Pit latrines in Nepal — the refugee dimension

by Jonathan Puddifoot

In last April's issue of *Waterlines*, Richard Middleton argued that, with careful planning and community involvement, VIP latrines are safe, reliable, and affordable. Are they also the solution to the sanitation problems endemic in an emergency situation? Jonathan Puddifoot has some encouraging answers.

THE INFLUX OF 86 000 Bhutanese refugees into eastern Nepal during 1992 and 1993 posed all the usual problems for the agencies dealing with such a crisis. The United Nations High Commission for Refugees (UNHCR) and its implementing partners — Lutheran World Service (LWS), Oxfam, SCF (Save the Children), and the Red Cross — together with the local community and the Government, faced crowded camps, where uncontrolled defecation polluted the groundwater, leading to high levels of diarrhoeal infection, cholera, and typhoid.

Health impact

Working together with well-organized refugee camp committees, in only three years, LWS has managed to oversee the building of over 8000 ventilated improved double-pit (VIDP) latrines, each costing less than $50. Each latrine is used by two neighbouring families, who have already received the 'software' of personal hygiene messages, which are communicated by a network of thousands of volunteer healthworkers in the camps. The software is as important as the latrine itself: 87 per cent of the refugees had never used a latrine, their only option being open defecation.

The proper use of latrines has been the major factor in the dramatic reduction of diarrhoeal infection across all the camps, and shows every sign of continuing to do so, even after the refugee problem is resolved — 98 per cent of the refugees have said that they will try and build a VIDP latrine when they go home. As they have practical experience of building one, (they assembled them in the camps) it seems likely that a large number will do so.

But how much impact can building latrines have? Assessing the impact of sanitation on a community is notoriously difficult. How do you isolate the impact of sanitation from, for example, changes in diet or population? What about other development efforts taking place at the same time? A refugee camp is very unusual: everyone eats the same food, everyone lives in the same type of 'house'; it is as close to a controlled community as you can get.

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Design for camp living: the Bhutanese refugees' 'homes' and VIPD latrines.

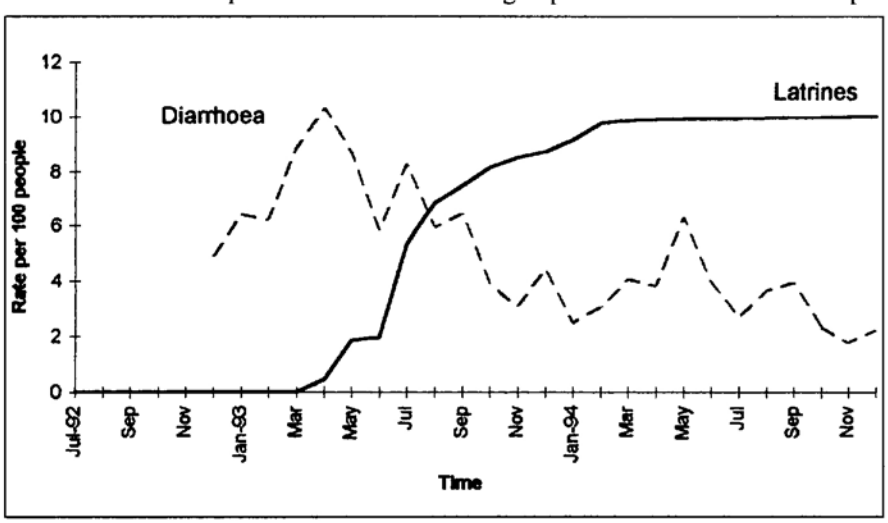


Figure 1. Diarrhoea and latrine rates in Beldangi 2 Extension camp.

Careful monitoring

Month by month, SCF and LWS monitored the rates of reported diarrhoeal infection (typically, dysentery and giardia) and the number of latrines per 100 people over a two and a half year period — see Figure 1 — showed a high correlation in most camps. The highest (83 per cent from Beldangi 2 Extension camp) indicates the indispensable role latrines play in improving public health.

From a peak average rate of 6.6 diarrhoea cases per hundred between December 1992 and March 1993, after the latrines were constructed, this figure dropped to 3.5 diarrhoea cases per hundred for the same period the fol-

lowing year, when latrine construction was nearly finished. The continuing use of latrines maintains a declining rate of infection across all camps.

Latrine kits

So how do you go about building up to 800 latrines per month — and manage to maintain high standards? LWS found that the answer lay in a combination of prefabricated latrine 'kits', and encouraging the refugees to assemble their latrines themselves.

The tasks involved in building the latrines were classed as 'skilled' and 'unskilled'. The refugee family using the latrine performed all the unskilled tasks, with supervision and advice from the LWS workers.

Construction teams, many of them refugees, did the skilled tasks such as setting ring moulds, hand-forming the squat plate, and so on. The prefabricated parts (including the superstructure kits) were then assembled on site by the future users, and the latrine was complete.

Fabrication yards were set up in the camps, where the kits were made up. One yard made superstructure kits, consisting of pre-cut poles and bracing, doors, and sandwich-panel roofs. Another yard made concrete-ring covers. The rings themselves, the squat plate, and setting the chute pipe in the squat plate, was done at the site of the latrine.

