of such an effect (see guidance note 6).

Guidance notes

- 1. A sanitary survey** is an assessment of conditions and practices that may constitute a public health risk. The assessment should cover possible sources of contamination to water at the source, in transport and in the home, as well as defecation practices, drainage and solid waste management. Community mapping is a particularly effective way of identifying where the public health risks are and thereby involving the community in finding ways to reduce these risks. Note that while animal excreta is not as harmful as human excreta, it can contain cryptosporidium, giardia, salmonella, campylobacter, caliciviruses and some other common causes of human diarrhoea and therefore does present a significant health risk.
- 2. Microbiological water quality:** faecal coliform bacteria (>99% of which are *E. coli*) are an indicator of the level of human/animal waste contamination in water and the possibility of the presence of harmful pathogens. If any faecal coliforms are present the water should be treated. However, in the initial phase of a disaster, quantity is more important than quality (see Water supply standard 1, guidance note 4).
- 3. Promotion of protected sources:** merely providing protected sources or treated water will have little impact unless people understand the health benefits of this water and therefore use it. People may prefer to use unprotected sources, e.g. rivers, lakes and unprotected wells, for reasons such as taste, proximity and social convenience. In such cases

technicians, hygiene promoters and community mobilisers need to understand the rationale for these preferences so that consideration of them can be included in promotional messages and discussions.

- 4. *Post-delivery contamination:*** water that is safe at the point of delivery can nevertheless present a significant health risk due to re-contamination during collection, storage and drawing. Steps that can be taken to minimise such risk include improved collection and storage practices, distributions of clean and appropriate collection and storage containers (see Water supply standard 3), treatment with a residual disinfectant, or treatment at the point of use. Water should be routinely sampled at the point of use to monitor the extent of any post-delivery contamination.
- 5. *Water disinfection:*** water should be treated with a residual disinfectant such as chlorine if there is a significant risk of water source or post-delivery contamination. This risk will be determined by conditions in the community, such as population density, excreta disposal arrangements, hygiene practices and the prevalence of diarrhoeal disease. The risk assessment should also include qualitative community data regarding factors such as community perceptions of taste and palatability (see guidance note 6). Piped water supply for any large or concentrated population should be treated with a residual disinfectant and, in the case of a threat or the existence of a diarrhoea epidemic, all drinking water supplies should be treated, either before distribution or in the home. In order for water to be disinfected properly, turbidity must be below 5 NTU.
- 6. *Chemical and radiological contamination:*** where hydrogeological records or knowledge of industrial or military activity suggest that water supplies may carry chemical or radiological health risks, those risks should be assessed rapidly by carrying out chemical analysis. A decision that balances short-term public health risks and benefits should then be made. A decision about using possibly contaminated water for longer-term supplies should be made on the basis of a more thorough professional assessment and analysis of the health implications.
- 7. *Palatability:*** although taste is not in itself a direct health problem (e.g. slightly saline water), if the safe water supply does not taste good, users may drink from unsafe sources and put their health at risk. This may also be a risk when chlorinated water is supplied, in which case promotional activities are needed to ensure that only safe supplies are used.

- 8. Water quality for health centres:** all water for hospitals, health centres and feeding centres should be treated with chlorine or another residual disinfectant. In situations where water is likely to be rationed by an interruption of supply, sufficient water storage should be available at the centre to ensure an uninterrupted supply at normal levels of utilisation (see Appendix 2).

Water supply standard 3: water use facilities and goods

People have adequate facilities and supplies to collect, store and use sufficient quantities of water for drinking, cooking and personal hygiene, and to ensure that drinking water remains safe until it is consumed.

Key indicators (to be read in conjunction with the guidance notes)

- Each household has at least two clean water collecting containers of 10-20 litres, plus enough clean water storage containers to ensure there is always water in the household (see guidance note 1).
- Water collection and storage containers have narrow necks and/or covers, or other safe means of storage, drawing and handling, and are demonstrably used (see guidance note 1).
- There is at least 250g of soap available for personal hygiene per person per month.
- Where communal bathing facilities are necessary, there are sufficient bathing cubicles available, with separate cubicles for males and females, and they are used appropriately and equitably (see guidance note 2).
- Where communal laundry facilities are necessary, there is at least one washing basin per 100 people, and private laundering areas are available for women to wash and dry undergarments and sanitary cloths.
- The participation of all vulnerable groups is actively encouraged in the siting and construction of bathing facilities and/or the

production and distribution of soap, and/or the use and promotion of suitable alternatives (see guidance note 2).

