

Water, Sanitation, Health and Hygiene Studies Project
Aga Khan Health Service
Northern Areas and Chitral

LIBRARY
INTERNATIONAL REFERENCE CENTRE
FOR COMMUNITY WATER SUPPLY AND
SANITATION (IRC)

ISSUE PAPER: 5

THE BALTI-LATRINE
A SOCIO-TECHNICAL STUDY OF TRADITIONAL
SANITATION SYSTEMS IN BALTISTAN

by:

Michael A.M. Langendijk
Jeanet A. van de Korput

November 1995

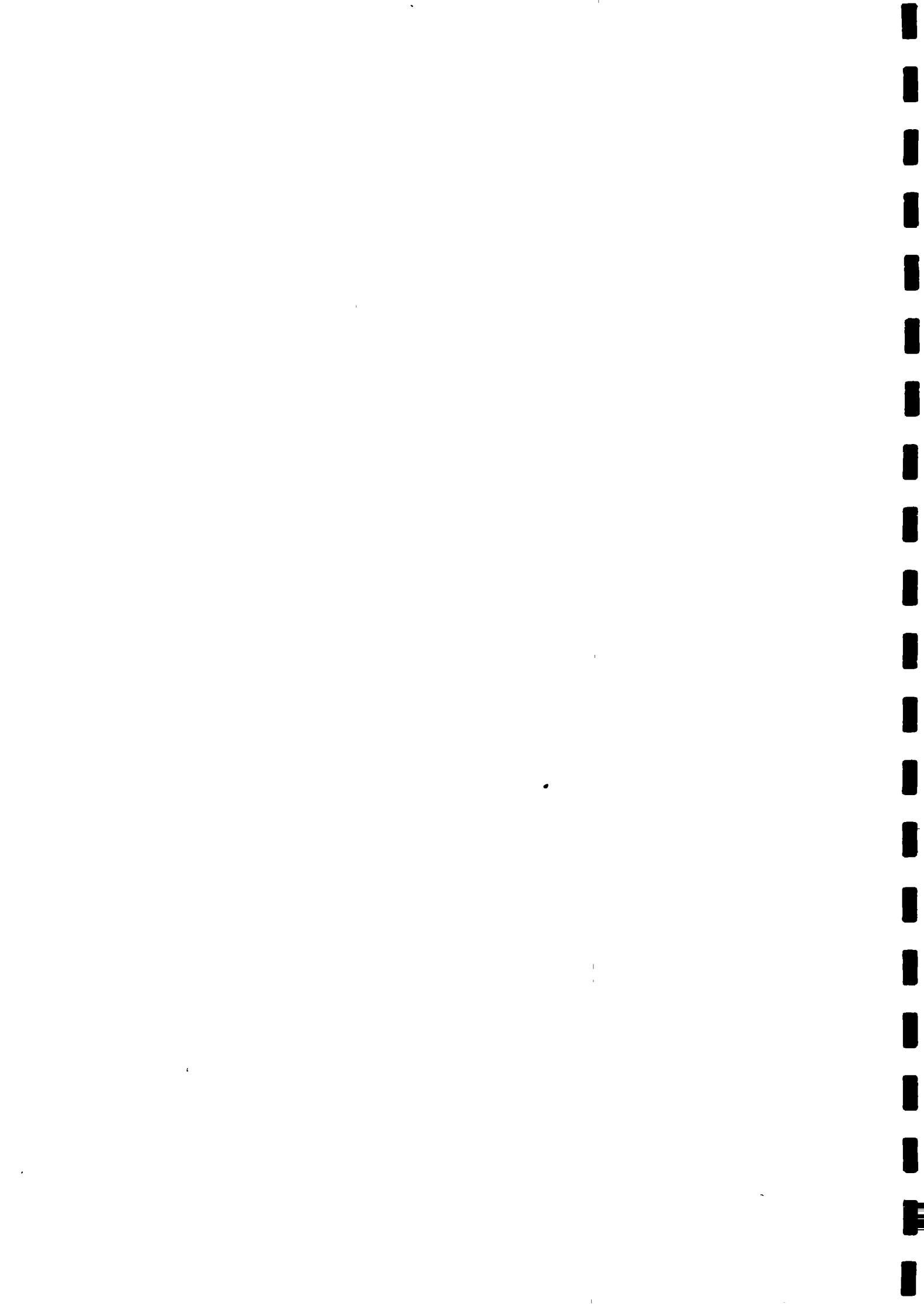


TABLE OF CONTENTS

	TABLE OF CONTENTS	i
	LIST OF TABLES, FIGURES AND DRAWINGS	ii
	GLOSSARY	iii
	ACKNOWLEDGEMENTS	iv
	INTRODUCTION	1
CHAPTER 1	AN INTRODUCTION TO BALTISTAN	3
CHAPTER 2	DESCRIPTION OF THE BALTI-LATRINE	5
2.1	The location of the Balti-latrine	5
2.2	The construction of the Balti-latrine	6
2.3	Conclusion	9
CHAPTER 3	USE PATTERN OF THE BALTI-LATRINE	10
3.1	When is the latrine used?	10
3.2	Anal cleansing materials	11
3.3	The 'manure factory': management of the pit contents and the production of manure	14
3.4	Conclusion	15
CHAPTER 4	EMPTYING THE LATRINE	16
4.1	Who empties the latrine and how?	16
4.2	Time and frequency of emptying the latrine	17
CHAPTER 5	THE MANAGEMENT AND USE OF THE MANURE	19
5.1	Managing the heap of manure	20
5.2	Indigenous manure taxonomy and agronomical aspects	20
5.3	Use of latrine manure on staple crops and vegetables	21
CHAPTER 6	USERS SATISFACTION AND IMPROVED BALTI-LATRINES	23
6.1	Users satisfaction	23
6.2	Modified and improved Balti-latrines	25
CHAPTER 7	HEALTH RISKS RELATED TO THE BALTI-LATRINE: A BIO-MEDICAL PERSPECTIVE	28
7.1	Health risks related to the use and management of the latrine	28
7.2	Microbiological sampling of the latrine contents	30
CHAPTER 8	CONCLUSIONS, RECOMMENDATIONS AND ACTION PLANS	33
8.1	Identified fields for improved use	33
8.2	Identified fields for technical improvements	35
8.3	Introduction of an improved model of the Balti-latrine	38
8.4	Further study	40

i

LIBRARY, INTERNATIONAL REFERENCE
CENTRE FOR COMMUNITY WATER SUPPLY
AND SANITATION (IRC)
PO BOX 13130, 2509 AD The Hague
Tel (070) 814911 ext. 141/142
BARCODE 13468
LO: 822 PKN095

LIST OF TABLES, FIGURES, DRAWINGS AND PHOTOGRAPHS

TABLES

Table 1	Range of minimum, maximum and average pit dimensions	6
Table 2	Number of holes that were observed in Balti-latrines	9
Table 3	Water use above the hole and smell observations	12
Table 4	Emptying frequencies of the Balti-latrine	17
Table 5	Results of microbiological sampling of latrine contents	32

FIGURES

Figure 1	Materials used for anal cleansing after defaecation	11
Figure 2	Bulky materials added at irregular intervals	14
Figure 3	Months of emptying, if once a year	18
Figure 4	Months of emptying, if twice per year	18
Figure 5	Different management patterns of latrine manure on vegetable gardens	22
Figure 6	Strong points of the Balti-latrine	24
Figure 7	Disadvantages of the Balti-latrine	25

DRAWINGS

Drawing 1	Locations of the Balti-latrines	5
Drawing 2	Construction features of the Balti-latrine	8
Drawing 3	Heaps of soil or silt next to the holes	11
Drawing 4	Various existing ablution places and proposed cemented ablution place	13
Drawing 5	Emptying the Balti-latrine	16
Drawing 6	Women spreading the latrine contents	20

PHOTOGRAPHS

Photo 1	Front, back and emptying closure of the Balti-latrine	7
Photo 2	Child using the Balti-latrine	10
Photo 3 and 4	Experimental TPC-latrine at the WSHHSP office in Skardu	27

MAPS

Map 1	Map of Baltistan with the areas selected for the study	4
-------	--	---

GLOSSARY

Ba-lut	Manure from the cow and yak shelters
Borsay	Bushes that are thrown in the Balti-latrine in order to reduce smell
Chak-lut	Manure from the Balti-latrine i.e. decomposed human excreta and organic matter mixed with soil or silt (and sometimes with animal shed manure)
Chaqa	Dry latrine present in every household in Baltistan referred to in this report as the Balti-latrine
Churong	Basket made of reed used for carrying loads on the back
Ghoot Boot	Balti name for a Cretin, in Urdu called 'Gonga Bonga'
Ra-lut	Manure from the goat and sheep shelters
Teharat	Anal cleansing with water
Wazzu	Religious ablution which is obligatory before prayers
Zgo Kha	Literally: "I will go nearby the door", which Balti people understand as: "I will go outside for defaecation in the chaqa".

ACKNOWLEDGEMENTS

The basis of this report is a study that was carried out in Baltistan in late autumn of 1994 by a team of six from the WSHHSP. The team consisted of John Collett (Project Director), Munawar Abbas (Microbiologist), Mohammad Hussain (Field Engineer), Muneeba, Jeanet van de Korput and Michael Langendijk (Anthropologists). They were assisted in the fieldwork by Mrs. Asia and Mrs. Rehana of AKRSP. Microbiological testing of the latrines was carried out by Hyder Raza and Munawar Abbas, microbiologist of the WSHHSP.

John Collett commented extensively on drafts of the report. The illustrations in the report are by Muhib-Uddin, the WSHHSP artist.

We would also like to acknowledge the corrections to the text made by Ms. Anita and the comments made by Mr. Tony Moody from the London Hospital for Tropical Diseases.

INTRODUCTION

In the field of sanitation Baltistan is a unique place for the region; it has a sanitation coverage of 98%. Nearly every household in the area has its own Balti-latrine¹. This is a sanitation system in which human excreta and additional materials are accumulated in a single above ground chamber (for convenience referred to as a pit in this report) to be used as manure on the fields and vegetable gardens. These household Balti-latrines are used throughout the year by the whole family. The people of Baltistan highly value the quality of this manure and regard it as indispensable for the enrichment and conditioning of the soil. Besides the domestic latrine, communal latrines are also constructed in some areas².

On a small scale villagers have started to install pour-flush latrines, mainly for use by guests from outside Baltistan. Families continue to use their existing Balti-latrine which signifies the importance given to the manure and their general satisfaction with this traditional system. Also, the pour-flush is not a very practical system in winters when temperatures can often decrease to below minus 20°C! Considering these traditions and other socio-economic and cultural factors, it has been the strategy of the WSHHSP to look closely at the existing system and practices with a view to seeing where they could fit in a sanitation improvement programme. In order to frame recommendations for acceptable, respectable and appropriate modifications to the system the Project carried out an extensive in-depth study of the Balti-latrine and its use and management by the villagers.

The aim of the study was:

- 1) to gain more accurate information about people's perceptions, practices and their present sanitation systems in each valley in Baltistan in order to recommend locally appropriate modifications to the Balti-latrine
- 2) to gain quantitative and qualitative socio-technical data in order to develop suitable messages and interventions for safer and better utilization of human excreta in agriculture.

Methodology

During a rapid assessment of the water and sanitation situation in Baltistan in 1993, a social-science team did initial research on the Balti-latrine. Over 80 interviews were held in Baltistan and in each of them the latrine was one of the topics that was covered³. In February 1994, a technical team of the Project carried out preliminary microbiological tests of Balti-latrines and manure heaps in ten villages. The study

¹. The word for latrine in the Balti language is Chaqsa. People, however will not normally use this term when they go to relieve themselves. Villagers do sometimes use the word Chaksa but educated people consider it a slightly vulgar expression. This paper will use the term Balti-latrine in preference to the word Chaqsa.

². This report will focus on the practices and ideas of villagers with regard to the domestic Balti-latrine. Basically the design and the management of the communal type do not significantly differ from the individual latrine. The communal latrines are kept fairly clean by their owners so as not to dissuade passers by from using them. The contents of a communal latrine are exclusively for use by the owner. Communal latrines are usually constructed at the edges of fields, near public places and at road sides.

³. See chapter 3, 4 and 7 of Water, Sanitation, Hygiene and Health, Position Paper 3: Baltistan.

provided initial data on *Ascaris*, helminths and other parasites. One conclusion was that complete decomposition did not take place in the latrines. Part of the microbiological study was a background survey in 80 households performed by the sub-engineer and the microbiologist from the Skardu office.

From these research efforts, an understanding of the Balti-latrine started to emerge and it was recommended that an in-depth study should be performed before the Project team could develop a strategy for latrine improvement.

For the in-depth study, a research team of eight people was formed, consisting of the Project Director and three social scientists from the Gilgit office, the Project sub-engineer and microbiologist from the Skardu office and two Women Social Organizers from AKRSP. After several sessions the Gilgit staff prepared a draft questionnaire and an observation list building on the results of the Project's previous studies. Both formats were discussed and extensively modified during a two day workshop in Skardu. It was decided that in-depth probing and explanation of answers would be used to add valuable information to the quantitative survey format. For practical reasons, the team of eight was divided into two working groups, each working in a particular area and travelling together. The groups consisted of a male and a female couple, each including a person from Baltistan. Each research couple would do five interviews per day, i.e. ten interviews per village, over a period of seven days. Despite the time constraints and long travelling hours, the teams managed to do 124 interviews and 127 latrine observations.