Early construction efforts included casting the rings at the fabrication yards (special curing ponds were built) and then transporting them to the latrine site. As each ring weighed around 150kg and was very fragile, (the wall thickness of the rings was only 4cm), however, it soon became clear that casting *in situ* was a much better alternative, as it avoided both breakage during transport, and the need for reinforcement in the concrete.

The ventpipe, fly-traps, vent cap, and the chute pipe were ordered pre-cut to the correct size from the supplier.

What do the users think?

In 1995, fieldworkers surveyed 186 refugee families, most of whom had been using their latrines for more than two years. The results showed almost total acceptance of the technology, with 98 per cent of refugees having stopped their traditional practice of open defecation. The essential personal hygiene messages have also sunk in — 80 per cent of respondents said that they now washed their hands after defecating.

The original estimates allowed for an average of 12 people using each

A customized VIPD

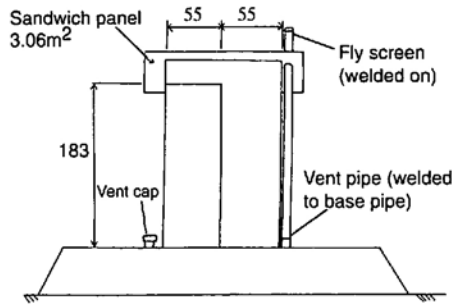


Figure 2. Front elevation of VIPD superstructure.

NB All dimensions in cm

- *Vent pipe, cap, fly screen and vent-pipe base supplied by manufacturer*
- *All plastic parts welded with heating plate, except vent cap (self-tapping screws)*

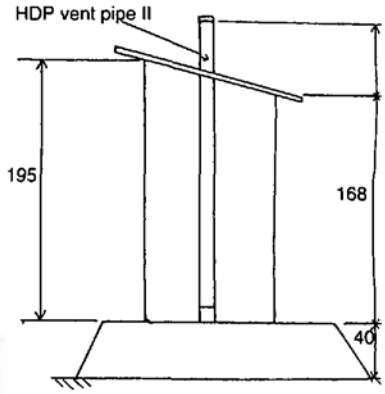


Figure 3. Side elevation of VIPD superstructure.

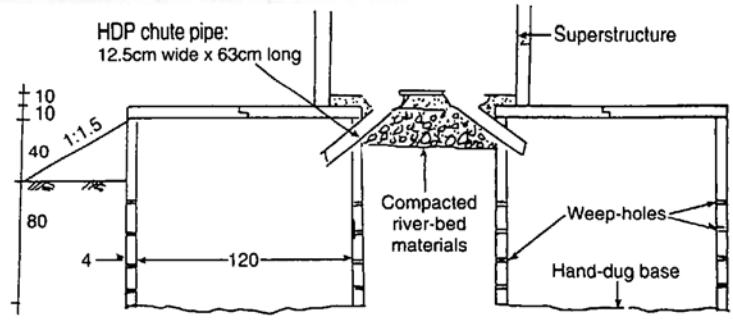


Figure 4. Latrine design - section.

Note: Ring length either 120cm with weep-hole (as shown) or 60cm. When 60cm, pit is deepened with an unlined section below ring .

One problem with the siting of latrines in the Nepal camps was a high water-table in some areas: if a pit is dug a metre deep, the groundwater could become contaminated with *E.Coli* and other diarrhoeal bacteria. Other problems concerned the latrine-design life expectancy — how long are they supposed to last? Over-investment in latrines might be a waste of money if a solution is found to the refugee problem, enabling them to leave the camps. Alternatively, under investment would lead to large, recurring maintenance costs.

The final design allowed for both these factors. A raised, twin-pit latrine kept the pit base as far from groundwater as possible. The design life of the latrine was split in two: a substructure with a ten-year life, costing $24; and a superstructure with a three-year life, costing $17. Naturally, as experience in construction was gained, the latrine specifications were modified, but the basic design remains unaltered.

Superstructure

The superstructure illustrated in Figures 2 and 3 provides:

- o Privacy for the user;
- o shade over the squat plat (to reduce flies); and
- o stops rainwater getting into the pit and flooding it.

A sandwich-panel roof, made of layers of flattened bamboo and plastic sheeting provides rainproofing. Bamboo poles with wattle and mud daub make up the walls and the door of the superstructure. Fifty-seven metres of bamboo is needed, at a cost of under $5. The abundance of cheap bamboo is a blessing!