Guidance notes

- 1. *Water collection and storage:*** people need vessels to collect water, to store it and to use it for washing, cooking and bathing. These vessels should be clean, hygienic and easy to carry and be appropriate to local needs and habits, in terms of size, shape and design. Children, disabled people, older people and PLWH/A may need smaller or specially designed water carrying containers. The amount of storage capacity required depends on the size of the household and the consistency of water availability e.g. approximately 4 litres per person would be appropriate for situations where there is a constant daily supply. Promotion and monitoring of safe collection, storage and drawing provide an opportunity to discuss water contamination issues with vulnerable groups, especially women and children.
- 2. *Communal washing and bathing facilities:*** people may need a space where they can bathe in privacy and dignity. If this is not possible at the household level, central facilities may be needed. Where soap is not available or commonly used, alternatives can be provided such as ash, clean sand, soda or various plants suitable for washing and/or scrubbing. Washing clothes is an essential hygiene activity, particularly for children, and cooking and eating utensils also need washing. The numbers, location, design, safety, appropriateness and convenience of facilities should be decided in consultation with the users, particularly women, adolescent girls and any disabled people. The location of facilities in central, accessible and well-lit areas can contribute to ensuring the safety of users.

3 Excreta Disposal

Safe disposal of human excreta creates the first barrier to excreta-related disease, helping to reduce transmission through direct and indirect routes. Safe excreta disposal is therefore a major priority, and in most disaster situations should be addressed with as much speed and effort as the provision of safe water supply. The provision of appropriate facilities for defecation is one of a number of emergency responses essential for people's dignity, safety, health and well-being.

Excreta disposal standard 1: access to, and numbers of, toilets

People have adequate numbers of toilets, sufficiently close to their dwellings, to allow them rapid, safe and acceptable access at all times of the day and night.

Key indicators (to be read in conjunction with the guidance notes)

- A maximum of 20 people use each toilet (see guidance notes 1-4).
- Use of toilets is arranged by household(s) and/or segregated by sex (see guidance notes 3-5).
- Separate toilets for women and men are available in public places (markets, distribution centres, health centres, etc.) (see guidance note 3).
- Shared or public toilets are cleaned and maintained in such a way that they are used by all intended users (see guidance notes 3-5).
- Toilets are no more than 50 metres from dwellings (see guidance note 5).
- Toilets are used in the most hygienic way and children's faeces are disposed of immediately and hygienically (see guidance note 6).

Guidance notes

- 1. *Safe excreta disposal:*** the aim of a safe excreta disposal programme is to ensure that the environment is free from contamination by human faeces. The more all groups from the disaster-affected population are involved, the more likely the programme is to succeed. In situations where the population has not traditionally used toilets, it may be necessary to conduct a concerted education/promotion campaign to encourage their use and to create a demand for more toilets to be constructed. Disasters in urban areas where the sewerage system is damaged may require solutions such as isolating parts of the system that still work (and re-routing pipes), installing portable toilets and using septic tanks and containment tanks that can be regularly desludged.
- 2. *Defecation areas:*** in the initial phase of a disaster, before any toilets can be constructed, it may be necessary to mark off an area to be used as a defecation field or for trench latrines. This will only work if the site is correctly managed and maintained.
- 3. *Public toilets:*** in some initial disaster situations and in public places where it is necessary to construct toilets for general use, it is very important to establish systems for the proper regular cleaning and maintenance of these facilities. Disaggregated population data should be used to plan the ratio of women's cubicles to men's (of approximately 3:1). Where possible, urinals should be provided for men (see Appendix 3).
- 4. *Communal toilets:*** for a displaced population where there are no existing toilets, it is not always possible to provide one toilet per 20 people immediately. In such cases, a figure of 50 people per toilet can be used, decreasing to 20 as soon as possible, and changing the sharing arrangements accordingly. Any communal toilet must have a system in place, developed with the community, to ensure that it is maintained and kept clean. In some circumstances, space limitations make it impossible to meet this figure. In this case, while advocating strongly for extra space to be made available, it should be remembered that the primary aim is to provide and maintain an environment free from human faeces.
- 5. *Shared facilities:*** where one toilet is shared by four or five families it is generally better kept, cleaner and therefore regularly used when the families have been consulted about its siting and design and have the

responsibility and the means to clean and maintain it. It is important to organise access to shared facilities by working with the intended users to decide who will have access to the toilet and how it will be cleaned and maintained. Efforts should be made to provide people living with HIV/AIDS with easy access to a toilet as they frequently suffer from chronic diarrhoea and reduced mobility.

- 6. Children's faeces:** particular attention should be given to the disposal of children's faeces, which are commonly more dangerous than those of adults, as the level of excreta-related infection among children is frequently higher and children lack antibodies. Parents or care givers need to be involved, and facilities should be designed with children in mind. It may be necessary to provide parents or care givers with information about safe disposal of infant faeces and nappy (diaper) laundering practices.