Random selection of villages

For the study, the Baltistan region was divided into seven different sub-areas based on altitude, landholding, cultural and socio-economic criteria. Definition of the boundaries of these sub-areas was based on earlier study results and experience of the local team members and a map that had been prepared by the Project. The sub-areas are demarcated on the map. In each sub-area, two villages were selected. First the total villages in that particular area were counted and a equal number of numbered paper slips were put in a basket. At random, a slip was drawn and the number was read out. Following the topographical sequence of the map, the villages were counted until the selected number was reached.

Data processing

Following the completion of the fieldwork, the data were put together on sheets using a Lotus-123 programme. Statistics included mean, standard deviation and percentages. Due to the scope of the study and time pressure, it was impossible to process the data using other statistical measures. For presentation of the data, the format was further simplified; the more detailed data are available at the Project office.

CHAPTER 1

A BRIEF INTRODUCTION TO BALTISTAN

Baltistan is a region in the Northern Areas of Pakistan that consists of two districts: Skardu and Ghanche. The region is situated in the extreme North-East of the country, bordering China and India. The total population is estimated to be around 300,000 people. According to a survey of the WSHHSP, the total number of villages is around 290.

The region is situated at an altitude ranging from 2200 meters in Skardu to nearly 3000 meters, surrounded by high mountain peaks. The region has a climate with warm summers and extremely cold winters. In January 1995, for example, temperatures dropped down to minus 26 degrees centigrade. Most valleys are snow-covered for part of the winter.

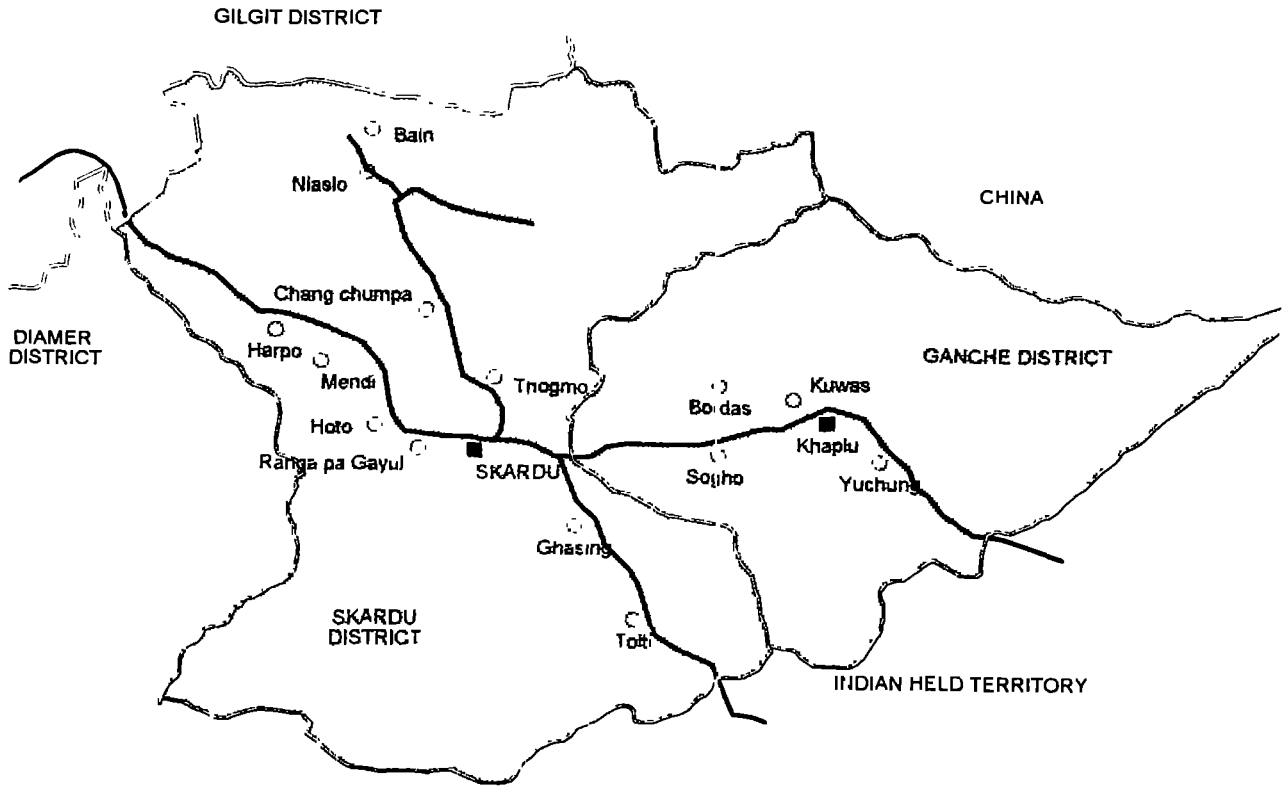
The main language of Baltistan is Balti, with a number of Shina speakers in the area closer to Gilgit. The majority of the population belongs to the Shia sect of Islam and in Ghanche district the majority of the population belongs to the Noor Bakshi sect. Living dispersed over the region some villagers belonging to the Sunni sect.

The primary economic activities in Baltistan are subsistence agriculture, livestock, fruit and tourism. Labour migration to down-country forms an important source of income for households. Due to its strategic position the Pakistan army has many activities in the region that provide some jobs and other sources of income.

Economically the region seems to be less productive than Ghizer and Gilgit. In the fields of education and health, the region's development also seems to be lagging behind. The outcome of this is a relatively low level of education, health awareness, domestic and personal hygiene and nutritional status. Except for AKRSP and WSHHSP, none of the AKDN organizations are active in Baltistan and it can be argued that the region generally has received less assistance than other parts of the area.

On the local level some institutional changes are now on the way. In the first place, a large number of villages have established Village and Women Organizations with the help of AKRSP. Secondly, young educated men have set up local Welfare Committees in several villages aiming at education and general welfare, including health. Several of these local organizations are very active but seldom beyond the borders of one or two villages.

Also, a number of small NGOs (both local and from down-country), with mandates larger than serving a single village community, have established or are in the process of establishing themselves.



Map of Baltistan showing the selected areas and villages

CHAPTER 2 DESCRIPTION OF THE DOMESTIC BALTI-LATRINE

2.1 THE LOCATION OF THE BALTI-LATRINE

i) Introduction of the rural built environment

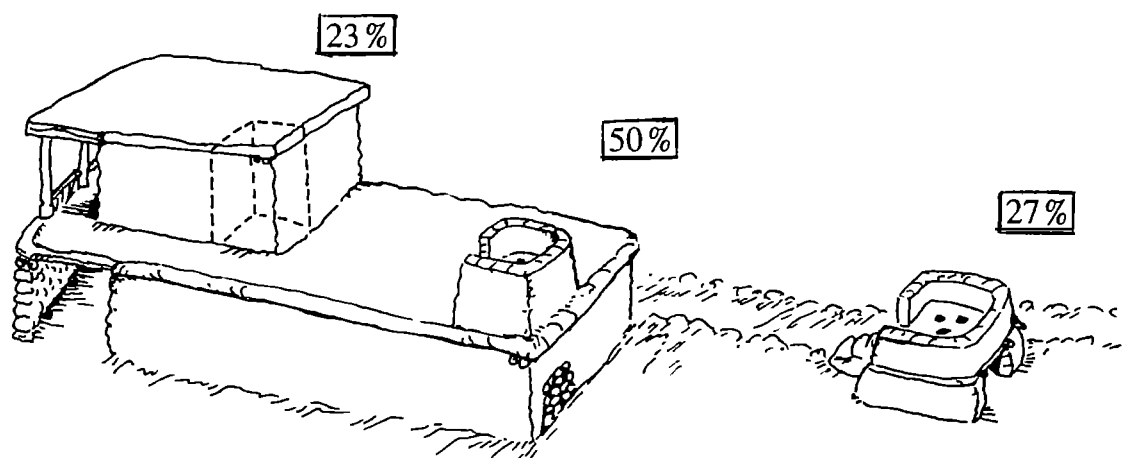
Generally the villages in Baltistan are more congested than those in Ghizer and Gilgit. In congested muhallahs the houses often have animal sheds on the ground floor with a living area on the first floor. These houses are often attached to, or even partly overlap each other.

The compounds of houses usually have different levels. A piece of land makes up the ground level and porches and verandas are on the first floor, sometimes built upon the roof of the neighbour's house. Because of the congested environment the compound cannot be walled completely. Houses that have been constructed separately usually have clearer boundaries specified by walls of stones and bushes.

ii) Location of the Balti-latrine

Every household in Baltistan has its own Balti-latrine. The place where the latrine is constructed depends on the availability of land, snow-fall in winter and the preference of the household. Where possible, the latrine is constructed on the porch with the lower chamber on the ground floor (50%). In areas like Upper Shigar, where severe snow-falls and extreme cold weather are common, the latrines are often built inside the houses (23%). The owners explained that the amount of snow makes it too difficult to go outside for defaecation in the winter.

More often, the Balti-latrine is constructed at a distance of 10 to 25 feet within the compound or at a location that is clearly detached from the house, at the edge or outside the compound (27%). This latter location is only selected when no alternative place is available closer to the house. Considering the congested environment of the villages in Baltistan, the detached latrines are still nearby the house as compared to other parts of Northern Pakistan.



Drawing 1: The three most common sites of Balti-latrine (in percentages)

iii) Orientation of the latrine and the direction of the squatting holes

In a few villages we found evidence that villagers had taken the wind direction into account in the construction of the latrine. These people had located the emptying hole of the chamber in such a way that the wind carried any bad smells away from the house. In most cases it was found that the direction of the squatting holes of the latrine are usually North-South to ensure that one will not turn his back towards Mekkah in the West.

2.2 CONSTRUCTION OF THE BALTI LATRINE

Throughout Baltistan there is a wide variation in the construction techniques and materials and in the sizes of the Balti-latrine. Consequently, every Balti-latrine may look different. The generic principle of every Balti-latrine is that it has an upper compartment with openings for defecation, and a single lower chamber where the human excreta is accumulated.

i) The lower compartment of the latrine

The lower compartment or pit is constructed at ground level and is always situated in, next to or near to the cattle shed. The average height of the pit is about 6 feet, with sometimes a shallow ditch of about a foot below ground level. Pits are normally rectangular in shape and have an average size of about 9 feet length and 7 feet breadth.

The table below has been included to point out the variation in pit sizes. Of particular interest is the difference between the sizes of Balti-latrines in Shigar, with an average pit length of more than 10 feet, compared to those in Ghanche which are on average only 7 feet long. It is interesting to know that the people in Ghanche have the custom of emptying their compartments more often than in the other areas (see chapter 4.2).

	Length of pit (in feet)		Breadth (in feet)	
	min-max	average	min-max	average
Ghanche	5 - 11	6,8	4 - 8	5,6
Kharmang, Skardu and Rondu	8 - 10	9	6 - 9	7
Shigar	6 - 12	10,5	6 - 10	7,6

Table 1: Range of minimum, maximum and average pit lengths and breadths

The emptying hole

In one side of the pit is an opening to remove the contents. This hole often opens into the courtyard, street or field. In double story houses the opening is often inside the shed or in an animal enclosure, although it is most common that the hole opens into a public place like a courtyard or street. This emptying hole typically is five feet high and two and a half feet wide.

The majority of the people use stones, reed and wood to close off this hole. There is some regional variation that seems to be related to the availability of material. For example, people in Ghanche use more stones, in Shigar and Kharmang more reed and branches are used, and near Skardu more plastic and tin sheets are used than in other areas.

In 85% of the cases, people have (partly) closed the emptying hole to avoid cows, small animals and children from going in. Out of these, only 17% of the holes were completely closed with a wooden door or a temporary stone wall. The other 68% of the observed closures were partly open or had small openings. In 15% of the observed latrines the emptying hole was totally lacking any closure.

A very important comment from villagers was that small openings are needed in the pit in order to have an airflow that will reduce smell in the latrine. For this reason they did not like to close the emptying hole completely.



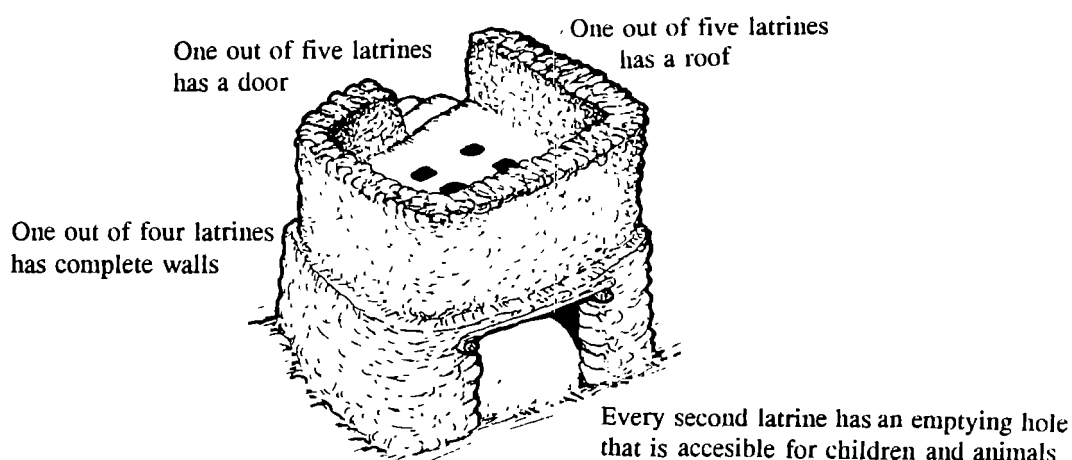
Photo 1: Front, back and emptying closure of the Balti-latrine

ii) The upper compartment; roof, walls and door

The upper compartment is built immediately on top of the chamber and encloses the squatting area. The size of this superstructure is usually similar to the chamber below as it is an extension of the same walls. The type and quality of construction of the upper compartment depends on its location, available materials and on individual preferences. Latrines that have been constructed inside the houses are usually well made, with a roof and walls that provide privacy.

