

SELECT THIS LINK TO VIEW CONTENTS

EMERGENCYSANITATION

ASSESSMENT AND PROGRAMME DESIGN

Peter Harvey, Sohrab Baghri and Bob Reed



Water, Engineering and Development Centre Loughborough University UK



Water, Engineering and Development Centre Loughborough University Leicestershire LE11 3TU UK

© WEDC, Loughborough University, 2002

Any part of this publication, including the illustrations (except items taken from other publications where the authors do not hold copyright) may be copied, reproduced or adapted to meet local needs, without permission from the author/s or publisher, provided the parts reproduced are distributed free, or at cost and not for commercial ends, and the source is fully acknowledged as given below. Please send copies of any materials in which text or illustrations have been used to WEDC Publications at the address given above.

A reference copy of this publication is also available online at: http://www.lboro.ac.uk/wedc/publications/es.htm

Harvey, P.A., Baghri, S. and Reed, R.A. (2002) Emergency Sanitation: Assessment and programme design WEDC, Loughborough University, UK.

ISBN Paperback 1 84380 005 5

This document is an output from a project funded by the UK Department for International Development (DFID) for the benefit of low-income countries.

The views expressed are not necessarily those of DFID.

Designed and produced at WEDC

About the authors

Peter Harvey is a Research Associate at the Water, Engineering and Development Centre (WEDC). He has worked as a public health engineer on emergency water supply and sanitation (watsan) programmes in Africa, Asia and Eastern Europe. He also has experience of rural water supply and sanitation projects in low-income countries. His major interests include groundwater development and the sustainability of water and sanitation projects.

Sohrab Baghri is a civil engineer with over fifteen years experience of water supply and sanitation projects in Africa, Asia and the Middle East. He has worked on both emergency and long-term development programmes with a wide range of international aid agencies. His interests include water treatment, environmental sanitation and watsan facilities for children and disabled people. He is now Water and Sanitation Adviser at Plan International's headquarters.

Bob Reed is a Senior Programme Manager at WEDC. He specialises in water supply and sanitation for rural areas, low-income urban communities and refugees. He has considerable experience of training, design and project implementation in the Pacific, the Caribbean, Asia and Africa. In recent years he has focused on the provision of improved and sustainable water supply and sanitation systems for displaced populations.

The authors would like to hear from anyone who uses this book in the field with comments on its usefulness and areas which require improvement. Please forward comments or suggestions to Bob Reed at the address overleaf.



Peter Harvey



Sohrab Baghri



Bob Reed

About WEDC

The Water, Engineering and Development Centre (WEDC) is concerned with education, training, research and consultancy for improved planning provision and management of physical infrastructure and services for development in lowand middle-income countries, focusing on the needs and demands of the poor.

WEDC is devoted to activities that improve the health and well-being of people living in both rural areas and urban communities. We encourage the integration of technological, environmental, social, economic and management inputs for effective and sustainable development.



Water, Engineering and Development Centre Loughborough University Leicestershire LE11 3TU UK

> Phone: +44 1509 222885 Fax: +44 1509 211079 Email: WEDC@lboro.ac.uk http://www.lboro.ac.uk/wedc/

Collaborators

The 'Assessment and Programme Design for Emergency Sanitation' project (R6873) has been funded by the Department for International Development (DFID) of the British Government.

The following organisations have acted as peer reviewers for this research contract. They have reviewed draft documents, provided access to staff for interview, given advice on project design and implementation, provided information, and have been involved in and provided support for field trials. This project would not have been possible without their support and encouragement.

Opinions noted within these documents do not necessarily represent those of DFID or the collaborators, but are solely those of the authors.



Development through Resource Organisation and Planning



INTERNATIONAL COMMITTEE OF THE RED CROSS



International Federation of Red Cross and Red Crescent Societies







UNITED NATIONS HIGH COMMISSIONER FOR REFUGEES

Acknowledgements

Thanks go to all individuals and organisations that have been involved in the production of the manual, guidelines and training modules. It is hoped that the wide range of organisations and individuals that have contributed to this project will facilitate the usefulness of this work to an even wider range of personnel and emergency situations.