Excreta disposal standard 2: design, construction and use of toilets

Toilets are sited, designed, constructed and maintained in such a way as to be comfortable, hygienic and safe to use.

Key indicators (to be read in conjunction with the guidance notes)

- Users (especially women) have been consulted and approve of the siting and design of the toilet (see guidance notes 1-3).
- Toilets are designed, built and located to have the following features:
 - they are designed in such a way that they can be used by all sections of the population, including children, older people, pregnant women and physically and mentally disabled people (see guidance note 1);
 - they are sited in such a way as to minimise threats to users, especially women and girls, throughout the day and night (see guidance note 2);

- they are sufficiently easy to keep clean to invite use and do not present a health hazard;
 - they provide a degree of privacy in line with the norms of the users;
 - they allow for the disposal of women’s sanitary protection, or provide women with the necessary privacy for washing and drying sanitary protection cloths (see guidance note 4);
 - they minimise fly and mosquito breeding (see guidance note 7).
- All toilets constructed that use water for flushing and/or a hygienic seal have an adequate and regular supply of water (see guidance notes 1 and 3).
 - Pit latrines and soakaways (for most soils) are at least 30 metres from any groundwater source and the bottom of any latrine is at least 1.5 metres above the water table. Drainage or spillage from defecation systems must not run towards any surface water source or shallow groundwater source (see guidance note 5).
 - People wash their hands after defecation and before eating and food preparation (see guidance note 6).
 - People are provided with tools and materials for constructing, maintaining and cleaning their own toilets if appropriate (see guidance note 7).

Guidance notes

1. **Acceptable facilities:** successful excreta disposal programmes are based on an understanding of people’s varied needs as well as on the participation of the users. It may not be possible to make all toilets acceptable to all groups and special toilets may need to be constructed for children, older people and disabled people e.g. potties, or toilets with lower seats or hand rails. The type of toilet constructed should depend on the preferences and cultural habits of the intended users, the existing infrastructure, the ready availability of water (for flushing and water seals), ground conditions and the availability of construction materials.

- 2. Safe facilities:** inappropriate siting of toilets may make women and girls more vulnerable to attack, especially during the night, and ways must be found to ensure that women feel, and are, safe using the toilets provided. Where possible, communal toilets should be provided with lighting or families provided with torches. The input of the community should be sought with regard to ways of enhancing the safety of users.
- 3. Anal cleansing:** water should be provided for people who use it. For other people it may be necessary to provide toilet paper or other material for anal cleansing. Users should be consulted on the most culturally appropriate cleansing materials and on their safe disposal.
- 4. Menstruation:** women and girls who menstruate should have access to suitable materials for the absorption and disposal of menstrual blood. Women should be consulted on what is culturally appropriate (see Non-food items standard 2 on page 232).
- 5. Distance of defecation systems from water sources:** the distances given above may be increased for fissured rocks and limestone, or decreased for fine soils. In disasters, groundwater pollution may not be an immediate concern if the groundwater is not consumed. In flooded or high water table environments, it may be necessary to build elevated toilets or septic tanks to contain excreta and prevent it contaminating the environment.
- 6. Hand washing:** the importance of hand washing after defecation and before eating and preparing food, to prevent the spread of disease, cannot be over-estimated. Users should have the means to wash their hands after defecation with soap or an alternative (such as ash), and should be encouraged to do so. There should be a constant source of water near the toilet for this purpose.
- 7. Hygienic toilets:** if toilets are not kept clean they may become a focus for disease transmission and people will prefer not to use them. They are more likely to be kept clean if users have a sense of ownership. This is encouraged by promotional activities, having toilets close to where people sleep and involving users in decisions about their design and construction, rules on proper operation, maintenance, monitoring and use. Flies and mosquitoes are discouraged by keeping the toilet clean, having a water seal, Ventilated Improved Pit (VIP) latrine design or simply by the correct use of a lid on a squat hole.

4 Vector Control

A vector is a disease-carrying agent and vector-borne diseases are a major cause of sickness and death in many disaster situations. Mosquitoes are the vector responsible for malaria transmission, which is one of the leading causes of morbidity and mortality. Mosquitoes also transmit other diseases, such as yellow fever and dengue haemorrhagic fever. Non-biting or synanthropic flies, such as the house fly, the blow fly and the flesh fly, play an important role in the transmission of diarrhoeal disease. Biting flies, bed bugs and fleas are a painful nuisance and in some cases transmit significant diseases such as murine typhus and plague. Ticks transmit relapsing fever and human body lice transmit typhus and relapsing fever. Rats and mice can transmit diseases such as leptospirosis and salmonellosis and can be hosts for other vectors e.g. fleas, which may transmit Lassa fever, plague and other infections.

