Making VIP latrines succeed

by Richard N. Middleton

In a recent *Waterlines* article (Vol.13, No.2), Robert Reed discussed the conditions under which pit latrines may not be suitable sanitation systems. Although a valuable reminder that even the simplest technologies may not always work, Richard Middleton believes the uncomfortable truth is that often there is no feasible alternative. He focuses on the double-pit VIP latrine, 'the only type of dry-pit latrine that can provide a permanent, safe, sanitation solution.'[1]

PEOPLE SHOULD NOT be forced to accept and pay for solutions that they do not want. Expectations can be unrealistic, however, so telling people what is available, and helping them to make better-informed decisions, should always be part of project planning and design. The results may be unexpected: for example, many people in Kumasi, Ghana opted for VIP latrines rather than sewered systems, because they were worried about costs, water-supply reliability, and the possible abuse of shared flush toilets.[2]

Discussions with the community may tell the planners that designs should be revised. For example, there were some well-known VIP failures in Botswana in the early 1980s; people were bathing in the VIP latrines because they offered privacy, and the slab foundations, which were not designed to have water seeping past them, subsided. As a result, the VIP design was changed to provide stronger foundations;[3] another solution is to build separate shower and bathing areas, perhaps linked to each other and to the main house by 'breezeways'. People must be encouraged to tell planners how they want their houses to be arranged; in most cases, the simplest way to do this is to build demonstration models in the community, and to let everyone inspect them and make comments.

Planners should also respect traditional 'latrine culture' (such as prohibitions on latrine sharing). Some experts believe, however, that when rural dwellers move to the city, they experience such major life-changes, that sanitary preferences also adjust.

Another concern is that children will not use the latrines, because they fear falling into the pit. This may be an exaggerated worry (children may be just more likely to defecate where they are), but it should be investigated, as children's faeces tend to be highly pathogenic. The solution may be modification of the pedestal or squat slab, by adding an insert or a separate children's seat.

A more serious problem is fear of the dark interior, and of possible lurking insects. A dark interior was originally specified to ensure that flies within the pit were attracted to the bright ventpipe and trapped, but it seems that some light can be admitted without affecting the fly-catching, provided that the ventpipe is large enough, and the screen is kept clean. Even in squatter communities, a high proportion of residents often has some form of electrical connection, and so a low-wattage bulb outside the VIP can also provide reassurance at night.

Space constraints

Lack of space is not usually a major problem, except in very high-density areas.[4] The VIP represents an improvement for the family, if designed carefully: the slab covering the twin pits provides a solid, flat, clean area suitable for storage and laundry, and may be very welcome (especially during rainy seasons, when the rest of the compound may be muddy). Where plot sizes are really small, it may be feasible to locate the pit-access hatches outside the property itself (for example, under the edge of an alleyway, if there is no traffic).

Latrine emptying

While VIPs have few operation and maintenance (O&M) requirements, they should be emptied periodically (typically, every three to five years). Municipalities often have problems in providing a reliable, effective, and affordable mechanized service,[5] so planners should ensure that emptying can be done by the family, or by private entrepreneurs. This involves establishing not only that people are willing to handle stabilized humus, but also that there is some safe place for ultimate disposal (ideally, of course, on the family's vegetable patch or fruit trees).

Groundwater and surface-water protection

All on-site sanitation systems, VIPs included, will discharge some effluent into the soil. With a VIP, the amount will be small, because it is a dry