All contributions are gratefully acknowledged. It should be noted, however, that the opinions in this document are solely those of the authors. The following individuals have contributed to the research either as peer reviewers, advisory panel members, by testing the work in the field, or by providing information for specific sections of the work.

Peer reviewers

DFID Department for International Development, UK

John Adams
Ben Fawcett
Ben Fawcett
Joy Morgan
Rutger Verkerk
Bioforce/Trinome, France
IIDS, Southampton, UK
Independent Consultant, UK
MSF, Amsterdem, Holland

Advisory panel members

Astier Almedom ex-LSHTM, London, UK
Andy Bastable OXFAM, Oxford, UK
Murray Biedler MSF, Brussels, Belgium
Dixon Chanda ex-MSF, Amsterdam, Holland
Riccardo Conti ICRC, Geneva, Switzerland
Ulrich Jaspers IFRC, Geneva, Switzerland

Ajeet Oak DROP, Pune, India

Claude Rakotomalala UNHCR, Geneva, Switzerland Rutger Verkerk MSF, Amsterdam, Holland

Editorial contributions

Kimberley Clarke Independent Consultant, UK

Other contributors

Raissa Azzalini MSF, Burundi

William Corkill IFRC, Nairobi, Kenya

Jean-Michel Detre MSF, Burundi

Shemeles Gebeyehu MSF, Kala, Zambia

Julius Kibassa TRCS, Lugufu, Tanzania Peter Maes MSF, Brussels, Belgium

Radjabu Mavlidi MSF, Burundi

Qumrun Nahar UNICEF, Bangladesh Joseph Ng'ambi MSF, Kala, Zambia

Deo Ntahonsigaye MSF, Burundi Gorik Ooms MSF, Burundi

Samuel Phiri MSF, Kala, Zambia

Veronique Ridel MSF, Burundi

Hans Van Dillen MSF, Lusaka, Zambia

Alberto Villani MSF, Burundi



Overview

Contents

1-14: Emergency sanitation manual

15-20: Guidelines for assessment and design

Case study

Bibliography

Index

Contents

Abbreviatio	ns	xviii	
Glossary of	terms	xix	
List of figur		XX	
_	List of tables		
	MANUAL		
Chapter 1.	Introduction		
4.4		1	
1.1	About this book	1	
1.2	What is emergency sanitation?	2	
1.3	Approach to sanitation programmes	3	
1.4	People	5	
Chapter 2.	Is intervention necessary?	7	
2.1	Criteria for intervention	7	
2.2		8	
2.3	Assessing the need for intervention	11	
Chapter 3.	Principles of assessment	13	
3.1	Assessment steps	13	
3.2	Who should be involved in assessments?	15	
3.3		15	
3.4	Equipment	16	
3.5	Background information	16	
3.6	Observation (visual assessment)	17	
3.7	Mapping	17	
3.8	Surveys	18	
3.9	Interviewing	18	
3.10	Group discussion (focus groups)	19	
3.11	Measuring	19	
3.12	Counting and calculating	19	
3.13	Assessment reports	20	
Chapter 4.	Background information	21	
4.1	General information	21	
4.2	Demographic data	22	
4.3	Physical features	24	
4.4	Other organisations	29	