Vector-borne diseases can be controlled through a variety of initiatives, including appropriate site selection and shelter provision, appropriate water supply, excreta disposal, solid waste management and drainage, the provision of health services (including community mobilisation and health promotion), the use of chemical controls, family and individual protection and the effective protection of food stores. Although the nature of vector-borne disease is often complex and addressing vector-related problems may demand specialist attention, there is much that can be done to help prevent the spread of such diseases with simple and effective measures, once the disease, its vector and their interaction with the population have been identified.

Vector control standard 1: individual and family protection

All disaster-affected people have the knowledge and the means to protect themselves from disease and nuisance vectors that are likely to represent a significant risk to health or well-being.

Key indicators (to be read in conjunction with the guidance notes)

- All populations at risk from vector-borne disease understand the modes of transmission and possible methods of prevention (see guidance notes 1-5).
- All populations have access to shelters that do not harbour or encourage the growth of vector populations and are protected by appropriate vector control measures.
- People avoid exposure to mosquitoes during peak biting times by using all non-harmful means available to them. Special attention is paid to protection of high-risk groups such as pregnant and feeding mothers, babies, infants, older people and the sick (see guidance note 3).
- People with treated mosquito nets use them effectively (see guidance note 3).
- Control of human body lice is carried out where louse-borne typhus or relapsing fever is a threat (see guidance note 4).
- Bedding and clothing are aired and washed regularly (see guidance note 4).
- Food is protected at all times from contamination by vectors such as flies, insects and rodents.

Guidance notes

1. **Defining vector-borne disease risk:** decisions about vector control interventions should be based on an assessment of potential disease risk,

as well as on clinical evidence of a vector-borne disease problem. Factors influencing this risk include:

- immunity status of the population, including previous exposure, nutritional stress and other stresses. Movement of people (e.g. refugees, IDPs) from a non-endemic to an endemic area is a common cause of epidemics;
- pathogen type and prevalence, in both vectors and humans;
- vector species, behaviours and ecology;
- vector numbers (season, breeding sites, etc.);
- increased exposure to vectors: proximity, settlement pattern, shelter type, existing individual protection and avoidance measures.

2. Indicators for vector control programmes: commonly used indicators for measuring the impact of vector control activities are vector-borne disease incidence rates (from epidemiological data, community-based data and proxy indicators, depending on the response) and parasite counts (using rapid diagnostic kits or microscopy).

3. Individual malaria protection measures: if there is a significant risk of malaria, the systematic and timely provision of protection measures, such as insecticide-treated materials, i.e. tents, curtains and bednets, is recommended. Impregnated bednets have the added advantage of giving some protection against body and head lice, fleas, ticks, cockroaches and bedbugs. Long-sleeved clothing, household fumigants, coils, aerosol sprays and repellents are other protection methods that can be used against mosquitoes. It is vital to ensure that users understand the importance of protection and how to use the tools correctly so that the protection measures are effective. Where resources are scarce, they should be directed at individuals and groups most at risk, such as children under five years old, non-immunes and pregnant women.

4. Individual protection measures for other vectors: good personal hygiene and regular washing of clothes and bedding is the most effective protection against body lice. Infestations can be controlled by personal treatment (powdering), mass laundering or delousing campaigns and by treatment protocols as newly displaced people arrive in a settlement. A

clean household environment, together with good waste disposal and good food storage, will deter rats and other rodents from entering houses or shelters.

- 5. Water-borne diseases:** people should be informed of health risks and should avoid entering water bodies where there is a known risk of contracting diseases such as schistosomiasis, Guinea worm or leptospirosis (transmitted by exposure to mammalian urine, especially that of rats: see Appendix 4). Agencies may need to work with the community to find alternative sources of water or ensure that water for all uses is appropriately treated.

Vector control standard 2: physical, environmental and chemical protection measures

The numbers of disease vectors that pose a risk to people's health and nuisance vectors that pose a risk to people's well-being are kept to an acceptable level.

Key indicators (to be read in conjunction with the guidance notes)

- Displaced populations are settled in locations that minimise their exposure to mosquitoes (see guidance note 1).
- Vector breeding and resting sites are modified where practicable (see guidance notes 2-4).
- Intensive fly control is carried out in high-density settlements when there is a risk or the presence of a diarrhoea epidemic.
- The population density of mosquitoes is kept low enough to avoid the risk of excessive transmission levels and infection (see guidance note 4).
- People infected with malaria are diagnosed early and receive treatment (see guidance note 5).