Roofs

80% of the observed latrines had no roof. This percentage includes the latrines inside houses that do not always have roofs. Very few of the latrines that were situated outside had any sort of protection from the rain and snow. Roofs are usually made of wood and branches or from wood and mud. Of all the observed latrine roofs only one was made of GI-sheet.



Drawing 2: Construction features of the Balti-latrine

Walls

The majority of the latrines have four walls but typically they are only built up to a height of three to four feet (65%). It is uncommon to find Balti-latrines with completely closed cubicles; often there is no roof and the wind can blow through or over the walls. Where roofs are constructed, at least a space of one or two feet is left between the top of the walls and the roof to keep the latrine airy and fresh.

The choice of materials for the walls again reflects local availability. In Ghanche the walls of more than 80% of the latrines are made of stone, in Shigar reed is used in over 60% of the latrines and 90% of the latrines in Skardu and lower Shigar are made of mudbricks because suitable soil is abundant. In Kharmang, both stones and reed are used, while in Rondu, stones and cloth are the most common materials that are used for walls

Doors

Only 20% of the latrines had a 'door', commonly made of a piece of jute bag or sometimes of wood.

iii) The floor and the shape, size and number of holes

The squatting platform of the upper compartment is usually made with wooden poles and branches, and covered with mud plaster or sand. In the floor, hole(s) are made that mostly have a rectangular shape (80%). It is common that latrines have different sizes with one smaller hole particularly for young children. An average size of a hole is about ten inches in length and six inches in breadth. Holes are never covered with lids. Although the number of holes in Balti-latrines range from one to nine, the majority of people have made three or four holes. Latrines having one or two holes were mainly observed to be small structures and at high altitudes where the latrines are constructed inside or very near the houses. The overall figure shows that four holes are present in nearly half the total latrines, and up to 90% of the latrines in Ghanche have this number.

# of holes	Ghanche	Shigar	Kharmang	Skardu	Rondu	Percentage of total
1 hole	0	5	0	0	0	2
2 holes	3	37	29	11	13	20
3 holes	9	19	19	24	20	17
4 holes	88	22	19	59	60	48
5 or more	0	17	33	6	7	13
	100%	100%	100%	100%	100%	100%

Table 2: Number of holes in Balti-latrines (in percentages of observed latrines)

The reason people gave for having several holes is to spread the contents equally into the pit below. Villagers told us that they first look through the holes in the latrine and choose the hole where the pile underneath is the lowest. Women explained that the use pattern is another important reason for having several holes. They said it is a custom to use the latrine together (see chapter 3.1).

2.3 CONCLUSION

Variation in appearance of the Balti-latrine is related to size, available materials, location and local traditions. For example most latrines near Skardu and in lower Shigar use mud bricks because soil is available. It was observed that latrines in a particular village usually shared the same basic construction characteristics and this seems to indicate that people copy or conform to a certain local construction standard.

Despite the above mentioned factors and the observation that latrines in Ghanche are smaller than elsewhere, it is difficult to differentiate a typical 'Shigar latrine' or a 'traditional Ghanche model' by simply observation of the construction. However, with regard to the use and management patterns of the latrines, it is possible to identify area specific patterns and to this we will turn in the next chapters.

CHAPTER 3 USE PATTERN OF THE BALTI-LATRINE

3.1 WHEN IS THE LATRINE USED?

The Balti-latrine is mainly used in the evenings and at night, but it is also common in Baltistan for people to use it during the day. In other parts of the Northern Areas, just the sight of someone going to a latrine is felt as something shameful, particularly amongst Shina speakers. But in Baltistan, women have been observed going to latrines without scruples. Despite being a culture that puts little emphasis on privacy, most people prefer to defaecate when it is dark outside.

During interviews with women, it was discovered that they have a custom to use the Balti-latrine together with other women or with their children. Particularly in the dark, before going to sleep, the women take a lantern and all the children to the latrine at the same time, a practice that saves time and ensures safety. The women added that men sometimes also use the latrine together. Male informants, on the other hand, denied such a custom and said it was something of the past. It seems that men, and to a lesser extent women, feel somewhat embarrassed to admit this practice.



Photo 2: Child using the Balti-latrine

3.2 ANAL CLEANSING MATERIALS

i) The use of soil, silt or cow dung

Soil is the most common anal cleansing material. Eighty percent of the respondents reported to use only soil or silt for anal cleansing after defecation. A few respondents said they sometimes use a mix of dry animal manure and soil. After this first cleaning, adults will try to use water for ablution of the anal area. Materials that are common in other regions of the Northern Areas, like stones, mud lumps or maize stalks are not used in Baltistan. Immediately using water for anal cleansing, without using sand first, is solely reported in the Rondu area.

People use one or two handfuls of soil or silt from a heap near to the squatting hole. After wiping the anal area with this material it drops down onto the faeces below. The user can then move some more material into the pit to cover the faeces using their foot or a small shovel. Balti people realize that the extra covering material will help to reduce flies and smell.

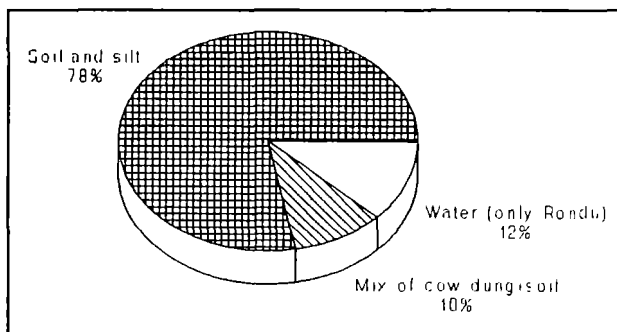
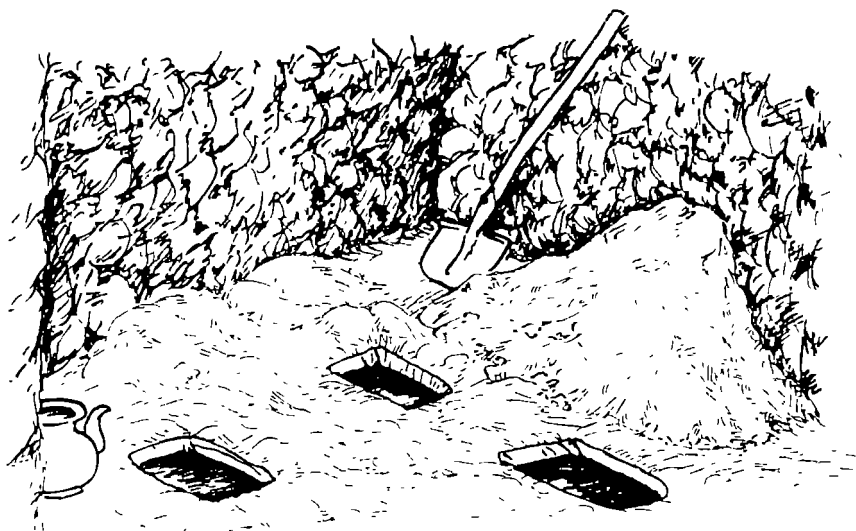


Figure 1: Anal cleansing materials used in the latrine

On the floor of the Balti-latrine, (82% of the time), a heap of cleansing material is present. In nearly 90% of the latrines found with material nearby this is dry fine soil or silt. In the other latrines, dried animal manure is present. It was found that in half of the households the men are responsible for bringing cleaning material to the latrine. In Ghanche however, it is more common for women to do this work



Drawing 3: Heaps of soil or silt next to the squatting holes

ii) The use of water for teharat in or near the latrine

As we have seen, only a small number of people in Baltistan immediately use water for anal cleansing. Where water is available adults will try to perform teharat (anal cleansing) otherwise they will do this at the first convenient occasion. Teharat is a part of the religious ablution including washing larger parts of the body (wazzu) and which is compulsory before going for prayers. Respondents mentioned that girls start to perform teharat when they are 9-10 years old and boys when they are 14-16 years old.

About 50% of the respondents perform teharat inside the latrine, the others go outside to relatively secluded places like the animal shed, the fields nearby or the private or communal bathrooms. Respondents also said they use water channels for ablution.

Considering that half of the people perform teharat inside the latrine only about 10% of the people have a constructed a special ablution place in their latrine. Such ablution place prevents water getting into the pit (see next section and drawing 4). The other people use water on the floor of the latrine but without the water leaking into the pit. These respondents said they sit in a corner of the latrine and after washing, the water soaks into the soil and dries. An other group, mainly the respondents from Skardu and Rondu, use water directly over the squatting hole without bothering to use anything solid for preliminary cleaning.

Wet contents and its relation to smell

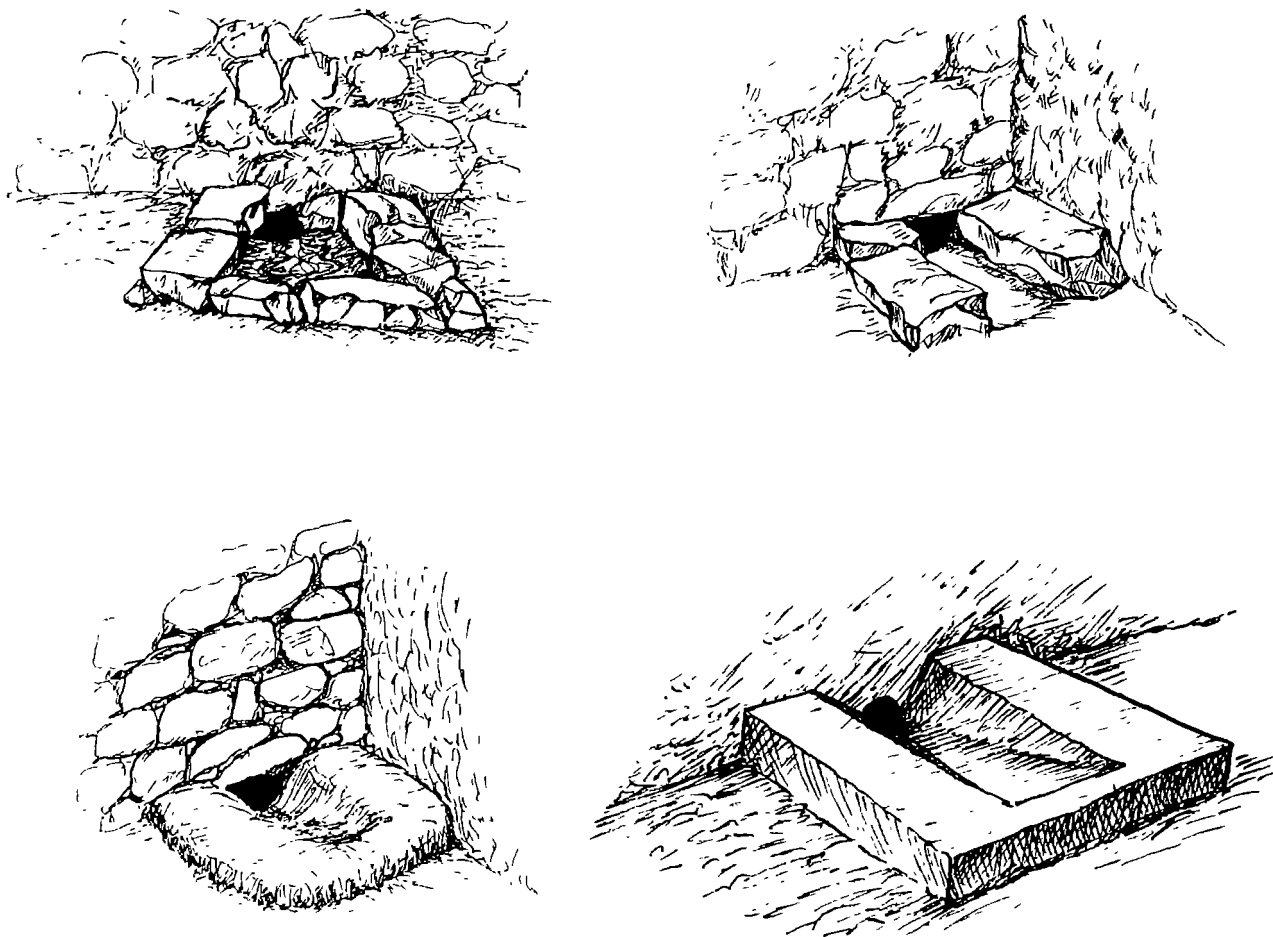
During observations three 'smell'-categories were used; no smell, little smell and a lot of smell. More than half of the latrines in Ghanche, Shigar and Kharmang did not smell at all, and most of the other smelled only a little. In Rondu, all of the latrines produce smell, 60% smells 'a lot' and one latrine was unbearable. There seems to be a relationship between smell, wetness of the latrines and the use of water above the hole. The observations show that wet latrine contents were observed in 43% and 53% of the cases in Skardu and Rondu and only in 3% to 5% of the latrines in the other areas.

	use of water above hole	no smell	little smell	a lot of smell
Rondu	100	nil	33	66
Skardu	100	24	53	23
Ghanche	6	55	39	6
Kharmang	15	72	14	14
Shigar	25	61	39	nil

Table 3: Water used above hole and smell observations (in percentages of observed latrines)

iii) Ablution place

As stated before, a number of respondents have taken the initiative to construct a separate abluion place in their latrine. During the study about 20 were observed. Usually the abluion place is a simple construction of some stones and mud. Typically it is rectangular shaped with three sides build against the wall. The water used in the abluion place usually dries up, seeps into the earth floor or trickles outside. In two villages however, we observed a drain from the abluion place directly into the waste channel or into an open space underneath the latrine. So far from our observations we have got the impression that during teharat only a very small amount of water is used. None of the abluion places for teharat were used for washing hands or any other parts of the body.