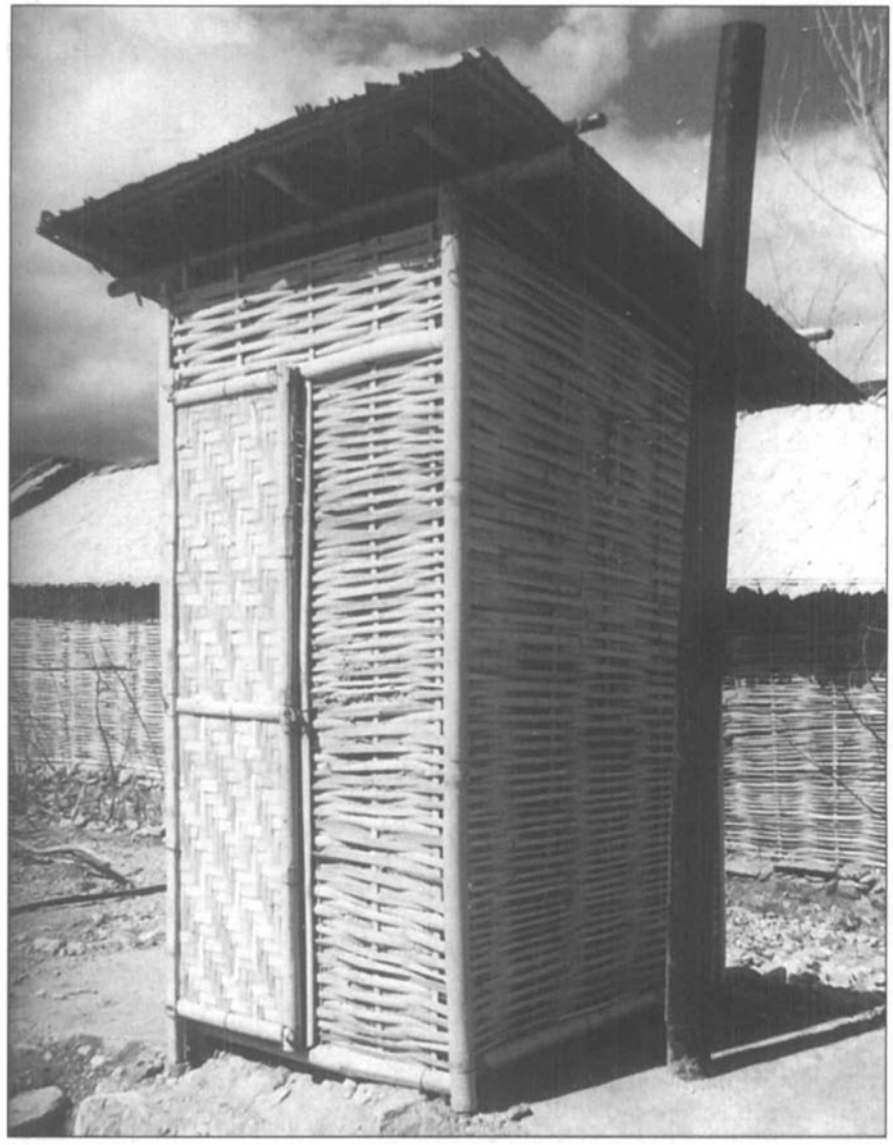
Substructure

The substructure (see Figure 4) provides two pits, each with a volume of around 1m^3, which is partially lined with 1.2m-wide concrete rings to add support to the pit sides, and made a base for the superstructure to stand on. The rings are covered with concrete lids which also contain the ventpipe openings. These lids have a joint and lifting rings cast onto them so that they can be removed and the pits cleaned out when necessary.

latrine. It was thought that a pit volume of 1m³ would be enough for one year's use, when it would be sealed, and the other pit made operational. In fact, the pits take longer to fill; in some camps, the average fill-time is over 500 days.

Initially, there were concerns that the large amounts of decomposed material to be disposed of would cause both public health and logistical problems. But, over a year, the excreta in the sealed pits decomposes, leading to a significant reduction in its volume, over 50 per cent in most cases.

The original volume of the pits was around 1m³. Refugees dig a hole in the ground next to the pit, and empty the decomposed material into it. People were hopeful that the material could be used to make compost material for the Forestry Department nurseries nearby; but the idea was dropped when it became clear that moving the large amounts (about 2500m³ per year) of decomposing excreta cleanly through the camps would be too expensive.



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Relatively simple to construct — and local materials equal affordability.

Future maintenance

Now that the latrines have been built, and have proved to be a successful technology, the next challenge facing both LWS and the refugees is how to maintain them effectively. Not only do the latrines need constant repairs and maintenance, but the full pits need to be emptied, the vent pipe needs to be moved, and so on.

To get the best performance out of the latrines, a latrine-centred management system is required — the system must be designed to serve the individual needs of each latrine. When there are 8000 latrines, this means a decentralized system, a refugee self-managed system. The Bhutanese refugees of Jhapa are already managing the food distribution system, running schools and health posts, and allocating housing with the help of UNHCR and other agencies. The latrines will be managed on a similar basis, with technical support and training from LWS; UNHCR will provide the necessary funds.

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The refugees have built their latrines — now they are ready to maintain them.

Ripe for replication

The experience in the camps in Nepal has shown that it is possible to build large numbers of VIP latrines in a short space of time; combined with education in appropriate health messages, this has a dramatic effect on the reduction of diarrhoeal infections, as well as preventing epidemics of cholera and typhoid from breaking out.

The VIPD is a cheap and relatively simple technology which can be used in other, similar refugee situations, provided that the materials and people are available. A level of refugee self-organization makes it easier to both build and maintain the latrines.

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