Guidance notes

- 1. Site selection** is important in minimising the exposure of the population to the risk of vector-borne disease; this should be one of the key factors when considering possible sites. With regard to malaria control, for example, camps should be located 1-2km upwind from large breeding sites, such as swamps or lakes, whenever an additional clean water source can be provided (see Shelter and settlement standards 1-2 on pages 211-218).
- 2. Environmental and chemical vector control:** there are a number of basic environmental engineering measures that can be taken to reduce the opportunities for vector breeding. These include the proper disposal of human and animal excreta (see Excreta Disposal section), proper disposal of refuse to control flies and rodents (see Solid Waste Management section), and drainage of standing water to control mosquitoes (see Drainage section). Such priority environmental health measures will have some impact on the population density of some vectors. It may not be possible to have sufficient impact on all the breeding, feeding and resting sites within a settlement or near it, even in the longer term, and localised chemical control measures or individual protection measures may be needed. For example, space spraying may reduce the numbers of adult flies and prevent a diarrhoea epidemic, or may help to minimise the disease burden if employed during an epidemic.
- 3. Designing a response:** vector control programmes may have no impact on disease if they target the wrong vector, use ineffective methods, or target the right vector in the wrong place or at the wrong time. Control programmes should initially aim to address the following three objectives: 1) to reduce the vector population density; 2) to reduce the human-vector contact; and 3) to reduce the vector breeding sites. Poorly executed programmes can be counter-productive. Detailed study, and often expert advice, are needed and should be sought from national and international health organisations, while local advice should be sought on local disease patterns, breeding sites, seasonal variations in vector numbers and incidence of diseases, etc.
- 4. Environmental mosquito control:** environmental control aims primarily at eliminating mosquito breeding sites. The three main species of mosquitoes responsible for transmitting disease are *Culex* (filariasis),

Anopheles (malaria and filariasis) and *Aedes* (yellow fever and dengue). *Culex* mosquitoes breed in stagnant water loaded with organic matter such as latrines, *Anopheles* in relatively unpolluted surface water such as puddles, slow-flowing streams and wells, and *Aedes* in water receptacles such as bottles, buckets, tyres, etc. Examples of environmental mosquito control include good drainage, properly functioning VIP latrines, keeping lids on the squatting hole of pit latrines and on water containers, and keeping wells covered and/or treating them with a larvicide (e.g. for areas where dengue fever is endemic).

- 5. Malaria treatment:** malaria control strategies that aim to reduce the mosquito population density by eliminating breeding sites, reducing the mosquito daily survival rate and restricting the human biting habit should be carried out simultaneously with early diagnosis and treatment with effective anti-malarials. Campaigns to encourage early diagnosis and treatment should be initiated and sustained. In the context of an integrated approach, active case finding by trained outreach workers and treatment with effective anti-malarials is more likely to reduce the malaria burden than passive case finding through centralised health services (see Control of communicable diseases standard 5 on page 281).

Vector control standard 3: chemical control safety

Chemical vector control measures are carried out in a manner that ensures that staff, the people affected by the disaster and the local environment are adequately protected, and avoids creating resistance to the substances used.

Key indicators (to be read in conjunction with the guidance notes)

- Personnel are protected by the provision of training, protective clothing, use of bathing facilities, supervision and a restriction on the number of hours spent handling chemicals.
- The choice, quality, transport and storage of chemicals used for vector control, the application equipment and the disposal of the

substances follow international norms, and can be accounted for at all times (see guidance note 1).

- Communities are informed about the potential risks of the substances used in chemical vector control and about the schedule for application. They are protected during and after the application of poisons or pesticides, according to internationally agreed procedures (see guidance note 1).

Guidance note

- 1. *National and international protocols:*** there are clear international protocols and norms, published by WHO, for both the choice and the application of chemicals in vector control, which should be adhered to at all times. Vector control measures should address two principal concerns: efficacy and safety. If national norms with regard to the choice of chemicals fall short of international standards, resulting in little or no impact or endangering health and safety, then the agency should consult and lobby the relevant national authority for permission to adhere to the international standards.

5 Solid Waste Management

If organic solid waste is not disposed of, major risks are incurred of fly and rat breeding (see Vector Control section) and surface water pollution. Uncollected and accumulating solid waste and the debris left after a natural disaster or conflict may also create a depressing and ugly environment, discouraging efforts to improve other aspects of environmental health. Solid waste often blocks drainage channels and leads to environmental health problems associated with stagnant and polluted surface water.

Solid waste management standard 1: collection and disposal

People have an environment that is acceptably uncontaminated by solid waste, including medical waste, and have the means to dispose of their domestic waste conveniently and effectively.