Drawing 4: Various existing abluion places and proposed cemented abluion place

3.3 THE 'MANURE FACTORY': MANAGEMENT AND PRODUCTION OF MANURE

i) Additional bulky material that is put into the latrine

As explained in section 3.2, small quantities of soil, silt or dried animal dung is frequently added to the pit after defecation. Beside these, large amounts of additional materials are put in the latrine at irregular intervals. The bulky materials that are added to the latrine are soil or silt and animal shed manure.

During the study the total amount of additional material was assessed in detail. A distinction was made between summer and winter, type of materials and amount. The quantity was measured in *churongs*, a traditional load carrying basket that is used to transport almost anything on one's back. These baskets vary in size and for the calculations, an average content of 30 kilograms was assumed. In case wheelbarrows were used, we assumed its content to be two *churongs*, i.e. 60 kilograms. Figure 1 shows that the total number of *churongs* is around 200 per household in all areas except Rondu.

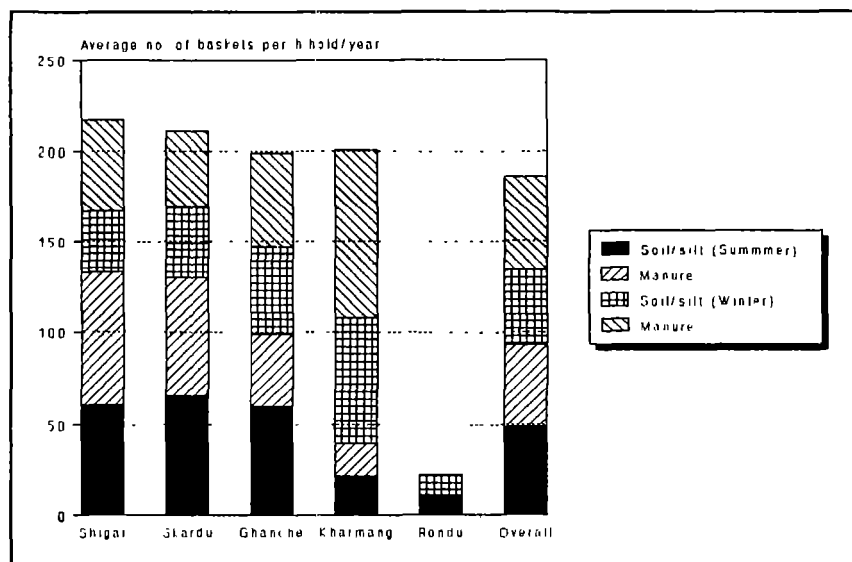


Figure 2: Bulky material added at irregular intervals in summer and winter

On average the respondents added about 50 *churongs* of soil or silt in the summers and 45 *churongs* in winter. The amounts are not consistent throughout Baltistan. In most households in Rondu, people did not add any soil and also in Kharmang the use of earth is limited. In the other areas, the addition of soil or silt can be up to 70 *churongs* or more. In all villages, animal manure is added to the latrine. The average number of *churongs* of animal manure per household is more than 40 in summer and almost 60 in winter. In several households the amount of manure added after the winter exceeded 100 *churongs*.

ii) Additional organic material that is added to the pit content

Besides soil, silt and animal shed manure, on average 70% of the households add one or more organic materials to the pit contents, including sweepings, bushes, wasted fodder and leaves (ranging from 100% of the households in Ghanche to 50% in Kharmang). There are variations in local customs and particular in Ghanche villagers recycle organic waste carefully. Kitchen waste and edible organic material however is first given to animals as fodder and what is left, including stalks, chaff and leaves is collected and

recycled into the pits through the holes in the squatting platform. Another important addition to the pit are household sweepings that are added by at least 40% of the respondents and even up to nearly 70% of the people in Ghanche. Also in Ghanche, two thirds of the respondents add chulut, the wet straw and chaff that soaks up the water used for anal cleansing and bathing.

Small amounts of a local bush called borsay is added by 22% of the people on average. It is added for its good smell and, according to those who use it, its capacity to increase the strength of the manure. Ash is used in less than 10% of the latrines, particularly in Kharmang. Many people consider ash as a material that is related with purity and therefore feel reluctant to use ash in a dirty place like a latrine, or people avoid using it because they believe that ash might attract super-natural beings (see also WSHHSP Position Paper on Baltistan, page 27).

iii) Mixing and turning the pit contents

Only in a very few cases have we heard that people 'stir' the pit contents in order to improve the composting process. In most areas people reacted in disbelief or started to giggle as they could not imagine that others bother to stir. Practically it seems to be difficult to do this because contents are often observed to be compact. A few cases have been reported where the pit contents are levelled out by poking from above in order to produce a relatively uniform mass without lumps or large voids. This practice is linked to situations where the chamber is small and where the tip of the pile(s) begin to get close to the squatting hole. A few days or weeks before customary emptying starts most of the villagers will top up the latrine with cow-dung. In this way fresh excreta on the top is mixed with animal shed manure.

iv) The moisture level of the pit contents

In most areas of Baltistan, people believe that too much liquid in the pit will make the manure smelly and wet. The majority of the people (60%) prefer a manure with an average moisture content ("not too dry, not too wet") and consciously avoid putting too much water into the pit. A women in Thorgo mentioned:

"Whether we use water above the pit depends on the condition of the manure in the pit, usually we avoid water but if the pit contents are very dry we will use water for some time. During other times we will wash on the floor of chaqsa. The reason is that we want to keep the manure in good quality which is inbetween neither very dry nor very wet".

As was stated in the previous paragraph the people from Skardu and Rondu are an exception. They think their manure is too wet and dirty but continue the habit of using water above the hole. The effect of this practice has been illustrated in table 3.

3.4 CONCLUSION

Almost everywhere in Baltistan people add soil, silt, cow dung and organic materials to their latrine in order to get a good quality manure and to produce a good amount. The preference of villagers to produce large amounts of manure through their latrines will have to be taken into account if an improved dry latrine was to be introduced in the region. Contrary to the other tehsils of Baltistan the villagers in Rondu and to a lesser extent also Skardu tehsil put less effort into their production of manure which combined with the use of water for anal cleansing immediately above the pit results in wet and smelly contents. As will be discussed in the next chapter this creates problems during emptying of the latrines. In this chapter ablution places were identified as a possible way to avoid contents of the chamber getting too wet.

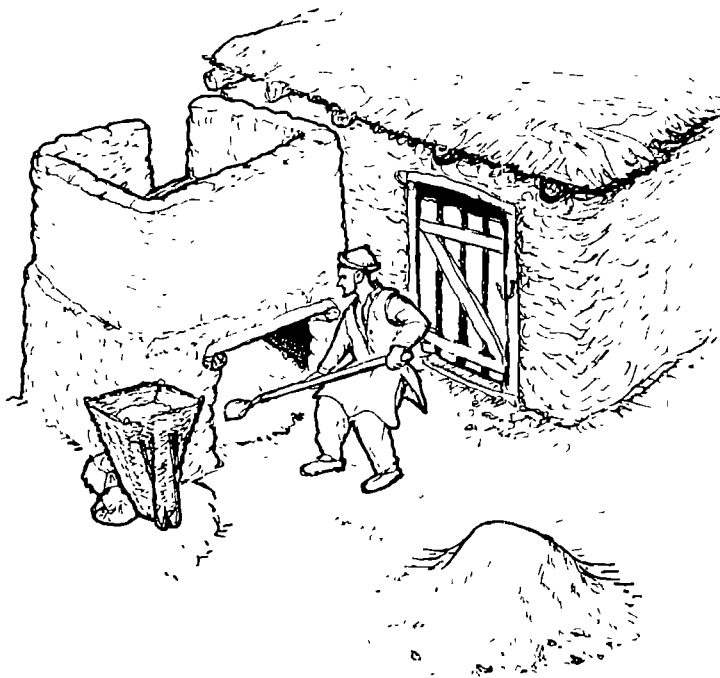
CHAPTER 4 EMPTYING THE LATRINE

4.1 WHO EMPTIES THE LATRINE, AND HOW?

i) Emptying of the latrine, a male task

Emptying the Balti-latrine is considered to be hard work and a low-status task. Usually male family members empty their latrine (about 70% of the cases). The only exception is in Ghanche where in a third of the cases women empty the latrines. If a household has kinship ties with a cretin⁴, it is common to ask him to empty the latrine. The cretins, locally called Ghoot Boot (or Gonga-bonga in Urdu), have a low status in the community and usually are paid with meals for their work. Sometimes a gift, often a piece of cloth, a little money or a small favour is done in return for their hard manual labour.

The use of paid labourers is becoming more common, particularly in Kharmang, Skardu and Rondu (about 30 to 40% of the respondents) and less so in Ghanche and Shigar (less than 10%). Labourers will be paid on a daily basis, around fifty rupees. In some areas, particularly in Rondu and Kharmang, respondents complained that labourers are not always easily available at the emptying time.



Drawing 5: Emptying the Balti-latrine

⁴. The main cause of cretinism is iodine deficiency which is common in the region. The effect in severe cases is mental retardation and muteness.

ii) Transportation of the manure

After men have removed the manure from the pit with a shovel, it will be put in a heap near the opening. From here, the manure is transported to the fields in baskets, wheelbarrows, on donkeys or with tractors. Previously both sexes used the churong but nowadays carrying baskets is seen as a low status job, fit for only women, cretins and the elderly. Men use wheel barrows, donkeys or tractors.

In most areas, the transportation of manure is a male task. However, in Ghanche District it is a job that in 60% of the cases is done by women alone. Another 24% it is done by women and men together. Less than 10% of the transport is done by men alone. In section 5.1 and 5.3 it will be explained how villagers manage the manure by putting it on heaps.

4.2 TIME AND FREQUENCY OF EMPTYING THE LATRINE

i) Frequencies of completely emptying the Balti-latrine

Every household in Baltistan has a relatively fixed routine for emptying their latrine, at a certain time and with a certain frequency. Half the respondents empty their latrine once a year (the majority of these living in Kharmang, Skardu and Rondu). Nearly 40% of the respondents empty it twice a year (mainly in Shigar and Ghanche) and another 10% of the people empty it more often. The traditions in Ghanche are different as a third of the villagers empty the latrine three times or more per year. In the village of Kuwas for example, some families emptied the latrine every two months i.e. six times per year!

	Once per year	Twice per year	Trice per year
Rondu	100	-	-
Skardu	63	31	6
Shigar	33	65	2
Kharmang	90	10	-
Ghanche	21	42	31
Total	51	39	10

Table 4: Emptying frequencies of Balti-latrines (in percentages)

The decision to empty the latrine is mainly based on custom, which again is related to the agricultural cycle of an area, the amount of manure that is produced and the quality, size and distance of the fields⁵. The decision to empty is not governed by the latrine becoming filled. Although the latrines are fairly full when emptying starts, this is because owners will have topped up the latrine with animal shed manure a few days or weeks before it is the customary time to empty.

⁵. There seems to be a relationship between the number of kanals of land and the frequency of emptying. In Kharmang, Skardu and Rondu the average land holdings are between 4 and 14 kanal and the majority empties once. In Shigar landholding is between 12 and 23 kanal and people often empty twice a year. The data from Ghanche do not support an all Baltistan conclusion as landholding is relatively small (7-14 kanal) but emptying is frequent.

ii) Emptying periods

50% of the respondents empty their latrine only once every year normally in February, March or the beginning of April (86%, n=63). Only a few farmers empty before the winter starts in November (14%)

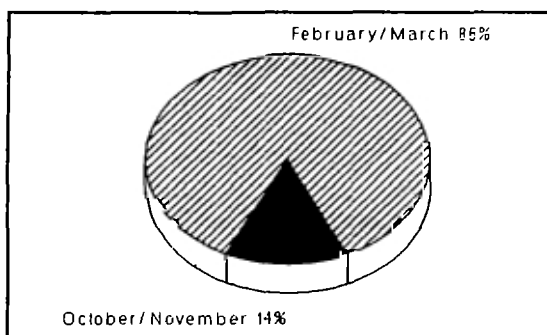


Figure 3: Months in which the latrine is emptied if once per year

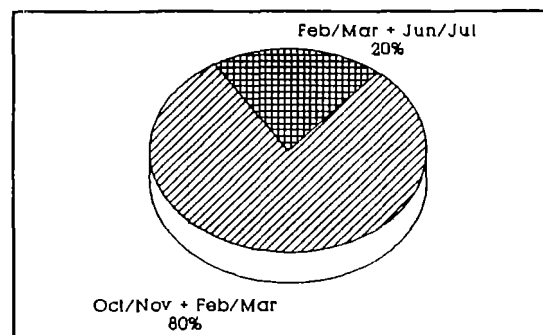


Figure 4: Months in which the latrine is emptied, if twice per year

If people follow the custom of emptying their latrine twice a year (40% of all respondents) the majority of them (80%, n=49) will first empty the latrine in October/November, and for the second time between February and early April. The other 20% who empty twice, mainly people from Ghanche, have a slightly different pattern as they empty two times after the winter; in February/March and in June/July.