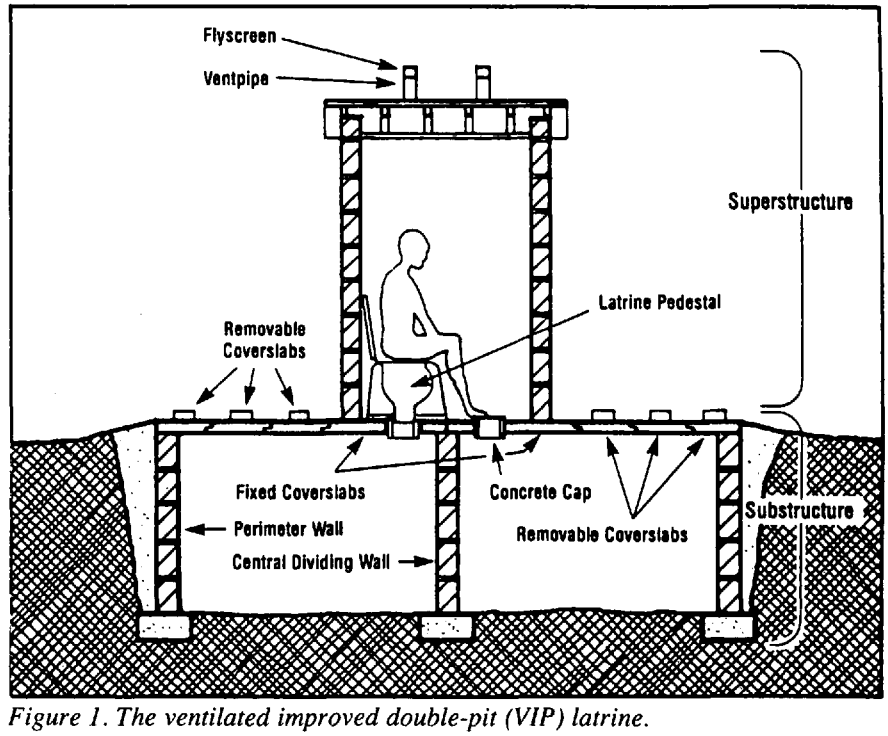


Figure 1. The ventilated improved double-pit (VIP) latrine.

system, and because much of the water contained in excreta will be exhausted up the ventpipe. Unless the soil is very open, or the water-table is shallow, most harmful constituents will not reach underlying aquifers. The most serious concern is usually over possible nitrate contamination of groundwater, in particular, where there are many VIPs in a small area.

In special cases, such as under karstic conditions, or where it is essential to maintain aquifer quality, the VIPs may be modified. For example, sealed vaults may be used instead of pervious pits, or in high water-table areas the 'pits' may be partially above ground. Before proceeding to expensive modifications, or changing technologies, however, planners should take account of three important factors:

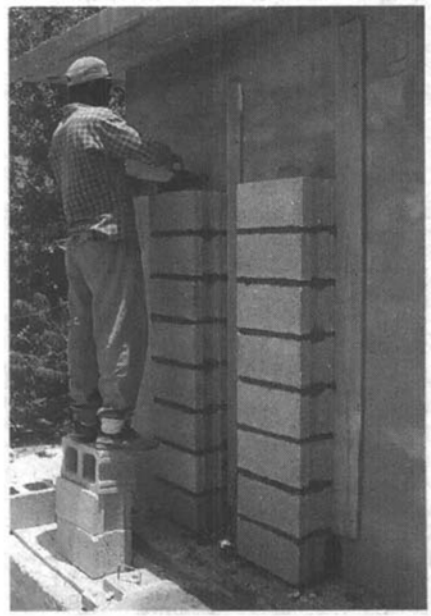
- Eventually, all shallow aquifers under urban areas will probably be polluted, not only from latrines, but also from many other contaminants (from small industries, vehicle servicing etc.). Even deep aquifers may become polluted if uncontrolled construction, such as sinking piles or other foundations, penetrates overlying impermeable strata. Obtaining water from more distant and better-protected sources is probably the only long-term safe solution. As a general rule, adjusting the water supply is easier and cheaper than trying to change people's sanitation habits, or controlling discharges.
- VIPs are not the only forms of sanitation that discharge into the soil. Traditional pit latrines have similar characteristics (except that they are often deeper and are never emptied, so buried pollutants continue to increase), septic tanks are designed to leach into the soil, and sewers leak (especially in developing countries, where construction techniques are often poor and traffic damage high).
- In most urban areas, stormwater is heavily polluted. Watercourses into which storm drains discharge, and any aquifers recharged by stormwater, are likely, therefore, to become polluted, regardless of local sanitation systems.

Sullage management and surface-water protection

Sullage management has always been given very low priority in sanitation programmes. It was not discussed in any detail in the original 1976-8 World Bank research project on low-cost sanitation alternatives,[6] and is barely covered in the latest WHO handbook.[7] Perhaps, in comparison with the extremely serious environmental and health consequences of, almost universal, inadequate excreta disposal, sullage management has been judged to be less critical. There is also the awkward fact that, in most cities, dealing with sullage means keeping storm drains flowing freely; that means adding both storm drainage and solid waste management to the list of major problems that must be solved simultaneously.

