

Chapter 1

Introduction

Improving health is one of the main goals of water and environmental sanitation interventions. Despite this, many aid and development workers working in the field of water and environmental sanitation have only a limited knowledge of the infections they try to prevent. Although the relevant information does exist, it is often scattered in specialised literature and rarely finds its way into the field.

This manual addresses this problem by presenting information to aid and development workers on these infections in relation to the interventions that these workers control: water supply, sanitation, drainage, solid waste management, and vector control.

1.1 Definitions of commonly used terms in this manual

Water supply is the means by which people are provided with water for domestic use. This is water used for drinking, cooking, washing, and other domestic activities like watering gardens or water for domestic animals.

Sanitation refers to all aspects of excreta disposal (human and animal, faeces and urine). It includes sanitary structures (e.g. latrines); material needed for the proper operation and use of the structures (e.g. water, soap); and the human behaviour and attitudes relating to excreta and its disposal.

Environmental sanitation means *drainage* (how unwanted water is disposed of); *solid waste management* (how refuse is dealt with); and *vector control* (measures taken to reduce the risks of disease posed by vectors).

Water and environmental sanitation means water supply, sanitation, drainage, solid waste management, and vector control. These are called the *components* of water and environmental sanitation projects. These components have physical aspects (e.g. latrines), as well as behavioural aspects (e.g. keeping latrines clean). Water and environmental sanitation is often shortened to *WES* in this manual.

Infection usually means the entry and development of organisms (e.g. virus, bacterium) in a host (human or animal) (Benenson, 1995). In this manual we use the word *infection* for the development in a host of an organism(s) whose transmission and/or prevention are influenced by WES.

Disease is a broad term normally used for any malfunction of the body resulting from a cause other than injury. An infection is only a communicable or infectious disease if it results in illness. Although, strictly speaking, it is not correct to use disease and infection synonymously (most infections covered in this manual can result in infection without symptoms), we have done so here to improve readability.

Please note: Throughout this manual, Dracontiasis is referred to as Guinea-worm, the commonly used name for the disease.

1.2 Who this manual is for

This manual has been produced primarily for non-medical aid and development workers working in water and environmental sanitation at field level. Nevertheless, anyone working in WES, or in the prevention of infections related to WES, may find this book useful.

Aid and development workers operating at various stages of the project cycle will find this manual useful. Whether you need to assess the health risks in an existing situation; write, or assess, a project proposal; or implement an intervention, you will find relevant information in this book. You do not need to have extensive knowledge, of or experience in WES or in disease to be able to use this manual.

1.3 Scope of the manual

This manual covers infections that occur in all developing countries, and will be useful for both emergency and longer term development projects. It can be used in both urban and rural situations, and with settled as well as displaced populations such as internally displaced people and refugees.

The various components of WES up to the level at which aid and development workers in the field usually work are covered. We focus on appropriate technology options. The specific health problems related to industries, mines, large hospitals, abattoirs, or sewage treatment plants are not addressed.

Although housing plays an important role in the prevention of disease, housing issues have not been addressed here as the improvement of housing will not usually be the responsibility of the WES specialist.

1.4 Structure of the manual

While some readers will want to study subjects in depth, many fieldworkers need relevant, concise information which is accessible, and easy to work through. This manual, therefore, provides information in two ways and has two parts.

Part 1 is comprised of information in chapters as summarised in Section 1.4.1 below. Part 2 is comprised of annexes: information in list and tabular form as outlined in Section 1.4.2.

1.4.1 Part 1

Chapter 2: Disease and disease transmission

This chapter looks at how the infections related to WES are transmitted. The elements of the transmission cycle of disease are presented, along with important related issues. In addition, this chapter categorises the infections linked to WES into groups with similar transmission cycles.

Chapter 3: Disease in the population

In this chapter we introduce some basic concepts about the dynamics of disease in a population, and examine endemic and epidemic occurrence of disease, epidemiology, and mortality and morbidity rates.

Chapter 4: Water and environmental sanitation projects

Chapter 4 looks at the background to WES projects. We consider why these projects are necessary, and what they try to achieve. The WES project cycle is also described. In addition, several issues relating to the impact and sustainability of interventions are presented. The chapter ends with an examination of the link between health, poverty, and development.