Chapter 5.	Recommended minimum objectives	31
5.1	Minimum objectives	31
5.2	Excreta disposal	32
5.3	Solid waste management	36
5.4	Waste management at medical centres	40
5.5	Disposal of dead bodies	44
5.6	Wastewater management	48
5.7	Hygiene promotion	52
Chapter 6.	Excreta disposal	57
6.1	Associated risks	57
6.2	Selection criteria for excreta disposal	58
6.3	Communal or family latrines?	62
6.4	Immediate measures	63
6.5	Technology choice: Longer term intervention	68
6.6	Strategies for difficult conditions	78
6.7	Intervention levels	86
6.8	Design and construction	88
6.9	Emptying pits	101
C1 4 5	Solid waste management	105
Chapter 7.	Sond waste management	105
7.1	Associated risks	105
_		
7.1	Associated risks	105
7.1 7.2	Associated risks Sources and types of solid waste	105 106
7.1 7.2 7.3	Associated risks Sources and types of solid waste Initial steps	105 106 109
7.1 7.2 7.3 7.4	Associated risks Sources and types of solid waste Initial steps Key components of solid waste management	105 106 109 110
7.1 7.2 7.3 7.4 7.5	Associated risks Sources and types of solid waste Initial steps Key components of solid waste management On-site disposal options Transportation options Off-site disposal options	105 106 109 110 111
7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8	Associated risks Sources and types of solid waste Initial steps Key components of solid waste management On-site disposal options Transportation options	105 106 109 110 111
7.1 7.2 7.3 7.4 7.5 7.6 7.7	Associated risks Sources and types of solid waste Initial steps Key components of solid waste management On-site disposal options Transportation options Off-site disposal options	105 106 109 110 111 114 116
7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9 Chapter 8.	Associated risks Sources and types of solid waste Initial steps Key components of solid waste management On-site disposal options Transportation options Off-site disposal options Intervention levels	105 106 109 110 111 114 116
7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9 Chapter 8. 8.1	Associated risks Sources and types of solid waste Initial steps Key components of solid waste management On-site disposal options Transportation options Off-site disposal options Intervention levels Protective measures Waste management at medical centres Types and sources of medical waste	105 106 109 110 111 114 116 118
7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9 Chapter 8.	Associated risks Sources and types of solid waste Initial steps Key components of solid waste management On-site disposal options Transportation options Off-site disposal options Intervention levels Protective measures Waste management at medical centres	105 106 109 110 111 114 116 118 119
7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9 Chapter 8. 8.1 8.2 8.3	Associated risks Sources and types of solid waste Initial steps Key components of solid waste management On-site disposal options Transportation options Off-site disposal options Intervention levels Protective measures Waste management at medical centres Types and sources of medical waste Associated risks Minimising risks	105 106 109 110 111 114 116 118 119 121 121 122 124
7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9 Chapter 8. 8.1 8.2 8.3 8.4	Associated risks Sources and types of solid waste Initial steps Key components of solid waste management On-site disposal options Transportation options Off-site disposal options Intervention levels Protective measures Waste management at medical centres Types and sources of medical waste Associated risks Minimising risks Segregation, storage and transportation	105 106 109 110 111 114 116 118 119 121 121
7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9 Chapter 8. 8.1 8.2 8.3	Associated risks Sources and types of solid waste Initial steps Key components of solid waste management On-site disposal options Transportation options Off-site disposal options Intervention levels Protective measures Waste management at medical centres Types and sources of medical waste Associated risks Minimising risks Segregation, storage and transportation Disposal technology choices	105 106 109 110 111 114 116 118 119 121 121 122 124
7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9 Chapter 8. 8.1 8.2 8.3 8.4	Associated risks Sources and types of solid waste Initial steps Key components of solid waste management On-site disposal options Transportation options Off-site disposal options Intervention levels Protective measures Waste management at medical centres Types and sources of medical waste Associated risks Minimising risks Segregation, storage and transportation	105 106 109 110 111 114 116 118 119 121 121 122 124 125
7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9 Chapter 8. 8.1 8.2 8.3 8.4	Associated risks Sources and types of solid waste Initial steps Key components of solid waste management On-site disposal options Transportation options Off-site disposal options Intervention levels Protective measures Waste management at medical centres Types and sources of medical waste Associated risks Minimising risks Segregation, storage and transportation Disposal technology choices	105 106 109 110 111 114 116 118 119 121 121 122 124 125 127