Sullage can be disposed of on-site in many cases, using soakaway or, ideally, for crop production by evapotranspiration systems. Maintenance (for example, of grease traps) may be a problem, however, and is very dependent on user education and motivation. Again, demonstration projects and readily available local support are needed.

Before condemning VIPs for failing to manage sullage properly, however, critics should recall that septic-tank systems also often discharge highly pathogenic material directly to storm drains, and that most sewage-treatment plants in developing countries discharge effluents — not much better than raw sewage — into watercourses, drainage channels, or close inshore. Even totally untreated sullage presents less of a health and environment hazard than these discharges. Upgrading on-site sullage management as far as possible may be preferable, on environmental and public-health grounds, to switching to another 'higher' technology.



Ventilation efficiency drive in Jamaica — building the ventpipe from 8-inch hollow concrete blocks.

Most existing publications on sullage management originate from industrialized countries, and are not readily converted to operational guidelines relevant to developing countries. This omission needs to be remedied as soon as possible.

Odour and fly control — ensuring good ventilation

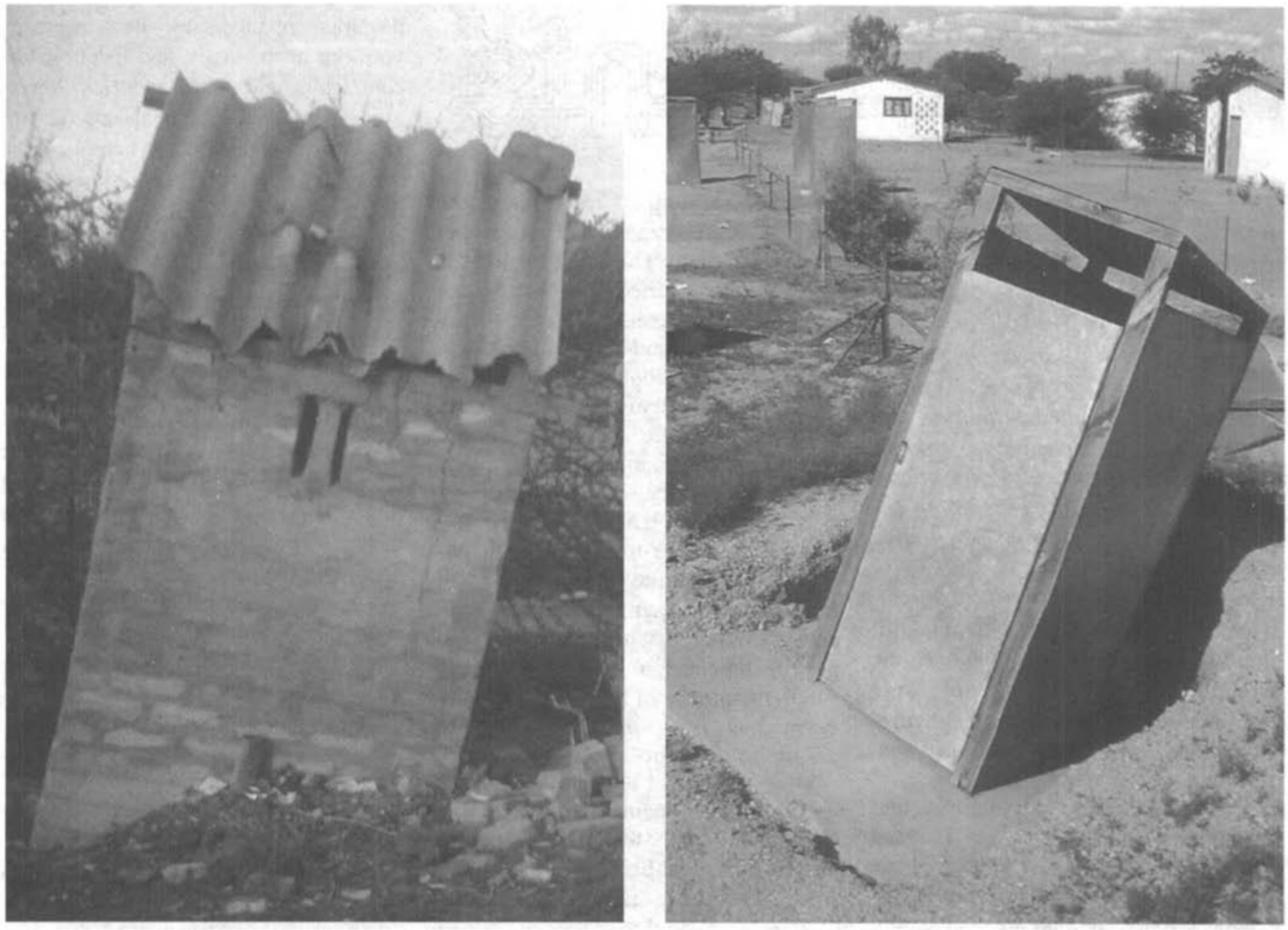
Failure to clean the fly screen over the top of the ventpipe is a very likely cause of VIP 'failure'; it results in reduced air flow (and a greater risk of smells inside the VIP), and, by reducing the amount of light travelling down the ventpipe, impairs its fly-trapping properties. This is not strictly a failure of the technology, but of the accompanying education programme; users need to know that if they do not clean the screen, there will be unpleasant consequences! The choice is then theirs.