If we look at the data for those who empty their latrine three times a year (10% of all respondents), three similar emptying periods are used; October/November, February/March and June/July. Therefore, it seems reasonable to summarize that farmers usually empty their latrine during the cooler periods of the year, just before and just after winter. Only the farmers in Ghanche tend to empty during the hot period between May and August.

iii) Putting materials on the bottom: preparation for the next cycle

After the latrine has been completely emptied the majority of the villagers will put materials on the bottom of the pit. Most people use earth (60%), with a smaller percentage using a mixture of earth and cow manure (20%) or organic material such as straw, bushes, leaves (20%). On average, about eight churongs of material are put on the bottom of the chamber before starting to use it again.

The reason the villagers mentioned for putting materials on the bottom is that the human excreta will decompose better, and soaking up of liquid will be better. Only 15% of the respondents do not put anything on the bottom before starting to use the latrine again immediately after emptying.

CHAPTER 5 THE MANAGEMENT AND USE OF THE LATRINE MANURE

5.1 MANAGING THE HEAP OF MANURE

After removing the manure from the latrine, farmers put it in a big heap near the house or in a nearby field. As stated in chapter four a majority of villagers will add amounts of animal shed manure to the latrine before emptying. But also after emptying a high percentage of the villagers (63%) mentioned that they mix the manure from the latrine with manure from the animal shed on one big heap. They believe that a combination will give the best and cleanest manure and people expressed clear preferences of how to mix the two types of manure⁶. It is not surprising that the frequency and the period of emptying of the animal shed largely coincides with that of the latrine.

Covering the heap

More than 30% of the respondents say they cover the heaps with silt to prevent them from being disturbed by animals during winter and to stop the smell. It is interesting that people also cover the heaps to stop the manure from getting wet and cold, which will make the manure 'weak'. People mentioned that during the winter, the manure gets warm. One person said: "You can warm your hands from the radiation". Several respondents said that covering the manure will improve the quality. These ideas were prevalent mainly in Shigar and Ghanche. They indicate that these villagers use indigenous skills and knowledge to achieve proper decomposition as high temperatures in manure heaps are one of the main mechanisms for destroying faecal pathogens.

The manure that is put in heaps near or on the fields in November is kept for about five months, in comparison to the February/March heaps which are only kept for a few days up to a month at the most.

Smaller heaps and spreading over the field

When the weather is suitable and the snow has melted, men and women spread the manure on the fields in February or March. It depends on the soil quality whether farmers will irrigate their fields once and then plough their fields or whether they will start by spreading the manure before ploughing and sowing. Usually after sowing the fields and when enough water from snow melt becomes available, people start with regular irrigation of the growing crop.

From the big heap, the manure is distributed around the field with the help of churongs or wheelbarrows. At regular intervals, small heaps are made and the final spreading will usually start the next day. This spreading is a female task; only 10% of the respondents, all from Kharmang said that men will help with this work. Labourers are never hired for this task. For spreading evenly, the manure is broken into small pieces. 40% of the women will use spades or wooden forks and shovels for this, also men use shovels. But as breaking lumps is easier manually, 60% of the women are used to doing this with their hands.

⁶. 89% of the respondents had clear ideas about what combination gives the best quality manure. It is most common to put contents of the latrine on the bottom of the heap, with the cow manure on the top (68%). Others put cow dung both on the bottom and the top with the human manure in between (11%). Another 8% of the respondents starts with cow dung, then put latrine contents and finally sheep or goat manure. People say that animal manure on the top will stop cows from eating the human manure and will avoid smell and dirt.



Drawing 6: Women spreading latrine contents

5.2 INDIGENOUS MANURE TAXONOMY AND AGRONOMICAL ASPECTS

Agronomical considerations in the choice of anal cleansing materials

The importance of the manure from the latrine is reflected in the choice for a particular type of cleaning material. This choice often depends on the type of soil and the structure of the fields in a particular village. If the soil in a field tends to become 'hard' (a layer of dried out soil) the farmer may take part of this to the latrine as a cleaning material. The result is that after manuring the soil gets more soft. Other soil that tends to dry out and to becomes like dust which people call soil that is 'too soft'. Also this may be taken to the latrine and after reconditioning it is brought to the field as manure. Good soil will normally not be used as an anal cleansing material.

In villages where new fields are being developed the farmers will not use soil but the silt that has settled in channels and ponds. According to farmers this is the best way to mix the silt and enrich it with human excreta. In such a case the latrine acts like a soil-processing unit. Villagers are very conscious about these qualities of the human excreta and in villages where the agricultural fields are not near the houses soil or silt that needs to be improved will be carried over fair distances. In a village in Shigar for example we talked with a farmer who rented a tractor to transport 'hard' soil from his fields to the latrine near his house.

Agronomical aspects in the choice of different types of manure

Although villagers in Baltistan value all manure as an important means to fertilize their fields, they have clear ideas about the value of different types of manure. Cows and yaks are said to produce only a relatively small amount of manure that is considered a weak type of fertilizer. Their dung is called ba-lut. Donkeys and horses are appreciated because they produce a large quantity of manure that is regarded as much stronger than cow dung. Nevertheless, only a few people are able to keep these animals. Despite the relatively small quantity, the manure from goats and sheep (ra-lut) is considered as the best and strongest animal manure. Almost all the people regard manure from the Balti-latrine, called chak-lut, as the strongest fertilizer with the exception of a few people who think ra-lut is even stronger

As was stated before farmers have clear ideas about what combination gives good quality manure. Cow dung is considered to be relatively weak but as it is more bulky, mixing with chak-lut is, in a sense, a way to upgrade it. It is however not common to mix the 'weaker' cowdung with the 'stronger' sheep and goat dung. These animals are kept in separate sheds in order not to mix their dung.

The concepts about the quality of manure are also reflected in the use of certain manure for particular purposes. One respondent said that on newly developed fields, he would use ra-lut and chak-lut for some years until the crops were of good standard. On normal fields, he would use only ba-lut. If the harvest of a particular field was below expectation, he would revitalize the strength of the soil by using a mixture of latrine manure and cow dung. Although this is limited evidence and perhaps other people use different combinations of manures, such ideas do indicate that farmers have clear preferences for certain manure types.

5.3 USE OF LATRINE MANURE ON STAPLE CROPS AND VEGETABLES

Each heap for a particular crop

The majority of the mixed human-animal manure is used on the fields for staple crops like wheat and barley. As farmers classify different types of manure consequently they make different heaps for different fields. The heaps are spread on the fields by taking soil quality, previous yields and the type of crop into account. In Baltistan the main first crop is barley or wheat. Many farmers also grow a second crop usually buckwheat (brow), maize for fodder or different types of beans. It is not common to make a second application of latrine manure for these crops.

The use of the latrine manure on vegetable gardens

Though the majority of the contents of the latrine will be used on the staple crops, another part of latrine manure is used on vegetables. The different practices of villagers are depicted in the figure below. The majority of farmers (90%) use some type of latrine manure for their vegetable gardens (salad, tomato, onion, cabbage) or vegetable fields (potato and turnip). Only 10% of the population say that they never use latrine manure on their vegetables. These respondents often added that the use of human excreta on vegetables is not clean and not good for health and they prefer to use cow or sheep/goat dung on their vegetable plots.

The farmers who use the latrine manure on the vegetable gardens follow two different practices. After emptying the latrine in February or in June (the latter only in Ghanche)⁷ some of the manure is kept separate for the vegetable gardens. The majority of the farmers (60%) use this manure within a few days on their vegetable garden. Even more hazardous is the practice followed by a fifth of these farmers who take latrine manure from the pit and apply it directly on their vegetable garden. They take the manure from the bottom of the pile and try not to take fresh excreta from the top, although this can never be totally avoided.

The other 30% of the farmers say they put the manure in a heap in order to get the contents drier and easier to apply. From a health point of view, this practice is important because while constructing a separate heap, the contents are aerated which helps to increase the aerobic decomposition process.

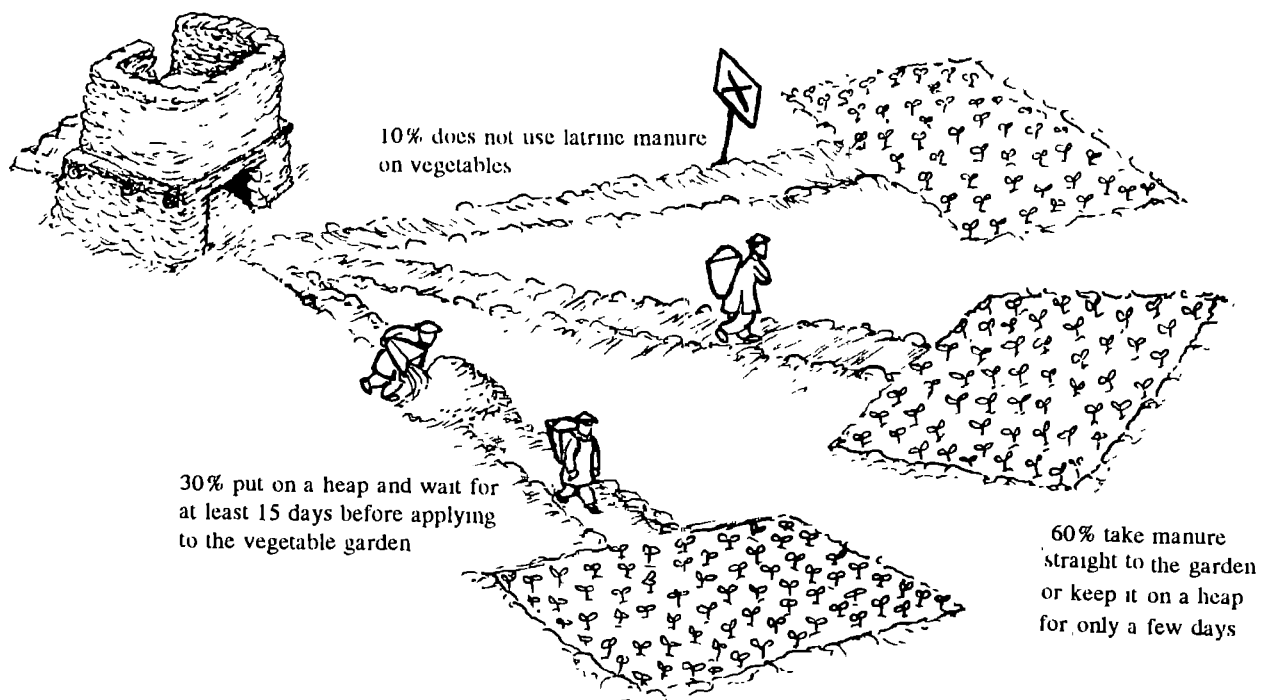


Figure 5 : Different management patterns of latrine manure on vegetable gardens

Two important observations are that it is almost exclusively women who are responsible for the vegetable gardens and that people prefer to use February or June manure as it is considered stronger and more suitable for vegetables than the manure from November. Basically these manuring practices for the vegetable gardens mean that many women come into contact with latrine contents that had a short retention time (<5 months) in the latrine and a limited time for further aerobic decomposition in a heap.

⁷ Usually people prefer to use this February or June compost as it is considered stronger and better suitable for vegetables than the manure from November.

CHAPTER 6 USERS' SATISFACTION AND IMPROVED BALTI-LATRINES

6.1 USERS' SATISFACTION

i) Villagers' perception

During the study, people were asked to mention three strengths and three weaknesses of the Balti-latrine. Their answers were similar to earlier information gathered by the WSHHSP field staff which makes it clear that people find it difficult to give an opinion about their latrines. Generally people do not report any particular problem about their latrine, neither do they find many strong points about their system, besides the benefit of the supply of latrine manure.

Therefore it is difficult to make an objective assessment of people's needs with regard to their latrine. Unless villagers are informed about possible improvements, they will not appreciate that certain changes can be advantageous. Without raising hygiene awareness we cannot expect villagers to communicate clear ideas, needs and suggestions. Figures 5 and 6 present the only feedback that villagers were able to give during the interviews.

ii) Advantages of the Balti-latrine

People were asked to mention three good points of the Balti-latrine. In total 13 different points were mentioned. These were categorized into five groups. As expected, over 90% of the respondents answered that the production of manure is the main benefit of having a Balti-latrine. The other 10% probably did not think of mentioning because it was too obvious. A woman in Thorgo said:

"We are happy with the chaqsa although it is a lot of hard work. We spend a lot of time in adding extra material like soil and manure but we need a lot of manure as well! This manure is good for our crops. It saves our money from buying chemical fertilizer and with 'desi' manure the crops also taste better".