Chapter 9.	Disposal of dead bodies	135
9.1	Associated risks: myths and realities	135
9.2	Medical epidemics	136
9.3	Cultural practices and needs	138
9.4	Mortuary service and handling of the dead	138
9.5	Burial	139
9.6	Cremation	140
9.7	Key recommendations for the disposal of the dead	140
Chapter 10	. Wastewater management	143
10.1	Associated risks	143
10.2	Sources and types of wastewater	144
10.3	Selection criteria	144
10.4	Technology choice	146
10.5	Wastewater treatment	155
10.6	Cholera treatment centres	161
10.7	Rainfall runoff	161
Chapter 11.	Hygiene promotion	163
11.1	Hygiene and health	163
11.2	Definition of hygiene promotion	164
11.3	Focus of hygiene promotion in emergencies	164
11.4	Key principles of hygiene behaviour	165
11.5	Staff	167
11.6	Women, men and children	168
11.7	Hygiene promotion actions	169
11.8	Intervention levels	172
11.9	Key indicators for hygiene practice	173
11.10	Key indicators for programme implementation	174
11.11	Relationship with other aspects of sanitation	174
	. Community participation	177
12.1	What is meant by community participation?	177
12.2	Stakeholder analysis	179
12.3	Gender and vulnerable groups	181
12.4	Participation matrix	181
12.5	Community mobilisation	182
12.6	Participatory appraisal techniques	183
12.7	Problem-tree analysis	185
12.8	Finance	187

Chapter 13	. Programme design	189
_	Programme summary	189
13.2	The Logical Framework	190
13.3	Activity plan	192
13.4	Programme Gantt chart	193
13.5	Personnel	194
13.6	Implementation plan	195
	Costs and budget	195
13.8	Proposal writing	198
Chapter 14	. Implementation	199
14.1	Implementation framework	199
14.2	Staff	199
14.3	Materials and equipment	200
14.4	Finances	201
14.5	Time	202
14.6	Outputs	202
14.7	Community	203
14.8	Information	203
14.9	Programme management	204
	Monitoring and evaluation	206
14.11	Monitoring methods	207
14.12	Evaluation	211
14.13	Report writing	213
	GUIDELINES	
Chapter 15	. Instructions for use	217
15.1	About these Guidelines	217
15.2	Approach	218
15.3	Guideline user group	219
15.4	Relationship between emergency sanitation and other	
	activities	220
15.5	Time targets	220
15.6	Instructions for use	220
Chapter 16	. Rapid assessment and priority setting	223
16.1	Is intervention appropriate?	223
16.2	Assessment process	223
16.3	Getting started	225
16.4	Data collection	225
16.5	Data analysis	234
16.6	Interpretation of results	250

Chapter 17	. Outline programme design	257
17.1	Design process	257
17.2	Problems, constraints and points of interest	259
17.3	Solution selection	259
17.4	Comparison with current practice	259
17.5	Outline programme proposal	260
17.6	Approval of programme and budget	260
Chapter 18	. Immediate action	263
18.1	Objective of immediate action	263
18.2	1	263
18.3	Relationship with longer-term activities	265
Chapter 19	. Detailed programme design	267
19.1	Design process	267
	Stakeholder analysis	268
	Gender and vulnerable groups	269
	Community participation	269
	Baseline survey	270
19.6	<u> </u>	272
	Selection checklist	276
	Developing the logical framework	277
	Developing the programme activity plan	277
	Developing the time frame for the activity plan	277
	Determining responsibilities	278
	Determining resources	279
	Preparing the budget	280
	Feedback and refinement of plan of action	280
19.15	Final programme proposal and approval	281
Chapter 20	. Implementation	283
20.1	What is implementation?	283
20.2	Implementation planning	284
20.3	Implementation framework	286
20.4	Implementation management	288
20.5	Monitoring	289
20.6	Evaluation	290
	CASE STUDY	
Case study:	Kala Camp, Luapula, Zambia	293
Bibliograph	у	349
Index		353

Abbreviations

CDC Centres for Disease Control

DFID Department for International Development (UK)
DROP Development for Resource Organisation and Planning

ICRC International Committee of the Red Cross

IFRC International Federation of Red Cross and Red Crescent Societies

LSHTM London School of Hygiene and Tropical Medicine

M&E Monitoring and evaluation
MSF Médecins Sans Frontières
NGO Non-governmental organisation
O&M Operation and maintenance