Key indicators (to be read in conjunction with the guidance notes)

- People from the affected population are involved in the design and implementation of the solid waste programme.
- Household waste is put in containers daily for regular collection, burnt or buried in a specified refuse pit.
- All households have access to a refuse container and/or are no more than 100 metres from a communal refuse pit.
- At least one 100-litre refuse container is available per 10 families, where domestic refuse is not buried on-site.

- Refuse is removed from the settlement before it becomes a nuisance or a health risk (see guidance notes 1, 2 and 6).
- Medical wastes are separated and disposed of separately and there is a correctly designed, constructed and operated pit, or incinerator with a deep ash pit, within the boundaries of each health facility (see guidance notes 3 and 6).
- There are no contaminated or dangerous medical wastes (needles, glass, dressings, drugs, etc.) at any time in living areas or public spaces (see guidance note 3).
- There are clearly marked and appropriately fenced refuse pits, bins or specified areas at public places, such as markets and slaughtering areas, with a regular collection system in place (see guidance note 4).
- Final disposal of solid waste is carried out in such a place and in such a way as to avoid creating health and environmental problems for the local and affected populations (see guidance notes 5-6).

Guidance notes

1. **Burial of waste:** if waste is to be buried on-site in either household or communal pits, it should be covered at least weekly with a thin layer of soil to prevent it attracting vectors such as flies and rodents and becoming their breeding ground. If children's faeces/nappies are being disposed of they should be covered with earth directly afterwards. Disposal sites should be fenced off to prevent accidents and access by children and animals; care should be taken to prevent any leachate contaminating the ground water.
2. **Refuse type and quantity:** refuse in settlements varies widely in composition and quantity, according to the amount and type of economic activity, the staple foods consumed and local practices of recycling and/or waste disposal. The extent to which solid waste has an impact on people's health should be assessed and appropriate action taken if necessary. Recycling of solid waste within the community should be encouraged, provided it presents no significant health risk. Distribution of commodities that produce a large amount of solid waste from packaging or processing on-site should be avoided.

- 3. Medical waste:** poor management of health-care waste exposes the community, health-care workers and waste handlers to infections, toxic effects and injuries. In a disaster situation the most hazardous types of waste are likely to be infectious sharps and non-sharps (wound dressings, blood-stained cloth and organic matter such as placentas, etc.). The different types of waste should be separated at source. Non-infectious waste (paper, plastic wrappings, food waste, etc.) can be disposed of as solid waste. Contaminated sharps, especially used needles and syringes, should be placed in a safety box directly after use. Safety boxes and other infectious waste can be disposed of on-site by burial, incineration or other safe methods.
- 4. Market waste:** most market waste can be treated in the same way as domestic refuse. Slaughterhouse waste may need special treatment and special facilities to deal with the liquid wastes produced, and to ensure that slaughtering is carried out in hygienic conditions and in compliance with local laws. Slaughter waste can often be disposed of in a large pit with a hole cover next to the abattoir. Blood, etc. can be run from the abattoir into the pit through a slab-covered channel (reducing fly access to the pit). Water should be made available for cleaning purposes.
- 5. Controlled tipping/sanitary landfill:** large-scale disposal of waste should be carried out off-site through either controlled tipping or sanitary landfill. This method is dependent upon sufficient space and access to mechanical equipment. Ideally waste that is tipped should be covered with soil at the end of each day to prevent scavenging and vector breeding.
- 6. Staff welfare:** all solid waste management staff who collect, transport or dispose of waste should be provided with protective clothing, at minimum gloves and ideally overalls, boots and protective masks. Water and soap should be available for hand and face washing. Staff who come into contact with medical waste should be informed of the correct methods of storage, transport and disposal and the risks associated with improper management of the waste.

6 Drainage

Surface water in or near emergency settlements may come from household and water point wastewater, leaking toilets and sewers, rainwater or rising floodwater. The main health risks associated with surface water are contamination of water supplies and the living environment, damage to toilets and dwellings, vector breeding and drowning. Rainwater and rising floodwaters can worsen the drainage situation in a settlement and further increase the risk of contamination. A proper drainage plan, addressing stormwater drainage through site planning and wastewater disposal using small-scale, on-site drainage, should be implemented to reduce potential health risks to the population. This section addresses small-scale drainage problems and activities. Large-scale drainage is generally determined by site selection and development (see Shelter, Settlement and Non-Food Items, chapter 4 on page 203).

Drainage standard 1: drainage works

People have an environment in which the health and other risks posed by water erosion and standing water, including stormwater, floodwater, domestic wastewater and wastewater from medical facilities, are minimised.

Key indicators (to be read in conjunction with the guidance notes)

- Areas around dwellings and water points are kept free of standing wastewater, and stormwater drains are kept clear (see guidance notes 1, 2, 4 and 5).
- Shelters, paths and water and sanitation facilities are not flooded or eroded by water (see guidance notes 2-4).