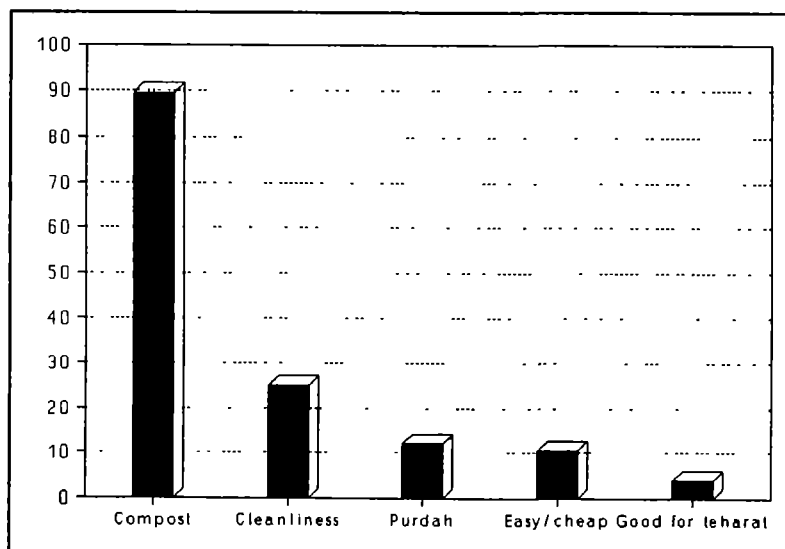


Figure 6:
Strong points of
the Balti-latrine

The opinion about other advantages varied considerably. Provision of purdah was only mentioned by about 10% of the people, both men and women. This would tend to indicate that the latrine either does not provide any privacy, which is usually the case, or that a latrine with purdah is not considered a real advantage. "Cleanliness of the village" was mentioned as a strong point for having a latrine by all respondents in Rondu. However, it was remarkable that the latrines in this area were more dirty and more smelly than any others. This would seem to imply a double standard, one for the village environment and another, lower standard for individual latrines. Except in Shigar where a third of the respondents mentioned cleanliness in the other areas only 10% of the respondents mention "village cleanliness" as an advantage. Two other important advantages that were mentioned by only a few people relate to the cheapness and ease of construction of the latrine (10%). Finally, one person mentioned that the latrine is good for teharat.

iii) Disadvantages of the Balti-latrine

When explicitly asked to give three weaknesses about the Balti-latrine, 33% of the people could not mention any problem. With probing the other 66% of the respondents identified points that can be fitted into five different categories.

Some respondents connected the latrine to a lack of hygiene and a cause of disease (9%). Lack of purdah and absence of protection against the weather was an answer given by 5% of the people. Another 5% of the respondents mentioned that adding materials and emptying the latrine is a heavy workload. This point was also noted during earlier visits, particularly in Kharmang, where villagers prefer to hire labourers.

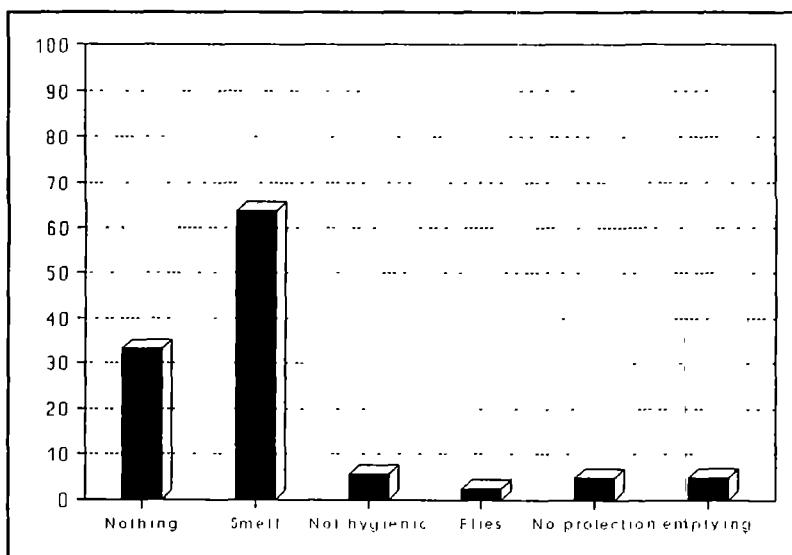


Figure 7: Disadvantages of the Balti-latrine

Flies were only mentioned by three respondents. Only when the investigators mentioned flies did some people say that they were a problem in the summer. Generally we got the impression that flies are not perceived as a nuisance but as an tolerable, and perhaps unavoidable, part of the agricultural way of life.

Smell was the biggest complaint of the villagers, mentioned by 63%. Surprisingly less than a third of the latrine owners in Rondu mentioned this problem although the smell in their latrines was observed to be very bad! All those who identified smell as a problem put extra material into the pit, usually soil and sometimes dry manure. The majority of the respondents said that adding material has the effect of making the smell disappear (60%) or reducing it (20%). The other 20% didn't know whether the smell would disappear. All respondents said that adding soil would have effect. This means that although smell is identified as a disadvantage, villagers have the means to decrease the problem by adding materials.

6.2 MODIFIED AND IMPROVED BALTI-LATRINES

i) Local initiatives and ideas to improve the latrine

When villagers were asked what they would prefer, to construct a pour flush latrine or to improve their existing latrine, more than 90% answered that they were in favour of improvements! The obvious next question was: "What do you think can be improved about the Balti-latrine?" The survey indicated that 30% of the respondents could not think of any improvement. The other 70% came up with a range of ideas for improving the convenience and cleanliness of the latrine, all of which involved changes in the construction. 20% of respondents suggested a "better construction" of the latrine, a rather general term which indicates modern construction methods and the use of materials like concrete, GI sheet, and a RCC slab for the squatting platform. Some people were more specific. They mentioned the construction of a roof (10%), higher walls (10%) or the addition of a door (9%) for the superstructure. Only one respondent mentioned a lid for the holes as a means of decreasing smell.

Some people were quite specific about ideas for improving the pits. Nearly 10% mentioned that plastering the inside of the pits would stop smell and seepage. In Shigar particularly, people mentioned that a better emptying door could be made and finally one person mentioned that the pit should be a slightly below ground-level to improve the decomposition process.

A few people realized the possible health risks of the latrine and suggested that the latrine should be situated further from the house (5%) or suggested avoiding the use of water immediately above the pit (4%). One person in Rondu came with his own analysis of the problem. He said that it would be better if the manure could be kept for some time before putting it on the field. He suggested building a second or even a third latrine so he could close the first one for some time. It is interesting that this concept, which is basically that of a twin pit 'compost' latrine, should be suggested by a local farmer. Beside these ideas no other suggestions about changes in the use or management of the latrine were made. This is hardly surprising because people have always used their latrine in a certain way and it is consequently difficult for them to think about the need for any behavioural changes.

ii) Improvements and initiatives of Development Organizations

To date, three different initiatives have been made to improve the Balti-latrine. All follow the same idea of introducing the twin pit 'compost' latrine, consisting of separate chambers that are filled alternately over a certain period. UNICEF/ LBRDD have constructed two of these and DHO Dr.Hassan Khan has constructed another improved dry latrine⁸. The latest effort to experiment with this type of latrine is by the WSHHSP which has constructed three.

⁸. See Water, Sanitation, Hygiene and Health Position Paper 3: Baltistan; pages 13-14 for more details.

UNICEF Latrine

In 1983-1985, UNICEF constructed two such type community latrines in Thorgo Bala on a trial basis with technical assistance of LBRDD. This improved Balti-latrine consists of two compartments, each with one squatting hole over the chamber below. After using one pit for 6 months it is closed and the second pit is used for the next 6 months to allow a longer retention time than normal. Both compartments have a small emptying. For construction, stones, wood and mud have been used. The whole structure costs between 12,000 and 15,000 rupees.

In the first year one compartment of the latrine was in use from April to September. After closing that compartment the people used the second from October to March. But in March, instead of only emptying the first pit which had been closed for 6 months, they emptied both pits. Thus the objective of reducing health risks by allowing longer retention time, was not met.

Ventilated Improved Balti-latrine (VIB-latrine)

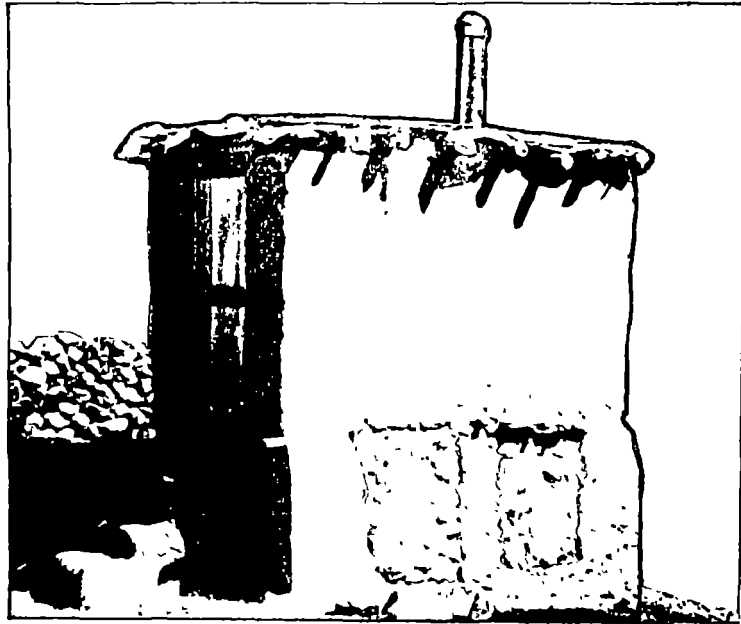
The second experiment is the Ventilated Improved Balti-latrine (VIB) designed by the District Health Officer, Dr. Hassan Khan. His objective is to develop a more respectable system for both rich and poor people that reduces the health risks involved in the conventional latrine. His "new" model is a relatively large sized twin pit 'compost' latrine with two ventilation pipes. Construction was started in 1993 in the courtyard of his residence in Shigar and has not been completed yet.

The two pits of the VIB-latrine are divided by a wall that supports the floor of the superstructure. At one side, the partition wall does not touch the outer wall and only one opening is made in the outer wall. This is an interesting simplification compared to the UNICEF design, which needs two emptying doors. The superstructure has four walls made of stone with a floor of wood, cement and mud plaster. Four holes have been made, two above each pit.

Twin Pit 'Compost' Latrine (TPC-latrine)

The WSHHSP has constructed three twin pit 'compost' latrines, one at its office in Skardu and two with households in Gole and Gohari. The design of these improved latrines is the same as the TPC-latrines that are constructed on an experimental basis in four villages in Gilgit. The latrines have two pits and are designed for a one year retention time, i.e. when the first pit fills up, it is closed and the second is put into use. After a year of being closed the contents of the first pit are removed and used as fertilizer. The theory is that after a complete year pathogens in the faecal matter will be destroyed and that the product will be a safer fertilizer.

In these latrines, stone masonry is used for the chambers and sun-dried mud bricks are used for the superstructure. The floor of the squatting platform is made of wood and cement-mud plaster with a hole above each chamber, both fitted with covers. A separate ablution place is provided on the squatting platform and the waste water is disposed of outside the latrine to keep the contents relatively dry. The pits are fitted with vertical ventilation pipes to help keep the superstructure free of smell and flies, and to assist air supply to the pit contents. The general aesthetics of the latrine appeals to villagers but the average cost of about Rs 4,500 is not cheap enough to make it an option that can be implemented everywhere (see photographs on page 27).



Photograph 3 and 4. TPC-latrine at the WSHHSP office in Skardu.

CHAPTER 7**HEALTH RISKS RELATED TO THE BALTI-LATRINE: A BIO-MEDICAL PERSPECTIVE****7.1 HEALTH RISKS RELATED TO THE USE AND MANAGEMENT OF THE LATRINE****i) Medical health risks**

The faecal matter of the latrines are likely to contain a variety of pathogens, including the eggs of parasites. Pathogenic bacteria are the main cause of diarrhoea and helminth eggs can develop into worms inside the body. These diseases are caused when people come into contact with food, water or fingers that are contaminated with these pathogens. The most common bacteria that cause diarrhoea are E-Coli, Shigella and Campylobacter. The main types of worms are the hook worm, the round worm, Trichurus and Ascaris worm and the tape worm.

ii) Health risks of practices related to the use of the latrine and manure

As mentioned earlier, a number of practices that are related to the use and the management of the Balti-latrine can be harmful to health. Below, an overview of these practices is given. This list will facilitate the process of developing health education messages.

- As described in Chapter 3.2, most of the Balti-people clean their anus with soil, silt or water. It is likely that through direct contact hands get contaminated.
- It has also been shown in Chapter 3.2 that people may perform ablution in open channels or in communal bathrooms. It has been observed that the same channel water is used for drinking water or washing dishes.
- In Skardu, Rondu and to a lesser extent contents of the chamber were observed to be wet. In most cases this resulted in strong smell and flies. In some cases this may lead to seepage from leaking pits to surface water. Wet contents are mainly due to the use of water directly above the pit but also due to lack of shelter to protect the contents of the chamber from rain and snow.
- Contents of the latrine are used as manure on fields (Chapter 5.2 and 5.3). Pathogens from the manure can spread to the surface water after irrigation, if children play in the fields, or if people walk through the fields and contaminate the household with dirty feet or shoes.
- As discussed in Chapter 5.3, women use relatively 'fresh' manure on their vegetable gardens. In particular those salads and vegetables that are not cooked will be likely to transmit pathogens.
- Referring to Chapter 4.1, people empty the latrines by standing inside with shovels and they transport the manure with carrying baskets, in wheelbarrows and with the help of donkeys. Handling human manure at the time of emptying and during transport can be significant routes of pathogen transmission.
- At the time of spreading (see chapter 5.1) 60% of the women use their hands in breaking the lumps as they say this is easiest. Pathogens from hands and nails can easily be transmitted directly to the mouth or indirectly via handling food and water.