PAHO Pan American Health Organisation

PHAST Participatory Hygiene and Sanitation Transformation

PRA Participatory rural appraisal

RRA Rapid rural appraisal

SWOT Strengths, weaknesses, opportunities, threats

TRCS Tanzania Red Cross Society
TSS Total suspended solids

UNCHS United Nations Centre for Human Settlements (Habitat)

UNHCR United Nations High Commissioner for Refugees

UNICEF United Nations Children's Fund uPVC unplasticised polyvinyl chloride VIP Ventilated improved pit (latrine)

WEDC Water, Engineering and Development Centre

WHO World Health Organisation

Glossary of terms

Desludge: to empty the contents of a latrine pit or septic tank **Closed setting:** affected site has clear boundaries and population figures

are known (e.g. refugee camp)

Epidemic: the appearance of a particular disease in a large number of

people in the same period of time

Faecal–oral: disease transmission from faeces to the human digestive

system via the mouth

Gender: the physical and/or social condition of being male or

female

Infiltration: the absorption of liquid by material, for example when

water is absorbed by the ground

Landfilling: the disposal of solid waste by excavating a hole in the

ground, filling this with waste and then covering with soil

to fill the hole

Latrine: a toilet, especially a simple one such as a hole in the

ground

Logistics: the careful organisation of procurement, transportation,

storage and distribution of materials and equipment

Morbidity: the number of cases of a particular disease reported within

a particular society and within a particular period of time

Mortality: the number of deaths within a particular society and within

a particular period of time

Open defecation: to defecate outside a latrine, normally in a natural

environment

Open setting: affected site has no clear boundaries such as a normal

urban or rural area

Sludge the build up in volume of excreta, normally within a

accumulation: latrine pit or septic tank

Socio-cultural: relating to the social and cultural practices, beliefs and

traditions within a particular society

Stakeholder: a person or group of people who have a share or a personal

or financial involvement in a programme

Superstructure: the part of a building which is above the ground

Sustainability: the ability of something (e.g. activity, facility or system)

to keep operating effectively without negative impact

Vector: an insect or animal which carries a disease from one animal

or plant to another (particularly humans)

Wastewater: 'dirty' water arising from laundry areas, kitchens,

bathrooms, etc.

List of figures

1.1:	Approach to emergency sanitation programmes	4
2.1:	Causes and transmission routes of environmental-related diseases	9
3.1:	Assessment steps	14
4.1:	Sketch map of the affected area	25
4.2:	Sketch map of dwelling area	26
6.1:	Transmission of disease from faeces	58
6.2:	Open defecation field	64
6.3:	Trench defecation field	65
6.4:	Shallow family latrine	66
6.5:	A simple pit latrine	68
6.6:	Deep trench latrines	69
6.7:	Ventilated improved pit latrine	71
6.8:	Cross-section of a typical water-seal pan	72
6.9:	Pour-flush latrines	72
6.10:	Overhung latrine	73
6.11:	Borehole latrine	75
6.12:	Temporary toilet block over existing sewer	77
6.13:	Pollution from a pit latrine above the water table	78
6.14:	Raised twin-pit ventilated latrine	80
6.15:	Sand-enveloped pit	80
6.16:	Double vault composting latrine	82
6.17:	Wastewater treatment using a septic tank	83
6.18:	Aqua privy	85
6.19:	Cross-section of latrine slab with footrests	90
6.20:	Reinforced latrine slab	91
6.21:	Domed pit slab	92
6.22:	Wood and mud latrine slab	92
6.23:	Squat-hole cover	94
6.24:	Stress concentrations on rectangular and circular pits	95
6.25:	Shallow pit with lining	97
6.26:	Vacuum tanker emptying latrine pit	101
6.27:	Vacuum tanker with remote pumping unit	102