- Water point drainage is well planned, built and maintained. This includes drainage from washing and bathing areas as well as water collection points (see guidance notes 2 and 4).
- Drainage waters do not pollute existing surface or groundwater sources or cause erosion (see guidance note 5).
- Sufficient numbers of appropriate tools are provided for small drainage works and maintenance where necessary (see guidance note 4).

Guidance notes

- 1. Site selection and planning:** the most effective way to control drainage problems is in the choice of site and the layout of the settlement (see Shelter and settlement standards 1-4 on pages 211-224).
- 2. Wastewater:** sullage or domestic wastewater is classified as sewage when mixed with human excreta. Unless the settlement is sited where there is an existing sewerage system, domestic wastewater should not be allowed to mix with human waste. Sewage is difficult and more expensive to treat than domestic wastewater. At water points and washing and bathing areas, the creation of small gardens to utilise wastewater should be encouraged. Special attention needs to be paid to prevent wastewater from washing and bathing areas contaminating water sources.
- 3. Drainage and excreta disposal:** special care is needed to protect toilets and sewers from flooding in order to avoid structural damage and leakage.
- 4. Promotion:** it is essential to involve the affected population in providing small-scale drainage works as they often have good knowledge of the natural flow of drainage water and of where channels should be. Also, if they understand the health and physical risks involved and have assisted in the construction of the drainage system, they are more likely to maintain it (see Vector Control section). Technical support and tools may then be needed.
- 5. On-site disposal:** where possible, and if favourable soil conditions exist, drainage from water points and washing areas should be on-site rather than via open channels, which are difficult to maintain and often clog. Simple and cheap techniques such as soak pits can be used for on-site

disposal of wastewater. Where off-site disposal is the only possibility, channels are preferable to pipes. Channels should be designed both to provide flow velocity for dry-weather sillage and to carry stormwater. Where the slope is more than 5%, engineering techniques must be applied to prevent excessive erosion. Drainage of residuals from any water treatment processes should be carefully controlled so that people cannot use such water and it does not contaminate surface or groundwater sources.

Appendix 1

Water and Sanitation Initial Needs Assessment Checklist

This list of questions is primarily for use to assess needs, identify indigenous resources and describe local conditions. It does not include questions to determine external resources needed in addition to those immediately and locally available.

1 General

- How many people are affected and where are they? Disaggregate the data as far as possible by sex, age, disability etc.
- What are people's likely movements? What are the security factors for the people affected and for potential relief responses?
- What are the current or threatened water- and sanitation-related diseases? What are the extent and expected evolution of problems?
- Who are the key people to consult or contact?
- Who are the vulnerable people in the population and why?
- Is there equal access for all to existing facilities?
- What special security risks exist for women and girls?
- What water and sanitation practices were the population accustomed to before the emergency?

2 Water supply

- What is the current water source and who are the present users?
- How much water is available per person per day?
- What is the daily/weekly frequency of the water supply?
- Is the water available at the source sufficient for short-term and longer-term needs for all groups in the population?

- Are water collection points close enough to where people live? Are they safe?
- Is the current water supply reliable? How long will it last?
- Do people have enough water containers of the appropriate size and type?
- Is the water source contaminated or at risk of contamination (microbiological or chemical/radiological)?
- Is treatment necessary? Is treatment possible? What treatment is necessary?
- Is disinfection necessary, even if the supply is not contaminated?
- Are there alternative sources nearby?
- What traditional beliefs and practices relate to the collection, storage and use of water?
- Are there any obstacles to using available supplies?
- Is it possible to move the population if water sources are inadequate?
- Is it possible to tanker water if water sources are inadequate?
- What are the key hygiene issues related to water supply?
- Do people have the means to use water hygienically?

3 Excreta disposal

- What is the current defecation practice? If it is open defecation, is there a designated area? Is the area secure?
- What are current beliefs and practices, including gender-specific practices, concerning excreta disposal?
- Are there any existing facilities? If so, are they used, are they sufficient and are they operating successfully? Can they be extended or adapted?
- Is the current defecation practice a threat to water supplies (surface or ground water) or living areas?

- Do people wash their hands after defecation and before food preparation and eating? Are soap or other cleansing materials available?
- Are people familiar with the construction and use of toilets?
- What local materials are available for constructing toilets?
- Are people prepared to use pit latrines, defecation fields, trenches, etc.?
- Is there sufficient space for defecation fields, pit latrines, toilets, etc.?
- What is the slope of the terrain?
- What is the level of the groundwater table?
- Are soil conditions suitable for on-site excreta disposal?
- Do current excreta disposal arrangements encourage vectors?
- Are there materials or water available for anal cleansing? How do people normally dispose of these materials?
- How do women manage issues related to menstruation? Are there appropriate materials or facilities available for this?