Chapters 5 to 8

In these chapters we introduce the components of WES – domestic water supply, sanitation, drainage, and solid waste management – along with the health issues associated with each component.

We do not specifically look at vector control here, as this subject would be too vast to cover adequately. The role that water supply, sanitation, drainage, and solid waste play in vector control is, of course, important, and this is covered in the relevant chapters. Although we do not cover vector control in its own chapter, we have included all vector-borne diseases of importance in Annexe 1, and Annexe 3 presents summary tables on both vector-borne infections and vectors and their control.

1.4.2 Part 2

Annexe 1: Properties of infections related to WES

In this annexe we list all the common infections related to WES with their properties relevant to WES specialists. We cover over 85 infections in a standard format.

Annexe 2: Occurrence, transmission and control of infections related to WES (excluding vector-borne infections)

Annexe 2 presents information on the occurrence of infections, whether it has animal vectors, and measures of control in the form of tables. Vector-borne diseases are covered in Annexe 3.

Annexe 3: Vector-borne infections: their vectors and control

In this annexe we present tables which link infections to vectors, vectors to properties, and vectors to methods of control.

Annexe 4: The chlorination of drinking water

Here we look at how to determine the demand of chlorine in water, and how to calculate how much chlorine to add to large water volumes.

Annexe 5: Sizing pits for latrines and determining their infiltration capacity

This annexe explains how to size the pit for a latrine, and how much liquid the pit can cope with.

Annexe 6: Designing a simple drainage system for stormwater

Here we present a method for estimating how much stormwater a catchment area will produce, and how to size a drain which has to cope with this flow.

Annexe 7: Minimum standards in emergencies

In this annexe we present the basic needs of healthy people to survive, and the minimum standards of WES service that have to be provided to people in an emergency situation.

1.5 How to use the manual

To understand better the issues relating to disease transmission, the dynamics of disease in the population, and WES projects and WES components, read Chapters 2 to 7 from start to end. Many readers, however, will not be in a position to read through the text in this way, so the manual has also been designed to be used as a reference book, with information listed in the table of contents and the index.

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The manual is also structured to allow the reader to extract information by disease, by project, or by the components of WES.

The diseases

Information on individual infections is presented in Annexe 1.

More than 85 infections are covered in 60 individual sections. All sections have the same format, although some less relevant or less important infections are only summarised. Readers can find important information on each disease, such as distribution of the infection, severity of the disease, how transmission occurs, whether the infection is a risk in a disaster and preventative measures.

This information is important to know how to reduce an existing problem, or how to prevent the infection from becoming a problem in the future.

Annexes 2 and 3 present summary information on different infections. This allows the reader to verify quickly whether preventative measures are likely to be effective against specific diseases, and to associate different infections with specific preventative measures.

If a more general perspective on disease transmission is required, or information on the dynamics of disease in the population, Chapters 2 and 3 will be useful. In addition, these chapters will give more background information on issues raised in the other sections on diseases.

The WES project

Chapter 4 is an introduction to WES projects, and presents the issues that should be considered to improve impact and sustainability.

Chapters 5, 6, 7, and 8 briefly present some issues other than health which are associated with components of WES and which should be taken into consideration when making a project proposal.

The components of WES

Readers who want general information on water supply, sanitation, drainage, solid waste management, or vector control can find this in Chapters 5, 6, 7 and 8 and Annexes 3, 4, 5, 6, and 7. In these chapters, the issues related to health are presented, which will be useful for people who have to assess the health risks in an area, who want to know whether certain components would be effective in reducing the health risk, or who have to assess whether a proposed component would be the most effective measure. In these chapters and annexes we look at the

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practical aspects relating to the components which will help workers who have to plan, design, or implement interventions, or who have to assess whether existing structures or services are adequate.

Although this book has not been designed as a technical manual, technical information important to the proper functioning of WES components is included to avoid the common frustration experienced by readers of such texts: 'They tell us what to do, but not how to do it!'. The technical information is not complete, but may be useful, for example, to address rapidly specific problems that arise in an emergency such as the chlorination of drinking-water, the design of sanitary structures, or the removal of stormwater from a refugee camp. In addition, an annexe has been included which presents the priorities and minimum standards of WES in emergencies in summary form.