These harmful practices can be divided into occasional and into everyday practices. The occasional practices, the last two that are mentioned, are related to contact with latrine manure during emptying, transporting and spreading. It should be kept in mind that these practices only take place at certain times of the year. The health messages focused on these practices should be conveyed before and during these periods. The everyday practices, except for anal cleansing with soil, involve indirect contact with latrine manure or fresh excreta. Health messages focused on promotion of hygienic practices will require explanation of the contamination routes.

Some existing practices may be encouraged as they reduce the health risks of the latrines.

- It is a custom to add organic material, animal shed manure and soil or silt to the contents of the latrine which is expected to be beneficial to the decomposition process.
- In Chapter 3.2 it is mentioned that after cleansing with soil or silt, this material is dropped onto the faeces below. Often some more material is pushed through the squatting hole by using the foot. This practice will help to reduce flies and smell.
- Some households have an ablution place inside the latrine which will reduce wet contents of the chamber and avoids contamination of surface water if the waste water is properly disposed of.

iii) Health risks related to the different types of manure

To assess the health risks of manure we have categorized these in three main types: November, February and manure used on vegetables.

The November manure, of which a part is already six months old at the time of emptying, will remain on a heap in the field for about five months during the winter. Considering that this manure had a retention time of five to eleven months, that an aerobic process has been stimulated after moving the content two to three times (on large heaps and smaller heaps in the field) and that the manure will lie exposed for some weeks we might assume that destruction of pathogens has taken place and that the health risk of this manure is quite low.

The retention time of the February manure is shorter than that of the November manure and therefore the chances that pathogens are present is higher. Contact with this manure has health risks. Despite this risk, the following circumstances may reduce the chances of transmission of diarrhoeal diseases to humans. In February the manure is used to fertilize fields and after spreading and mixing with soil aerobic decomposition may have been stimulated. The direct radiation from the sun and dessication will not be favourable conditions for pathogen survival. Finally, irrigation of fields usually takes place a month or longer after application of the latrine content, so fresh excreta cannot be washed into the channel water. If water contamination does occur, the temperature of the water, often near freezing point at this time of the year, makes it unlikely for bacteria to prosper.

The highest health risk, according to our assumptions, will be the use of latrine manure on vegetable gardens especially for those crops which are manured and eaten without cooking. In the early months of the year the health risk might be limited for the same reasons mentioned for the February manure. However, from April onwards the chances of disease transmission from vegetable gardens may increase rapidly. Raw vegetables and salad crops such as lettuce, salad and unions become available and if they

are not properly washed in clean water they can transmit pathogens to people. It is not uncommon for women to add extra 'fresh' manure if their vegetables are not growing well thereby increasing the risks.

7.2 MICROBIOLOGICAL SAMPLING OF THE LATRINE CONTENTS

The number of viable *Ascaris* eggs in excreta-based manures is considered to be a standard indicator of the presence of other pathogens⁹. The *Ascaris* egg is an extremely durable organism and its destruction may be taken as a sign that no other harmful organisms will be alive. The theory of composting sanitation is that two processes will help to destroy pathogens. First, the temperature rise and secondly the detention time will destroy pathogens making the manure safe to use as a fertilizer.

The existing literature does not provide a clear international guideline for microbiological quality criteria of the use of human excreta in agriculture¹⁰. Local physical circumstances and management practices are key factors that influence the health hazards and evaluating the latrines based on international guidelines is therefore difficult. The present preliminary results should be seen as an initial step towards understanding more about the decomposition processes and the health risks of Balti-latrines.

A microbiological study of the contents of the Balti-latrine and of manure heaps in the field was performed in February 1994 and repeated on a small scale in 1995. A floating and irritation technique was used to assess the number of viable *Ascaris* eggs in the latrine contents and in the heaps on the field. In total twelve villages were selected in which the contents of 24 latrines were sampled for two pathogens, the *Ascaris Lumbricoides* and *Trichuris trichiura*. Faecal matter was sampled at three levels in the latrine, the top, middle and bottom. Generally, the sample results showed a decrease of viable eggs from top to bottom. In nine of the latrines, viable eggs were not found at the bottom, indicating that complete destruction had taken place.

During the two sampling periods however, the microbiologist ran into a number of practical problems with sampling and measuring the number of viable eggs and there were doubts about the reliability of the techniques. After a visit of Mr. Tony Moody, Head of clinical parasitology from the London Hospital of Tropical Diseases, a more reliable and repeatable methodology was developed for sampling latrines. It included a modified Formol Ether technique for concentration of *Ascaris* eggs¹¹. Also a new research

⁹. The eggs of these pathogens are present in the stool of people who are infected. If the larvae or eggs (re-)enter the body through a faecal-oral transmission route they can cause diarrhoea, itching and worms.

¹⁰. The WHO recommends to adopt the Engelberg guidelines for excreta that is used on vegetable and salad crops. See: Duncan Mara and Sandy Cairncross Guidelines for the safe use of wastewater and excreta in agriculture and aquaculture. WHO and UNEP 1989. The Engelberg guidelines, however, were formulated for waste water and due to local physical circumstances and management practices may not be applicable in North Pakistan. They state a microbiological quality for latrine contents of <1 viable helminth egg per kilogram, and <1000 faecal coliform bacteria per 100 gram (page 84). Guidelines for compost latrines in Guatemala quoted in the same guideline give a more realistic standard. These guidelines state that the following microbiological quality is considered safe for reuse: helminth eggs fewer than 8500 per gram with a viability of less than 30% and coliform counts less than 4000 per gram (page 51).

¹¹. The various microbiological methodologies and results will be discussed in detail in a forthcoming WSHHSP Issue Paper that will be finalized after a complete cycle of sanitation sampling in the Winter of 1995 and the Spring of 1996.

protocol was developed that included standardized sampling techniques and the use of control samples. Two additional parameters were added. One was a faecal coliform count using an experimental colour comparison test from Sweden called the ONPG test and the membrane filtration technique. As total coliform bacteria cannot survive in temperatures above 50 degrees Celsius their absence should indicate that thermophilic decomposition has taken place in the latrine. A second additional parameter was moisture level of the latrine contents. During the previous series of sampling a relation between pathogen survival and high moisture was identified and by measuring moisture levels this hypothesis could be tested. The measurement of pH was improved by making a solution and testing with a pH meter instead of the previous pH paper test.

The new protocol was first used on the improved 'compost' latrines in Gilgit District in early October 1995. The results showed that thermophilic composting had not occurred as total coliform were present. The experiment also showed that in most cases the survival of *Ascaris* was dependent on moisture level, if this level was below 15% this resulted in a significant decrease in viability of the *Ascaris* eggs. Therefore it was concluded that the destruction of pathogens taking place in the latrine was more a result of desiccation of the contents than by a high temperature composting effect.

A similar test was carried out in Baltistan. Here it was expected that the addition of large amounts of organic materials such as animal shed manure and leaves would result in more successful composting than is the case in Gilgit District. A study was initiated in October 1995 to test the contents of six latrines at three to four different periods during the decomposition cycle. The first sampling of the latrine contents took place in late October 1995. The second sampling of the latrine contents and of the heap (depending on the emptying time) will take place in November 1995. The third sampling of the heaps will take place in February 1996 and the fourth will be carried out after spreading the manure on the field in March 1996. Where possible a fifth test will take place after irrigation of the field.

Three villages are included in the study. One where wet latrines are prevalent (Ranga Pa Gayul near Skardu), and two villages where latrine contents are dry (Thogmo in Shigar and Kharku in Ghanche).

The table below shows the most important results of the microbiological sampling. The third column shows the level of E-coli that had survived in the various layers of the latrine contents. The fourth column shows the total number of *Ascaris* eggs present in one gram of manure and the number of viable eggs it contained. The percentage of viability is shown in the fifth column and this figure indicates the level of destruction that took place. It should be noted that the actual number of eggs depends on the health of the household members. Finally in the seventh column the moisture levels are presented.

Examining the results for the different levels of the contents (top-middle-bottom) the data show that destruction of pathogens does take place and that in the drier systems (for example Thogmo and Kharku) this is significantly greater than in the wetter latrines. In general the results from the first samples of the latrine contents in October 1995 indicate that in the Balti-latrines faecal coliforms have survived and that, like the twin pit compost latrines in Gilgit region a true composting effect did not occur. Tests later in the winter from the heaps may prove that composting takes place after the latrine contents have been transported to the field where conditions for aerobic composting are more favourable. Nevertheless a picture seems to emerge that the principle mechanism in these latrines is not composting but desiccating. It shows that the drier the latrine the more pathogens are destroyed.

Village Name	Latrine #	Sampling point	number of B-Coli/gram	# of Ascaris /gram	% Viability	% Moisture content
				Total / Viable		
Ranga Pi Ragiayul	1	Top	TNTC	350 / 350	100	85
		Mid	TNTC	300 / 300	100	43
		Bot.	4020	1450 / 1305	90	30
		Side		900 / 900	100	41
	2	Top	TNTC	400 / 400	100	64
		Mid	TNTC	150 / 150	100	33
		Bot.	TNTC	600 / 516	86	50
Control	Fresh		600 / 600	100	78	
Khar Ku	3	Top	2300	100 / 100	100	73
		Mid	75	150 / 50	33	26
		Bot.	0	Nil	-	17
		Side		Nil	-	20
	Control	Fresh		100 / 100	100	72
	4	Top	TNTC	100 / 100	100	69
		Mid	18020	550 / 550	100	33
		Bot.	23375	500 / 206	41	35
		Side		850 / 722	85	80
Thogmu	5	Top	TNTC	100 / 100	100	63
		Mid	875	3300 / 1450	44	30
		Bot.	475	1550 / 356	23	25
		Side		250 / 50	20	33
	Control	Fresh		2400 / 2304	96	76
	6A	Top	TNTC	Nil	-	67
		Mid	8750	300 / 48	16.6	20
		Bot.	0	150 / 0	0	13
Side			450 / 247	55	64	
6B	Top		150 / 150	100	43	
	Mid		450 / 396	88	28	
	Bot.		500 / 50	10	26	

Table 5: Results of microbiological sampling of latrine contents

CHAPTER 8 CONCLUSIONS, RECOMMENDATIONS AND ACTION PLANS

An emphasis on the improvement of the existing sanitation systems is a realistic and effective target, considering the 98% coverage of Balti-latrines in the area. Providing hygiene awareness, ideas, technical advice and motivation on how to improve the latrine structure and latrine management should be an essential part of WASEP activities in Baltistan.

Attractive and attainable improvements should be communicated in an understandable way to interested people through awareness raising and health education. Hygienic sanitation is expected to be an important means to improve the health status of a community. Thus promotion of sanitation improvements should get equal attention and take place alongside the implementation or rehabilitation of water supply schemes. To get sanitation on the priority agenda target groups should not only be village people but should initially also include decision makers, planners and the staff of implementing agencies

8.1 IDENTIFIED FIELDS FOR IMPROVED USE AND MANAGEMENT

MANAGEMENT OF THE CONTENTS OF THE BALTI-LATRINE

- i **Reduce the moisture content.** Most villagers prefer a manure that is not too dry nor too wet, just moist. It is suggested to emphasize the health risks of wet contents as the decomposition and destruction of pathogens is better in a drier environment. People should be discouraged to use water directly above the hole. Instead, cleansing in a separate place outside the latrine or preferably provision of a convenient ablution place inside the latrine should be promoted.
Action:
 - Awareness raising
 - Construction of the ablution place (see section on technical improvements)
- ii **Add organic matter.** To increase the fertility and improve the decomposition process, it is a custom to add organic materials and animal shed manure. This is a good practice which everyone should be encouraged to do. Also it helps to decrease smell. The addition of ash to latrines is not common in Baltistan because of its association with the spiritual world. Promotion of ash in latrines should be treated with caution and perhaps better avoided.
Action:
 - Promote the use and addition of extra materials particularly in Skardu and Rondu.
- iii **Cover the contents of the latrine.** Common anal cleansing materials are dry powdery soil, silt and a mix that includes dry cattle dung. Use of these materials above the hole and addition of extra quantity after every defaecation will help to cover the fresh excreta. Covering the pit contents in this way will help to avoid smell and flies and helps to control the moisture content so that decomposition proceeds efficiently. Thus such a practice should be encouraged.
Action:
 - Raise awareness about and promote the proper covering of excreta after each use of the latrine

A message that will not be included in the WASEP activities is turning of the content. Although this would help decomposition this is practically impossible due to the limited space inside latrines and it would also not be an unacceptable message both for villagers and for staff.