4 Vector-borne disease

- What are the vector-borne disease risks and how serious are these risks?
- What traditional beliefs and practices relate to vectors and vector-borne disease? Are any of these either useful or harmful?
- If vector-borne disease risks are high, do people at risk have access to individual protection?
- Is it possible to make changes to the local environment (by drainage, scrub clearance, excreta disposal, refuse disposal, etc.) to discourage vector breeding?
- Is it necessary to control vectors by chemical means? What programmes, regulations and resources exist for vector control and the use of chemicals?

- What information and safety precautions need to be provided to households?

5 Solid waste disposal

- Is solid waste a problem?
- How do people dispose of their waste? What type and quantity of solid waste is produced?
- Can solid waste be disposed of on-site, or does it need to be collected and disposed of off-site?
- What is the normal practice of solid waste disposal for the affected population? (compost/refuse pits? collection system? bins?)
- Are there medical facilities and activities producing waste? How is this being disposed of? Who is responsible?

6 Drainage

- Is there a drainage problem (e.g. flooding of dwellings or toilets, vector breeding sites, polluted water contaminating living areas or water supplies)?
- Is the soil prone to waterlogging?
- Do people have the means to protect their dwellings and toilets from local flooding?

Appendix 2

Planning Guidelines for Minimum Water Quantities for Institutions and Other Uses

Health centres and hospitals	5 litres/out-patient 40-60 litres/in-patient/day Additional quantities may be needed for laundry equipment, flushing toilets, etc.
Cholera centres	60 litres/patient/day 15 litres/carer/day
Therapeutic feeding centres	30 litres/in-patient/day 15 litres/carer/day
Schools	3 litres/pupil/day for drinking and hand washing (use for toilets not included: see below)
Mosques	2-5 litres/person/day for washing and drinking
Public toilets	1-2 litres/user/day for hand washing 2-8 litres/cubicle/day for toilet cleaning
All flushing toilets	20-40 litres/user/day for conventional flushing toilets connected to a sewer 3-5 litres/user/day for pour-flush toilets
Anal washing	1-2 litres/person/day
Livestock	20-30 litres/large or medium animal/day 5 litres/small animal/day
Small-scale irrigation	3-6mm/m ² /day, but can vary considerably

Appendix 3

Planning Guidelines for Minimum Numbers of Toilets at Public Places and Institutions in Disaster Situations

Institution	Short term	Long term
Market areas	1 toilet to 50 stalls	1 toilet to 20 stalls
Hospitals/medical centres	1 toilet to 20 beds or 50 out-patients	1 toilet to 10 beds or 20 out-patients
Feeding centres	1 toilet to 50 adults 1 toilet to 20 children	1 toilet to 20 adults 1 toilet to 10 children
Reception/transit centres	1 toilet per 50 people 3:1 female to male	
Schools	1 toilet to 30 girls 1 toilet to 60 boys	1 toilet to 30 girls 1 toilet to 60 boys
Offices		1 toilet to 20 staff

Source: adapted from Harvey, Baghri and Reed (2002)

Appendix 4

Water- and Excreta-Related Diseases and Transmission Mechanisms

Water-borne or water-washed	Cholera, shigellosis, diarrhoea, salmonellosis, etc. Typhoid, paratyphoid, etc. Amoebic dysentery, giardiasis Hepatitis A, poliomyelitis, rotavirus diarrhoea	Faecal-oral bacterial Faecal-oral non- bacterial	Water contamination Poor sanitation Poor personal hygiene Crop contamination
Water-washed or water-scarce	Skin and eye infections Louse-borne typhus and louse-borne relapsing fever	Inadequate water Poor personal hygiene	
Excreta- related helminths	Roundworm, hookworm, whipworm, etc.	Soil- transmitted helminths	Open defecation Ground contamination
Beef and pork tape worms	Taeniasis	Man-animal	Half-cooked meat Ground contamination
Water-based	Schistosomiasis, Guinea worm, clonorchiasis, etc.	Long stay in infected water	Water contamination
Water- related insect vectors Excreta- related insect vectors	Malaria, dengue, sleeping sickness, filariasis, etc. Diarrhoea and dysentery	Biting by mosquitoes, flies Transmitted by flies and cockroaches	Bite near water Breed in water Dirty environment

Appendix 5

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Thanks to the Forced Migration Online programme of the Refugee Studies Centre at the University of Oxford, many of these documents have received copyright permission and are posted on a special Sphere link at: <http://www.forcedmigration.org>

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