7.1:	Initial steps in solid waste management	109
7.2:	Communal solid waste pit	112
7.3:	Communal bin made from an old oil drum	113
7.4:	Refuse collection containers and vehicles	115
7.5:	Emptying a cart at a transfer station	116
7.6:	Simple landfilling	117
8.1:	Categories of waste from medical centres	122
8.2:	Sharps container	126
8.3:	Temporary drum incinerator	128
8.4:	Permanent incinerator	129
8.5:	Sharps pit	130
10.1:	Wastewater treatment by soil	147
10.2:	Unlined soakpit	148
10.3:	Soakpit lined	149
10.4:	Section through an infiltration trench	151
	Evaporation pan	153
	Evapotranspiration bed	154
	Grease trap	156
	Settlement tank	157
10.9:	Tank inlet and outlet pipe	158
	Horizontal reed bed	159
	Vertical reed bed	160
12 1.	Problem-tree analysis example	186
12.1:	Objectives-tree analysis example	187
12.2.	Objectives-tree analysis example	107
15.1:	Stages in emergency sanitation programme design	218
16.1:	Assessment process	224
	Priority-setting flow chart	253
17.1:	Outline design process	258
18.1:	Immediate action process	264
19.1:	Detailed design process	268
20.1:	Implementation planning process	284

List of tables

2.1: 2.2:	Sanitation-related diseases, causes and transmission routes Approximate threshold levels for mortality	8 11
3.1:	Assessment equipment	16
4.1:	Assessment cover page	22
4.2:	Demographic profile	23
4.3:	Soil infiltration rates	27
5.1:	Recommended minimum objectives for safe excreta disposal	32
5.2:	Recommended minimum objectives for solid waste management	36
5.3:	Recommended minimum objectives for waste management	
	at medical centres	40
5.4:	Recommended minimum objectives for the disposal of dead bodies	44
5.5:	Recommended minimum objectives for wastewater management	48
5.6:	Recommended minimum objectives for hygiene promotion	52
5.1:	Advantages and disadvantages of communal and family latrines	62
5.2:	Recommended interventions for space of more than 30m ² per person	86
5.3:	Recommended interventions for space of 20-30m ² per person	87
5.4:	Recommended interventions for space of less than 20m ² per person	87
5.5:	Spacing for steel reinforcing bars in pit latrine slabs	91
5.6:	Lining requirements for different soil types	96
5.7:	Suggested maximum sludge accumulation rates	98
5.8:	Recommended septic tank retention times	99
5.9:	Value of sludge digestion factor 'F'	100
7.1:	Recommended interventions for different scenarios	119
8.1:	Risks, pathways and hazards of medical waste	123
8.2:	Segregation categories	125
8.3:	Recommended interventions for different scenarios	132
10.1:	Sizes of settlement tanks	143
11.1:	The effects of hygiene practice on diarrhoeal disease	164
11.2:	Focus group discussion agenda	170
11.3:	Recommended interventions for different scenarios	172

12.1:	Example stakeholder analysis	180
12.2:	Example participation matrix	182
12.3:	Example ranking exercise	184
12.4:	Example seasonal chart for health and hygiene	185
13.1:	Generalised logical framework	190
13.2:	Example activity plan	192
13.3:	Example Gantt chart	193
13.4:	Example human resource plan	194
13.5:	Example implementation plan	195
13.6:	Example sanitation budget	196
14.1:	Implementation by milestones	205
14.2:	Monitoring framework	208
14.3:	Log-frame analysis example	209
	Checklist analysis table	211
14.5:	Evaluation framework	212
14.6:	Situation report example	214
14.7:	Evaluation report outline	215
16.1:	Base score definitions	235
16.2:	Sector analysis results	251
16.3:	Assessment summary	252
16.4:	Intervention levels	252
16.5:	Recommended intervention levels and scenarios	254
17.1:	Structure of outline programme proposal	260
19.1:	Stakeholder analysis	269
19.2:	Excreta disposal options	273
19.3:	Solid waste management options	273
19.4:	Waste management options at medical centres	274
19.5:	Disposal options for dead bodies	274
19.6:	Wastewater management options	275
19.7:	Hygiene promotion options	275
19.8:	Selection checklist	276
19.9:	Logical framework	277
19.10	: Example Gantt chart	278
19.11	: Implementation plan	279
20.1:	Implementation framework	287
20.2:	Implementation by milestones	288