MANURE MANAGEMENT AFTER EMPTYING THE LATRINE

- i **Wash hands after contact with manure.** During emptying and spreading of manure, villagers come into contact with manure. Hands, arms, necks, feet and clothes get soiled. Hands particularly will get dirty during spreading of manure as women break up the lumps to help spread it evenly. Although direct contact with the manure only takes place a few times a year, it is suggested that people are made aware of the health risks involved. Finger nail cutting isn't thought to be a priority message as nails are kept customarily short.

Action:

- Promotion of hand washing and nail cleaning, particularly in relation to human excreta
- Of lesser priority but a possible message is to suggest use of spades, shovels or the wooden forks to minimize contact with manure.

- ii **Awareness of the risk related to applying manure on vegetable gardens.** People are in the habit of applying the latrine manure directly to their vegetable gardens. They should be made aware of the health risks particularly in the summer when people use the 'fresh' manure on growing salad and other vegetable crops that are eaten raw.

Action:

- Make people aware of the health risks of applying latrine manure to growing vegetables.
- Promote the use of 'old' manure on vegetables.
- Promote washing of salads and vegetables carefully, preferably under clean running water.

RECOMMENDED ACTION PLAN FOR THE WSHHS PROJECT:

- ▶ Develop a set of sanitation guidelines for the orientation of staff of implementing agencies, both decision makers and field workers (1996);
- ▶ Prepare an outline for a workshop in Baltistan to discuss the contents of the guidelines and reach a consensus on appropriate interventions (1996);
- ▶ Develop a set of health education messages related to the Balti-latrine and TPC-Latrine which include the above mentioned fields of attention (1995-96);
- ▶ Incorporate these health messages into a training package for AKRSP WSOs and other interested people in Baltistan (1995-96).

8.2 IDENTIFIED TECHNICAL IMPROVEMENTS OF THE BALTI-LATRINE

More than 90% of the villagers in Baltistan would rather improve their existing sanitation system than to construct a pour-flush latrine. A list of possible technical improvements is presented in this paragraph. Most of these are self-help improvements to existing latrines. To motivate owners to carry out these improvements an integrated package will be developed that will focus on the construction of an ablution place which is an activity the WASEP will subsidize.

INTEGRATED BALTI-LATRINE IMPROVEMENT PACKAGE

i Construction of an ablution place.

This is an initial improvement for which the WASEP will provide cement and a waste water pipe. A mould will be used to cast a rim for the ablution place and cement will also be used to plaster the ablution place. The pipe will be used to connect the ablution place to a small soak pit that the owner will make outside the latrine.

Why promote ablution places?

- To avoid contents of the latrine becoming too wet.
- To use the construction as a subsidized starting point for other self-help improvements of the latrine (roofing, better closure of emptying hole, higher walls).
- To provide staff with a motivating tool and a trigger to discuss sanitation and health awareness.
- Where space is available, the ablution place might also be designed for use as a bathing platform. As such it can be linked with awareness raising on personal hygiene.

Where to promote ablution places?

Emphasis should be put on the areas of Rondu, Skardu and Kharmang, with less need in Shigar and little need in Ghanche. In the latter area many people already use a practical and satisfactory ablution system with sand, water and straw which soaks up the waste water which is then disposed of in the latrine. Ablution places should not be promoted in cases where it is inappropriate to build it on or near the squatting platform (for example where there is no place for water disposal) or in cases where people already have a suitable ablution place.

Action:

- Develop a package in which the ablution place is the focal element, others being suggestions for self-help improvements, improved management and other awareness and health education messages.
- Develop technical guideline for ablution place construction. It can be made of stones and mud but can also be promoted as a small cemented platform or a pre-cast cemented component.
- Develop a technical guideline for a small waste water soak pit.
- Prepare plans for distribution of the cement and waste water pipes.
- Investigate the possibility of establishing a mini-casting yard at the village level.

ii Roofs. Only 20% of the observed latrines have a roof and most of these are situated inside the houses. During the winter time, latrines with very wet contents (like black soup!) have been

observed, mainly due to lack of any protection from snow. Roof construction should be encouraged to avoid the pit contents getting too wet and to consequently prevent seepage through the pit walls.

Currently WSHHSP is considering a subsidy to encourage owners to construct a roof above their latrine.

- iii **Walls or higher walls.** When talking about the deficiencies of the latrine, less than 5% mentioned a lack of purdah and 9% of the respondents mentioned that higher walls would be an improvement. In the construction of higher walls it should be realized that completely closed cubicles are very uncommon in Baltistan. A space of at least one or two feet is left between the top of the wall and the roof to keep the latrine airy. Besides, people also fear that closed and dark places will attract supernatural beings.
- iv **Emptying hole.** In Chapter 2.2 it was concluded that many latrines do not have proper arrangements for closure of the emptying hole of the pit. Animals and playing children can enter in about 50% of the latrines. To avoid this, a simple temporary wall or door can be promoted. For reasons of pit ventilation, it seems appropriate to leave some space at the top of the door to maintain the airflow.

Other ideas for improvement of the Balti-latrine that may be possible but will not get priority in WASEP include:

Lids for the squatting holes. In all of Baltistan it has never been observed that people use lids to cover the holes. Lids are rather impractical as latrines have an average of four holes. Moreover, people are aware that the airflow through the holes takes away smell. Lids are therefore not recommendable in places with more than two holes unless a ventilation pipe is introduced.

Ventilation pipes. Smell is mentioned by 63% of the respondents as one of the disadvantages of the Balti-latrine. As has been stated before people tackle this problem by adding more soil and the investigators have the impression that making the latrine totally smell free is not the highest priority for most villagers. Also, as most latrines are without roofs or high walls ventilation is usually quite good. In cases where smell causes a problem that cannot be solved by adding more soil and where latrines have high walls and roofs the introduction of a ventilation pipe can be contemplated.

The location of the latrine. Only a few people (5%) of the respondents indicated that diseases can be spread from the Balti-latrine to people. They suggested that this could be improved by moving the whole construction further away from the house. When space permits this can be recommended. In general, this does not seem to be appropriate advice since there are limited alternative sites in most households, latrines are preferred near the animal shed and it is not a custom to build the chaqsa far from the house.

A partition wall. The construction of a partition wall, basically turning the Balti-latrine into a twin-pit latrine, has been suggested as an effective strategy to decrease the health risks of the latrine. We agree that this may be a logical technical improvement but practically this does not seem to be feasible

Why is a partition wall not a feasible strategy?

In-depth studies of the existing Balti-latrines indicate a number of practical reasons for not promoting a partition wall as a feasible strategy. Besides these practical constraints this intervention will not give a visible sign that you are a progressive 'modern' person and no tangible benefits are achieved like greater comfort or more purdah.

- Observations have shown that construction of a partition wall is not always practical. For example, the pit is too small or too low, or the position of the emptying door does not enable construction of a wall
- The promotion of a partition wall will need very strongly motivated staff who do not mind discussing this idea with villagers.
- Due to the variation of the pits, each one may have to be visited to give specific advice
- It might be difficult to identify people who are willing to work inside a used pit. Skilled masons in particular might have objections.
- The local variation in emptying regime of the latrines may be another confusing and complicating factor as each will need a different explanation.

RECOMMENDED ACTION PLAN FOR THE WSHHS PROJECT:

- ▶ Discussion and experimentation of different ideas, designs and construction materials for ablution places, roofs, walls and pit closures, 1996.
- ▶ Initial tests construction at office premises in Skardu and then pilot testing of the intervention and the prototypes in 2-3 villages possibly with the Marafie Foundation in 1995-96 Target villages should preferably be in Rondu and Skardu.
- ▶ Experimentation with different designs and construction materials for utilization or disposal of waste water from the ablution place. Attention may be given to ablution places that are used as a bathing platform. Monitor the use of the ablution place and user satisfaction, 1996.
- ▶ Design a set of simple visual aids (pictures, models, photos etc.) to be used to explain the ablution place idea and the other improvements during village dialogues or during health education sessions, 1996.
- ▶ Design an integrated awareness raising package that includes the ablution place idea besides the suggested improvements in management and use, and the health education messages.

8.3 INTRODUCTION OF A IMPROVED MODEL OF THE BALTI-LATRINE: THE TWIN PIT 'COMPOST' LATRINE

The twin pit 'compost' latrine is an improved model of the Balti-latrine that has two pits and a complete superstructure. The pits are used alternately and two different emptying cycles are suggested, in one system the pit is emptied once a year, the other works with a half-yearly emptying cycle.

Three experimental TPC-latrines have been constructed and it is suggested that the investigations will be continued by building several more possibly with some adaptations. The TPC-latrine will be evaluated and after one or two years of use, a decision can be made about large scale implementation¹².

Where?

The sites for experiments with a TPC-latrine with a one year retention time should take place in Kharmang, Rondu or Skardu. The sites for TPC-latrines with a six month retention time should take place in Ghanche district.

Why?

- The basic idea is to retain faecal matter in the pit for an adequate minimum period, based on the assumption that a high degree of pathogen inactivation or destruction will take place. This will result in the contents being safer to use as a fertilizer than is the case with the existing single chamber. To achieve this, the latrine has two ventilated pits that are used alternately.
- The latrine design that has been introduced to villagers consists of a proper superstructure, with a roof and a door. The pits are fitted with ventilation pipes. The theory is that this is a 'modern' looking development that provides protection and privacy and therefore will be attractive and respectable for those who can afford it. The superstructure is not the most important element from a health point of view but it is considered an essential feature for making the improved model acceptable.

VARIATION 1: TPC-latrine with a retention time of one year

Advantages of a one year retention time:

- By retaining the faecal matter for a year, under favourable conditions the majority of pathogens will be destroyed and therefore the contents will be safe to use as a fertilizer on any crop.
- For those who empty their latrine only once in a year, the emptying may coincide with their usual practice. In theory this should make the idea of the TPC-latrine more acceptable. The emptying time that should be recommended is February or March.
- The TCP-latrine is particularly suitable for the areas of Kharmang, Skardu and Rondu where the majority of the people usually empty their Balti-latrine once a year.

Disadvantage of a one year retention time:

- The retention time of this latrine is long (some faecal matter will be in the pit for nearly 24 months). The reason for this long retention period is to do with the destruction of

¹². See forthcoming WSHHSP Issue Paper on the evaluation of the Twin Pit 'Compost' Latrine.

pathogens which might be difficult for farmers to grasp. Moreover, retention can lead to a decrease (actual or imagined) of the manure's quantity and quality, whereas farmers prefer bulky and relatively fresh manure.

- By closing one pit of the latrine for a year the farmers will have no latrine manure during the first season. For some this might be an obstacle in accepting the latrine altogether. Others, due to necessity might make undesirable modifications to the emptying schedule
- For those who empty their latrine two or more times per year (mainly Shigar and Ghanche) it will be difficult or even impossible to change their practice and for them such a TPC-latrine is likely to be unacceptable.

VARIATION 2: TPC-latrine with a retention time of 4-6 months

Advantages of a 4-6 months retention time

- Emptying twice a year will be acceptable to the majority of the farmers in Shigar and Ghanche, and others that normally empty twice a year.
- Emptying twice a year implies shorter retention times and a fertilizer that farmers perceive as powerful, as compared to 'old' manure from latrines with a one year retention time
- Emptying times are advised in November and February to conform with the usual practice of most people.
- Twice a year emptying does not lead to a shortage problem of fertilizer in the first agricultural season as approximately half of the annual production is available at this time.

Disadvantages of a 4-6 months retention time

- The manure from February will have a minimum retention time of 4 months. This does not guarantee complete destruction of pathogens, although considerable reduction will take place especially if animal shed manure is being added to the Balti-latrine.

ACTION PLAN FOR THE WSHHS PROJECT:

- ▶ Further construction of a small number of experimental TPC-latrines will take place in spring 1996, possibly in cooperation with the Marafie Foundation.

4. FURTHER STUDY

The interdisciplinary study of 'composting' latrines has enhanced our understanding of sanitation in Baltistan. However a number of uncertainties still remain about composting sanitation in a dry mountainous environment. These include:

- What decomposition processes take place inside the pit and what processes take place outside on the field?
- What is the best approach for efficient pathogen destruction; desiccation, high temperature composting or long retention periods?
- What are the agronomic values of the manure for the different decomposition methods?
- To what extent is food contaminated from latrine manure?
- To what extent are animals the cause of peoples diarrhoea?

To address some of these unknowns it is recommended to continue research activities in the following fields:

i Microbiological testing of decomposing faecal matter

The initial tests on Balti-latrine contents should be reviewed and extended to include more latrines, or more intensive sampling of a few.

Samples should be taken from the pit contents and also at different stages of handling i.e. from the heaps, at spreading time, after manure has been on the field for some days, and finally during the first irrigation of the field after manuring. Monitoring of the product of the experimental TPC-latrines is included in the WSHHSP research activities for 1995-96.

Other microbiological test that are contemplated include testing the contamination level of salads and vegetables that were manured with latrine contents, and a study that will determine the extent to which animals contribute to cases of human diarrhoea

ii Monitoring of the management and user satisfaction of the TPC-latrine

Extensive monitoring of the use pattern, user satisfaction and feed-back is included in the WSHHSP activities for 1995-96.

iii Other alternative 'compost' latrines: Single chamber desiccating latrine

Promising results have been reported from the Ministry of Health in El Salvador with a solar assisted desiccation latrine. This latrine produces a safe to handle fertilizing material after 2-3 months. The suitability of this latrine for producing vegetable garden fertilizer should be assessed with interested womens groups.



~