A more serious problem, which may indeed lead to failure (or at least to the VIP becoming unacceptable in the community) is progressive loss of ventilation as population density increases, houses are crowded together, and second storeys are added to some buildings. Ventilation efficiency falls as more obstructions get in the way of wind flow. A solution being tried in Jamaica is to build the ventpipe from 8-inch hollow concrete blocks: the hollows form twin chimneys for each pit and, if the vent does not work efficiently, it can be raised several courses.

With mixed-height housing, or on steep slopes, however, there is the risk of ground-level VIPs discharging odours at the window-level of adjacent homes; a well-ventilated VIP may delight the owner, but torment the neighbours! There is no obvious solution, but one that seems feasible would be to have a sealed 'light well' on each pit (to trap flies), and a communal tall stack for venting purposes.

Persisting with VIPs — comparative costs

In most cases, VIP latrines will be substantially cheaper than sewerage or septic-tank systems, if all costs are taken into account.[6] Compare the physical inputs: to construct a VIP and washing area, the amount of materials needed is similar to building a bathroom, septic tank, and drain field, or for a bathroom and a connection to a street sewer, but the VIP does not have off-site construction costs (trunk sewers and sewage-treatment facilities;



Slip-sliding away: the collapse of pit latrines — such as these in Botswana — led to the introduction of the double-vault VIP.

septage hauling and treatment). O&M costs are negligible, while any water-borne system needs, primarily, water to make it function, and also involves high O&M costs for conveyance, treatment, and final disposal.

The cost of flushing water — a factor often forgotten in costing sanitation options — is significant (and many poorer households will not have the house water connection necessary to make flushing systems feasible). What is more, when many urban areas cannot provide even minimal, reliable, continuous water services, and when the cost of new water sources is likely to double or triple over time,[8] it is obviously undesirable to adopt water-intensive systems unless there is simply no other option available.

Conclusion

VIP latrines are, in general, a safe and reliable technology. Of course, unless planned carefully, they can fail. Even then, the solution in most cases is not to abandon the VIP, but to examine the causes of the failure and deal with them. Unless the original selection was completely misguided, or circumstances have changed radically, this will almost invariably prove more cost-effective than changing to another technology.

Planners must be far more attentive to the community's ambitions and preferences. Seeking out views from a wide range of potential users, building demonstration models for actual households — and monitoring reactions — and changing designs rather than trying to change people, will help to ensure success. ●

Notes and references

1. Simpler types of pit latrine (such as the Mozambique unvented design: Brandberg, Bjorn, 'Improved sanitation using the Sanplat System', *Waterlines*, Vol.12, No.4) are simple and low-cost, but cannot be incorporated into the house structure, and are not permanent; they are not comparable, therefore, with the VIP.
2. Whittington, Dale, Lauria, Donald T., and Wright, Albert M., 'Household demand for sanitation services: a case study of Kumasi, Ghana', INUWS Water and Sanitation Report No.3, World Bank, Washington DC, 1992.
3. Van Nostrand, John, and Wilson, James G., 'The ventilated improved double-pit latrine: a construction manual for Botswana', TAG Technical Note No.3, World Bank, Washington DC, 1983.
4. Multi-storey housing is not usually suited to VIPs, despite traditional solutions, such as the 'Yemeni long drop'.
5. Emptying remains a problem even on long-established and successful programmes (see, for example, Blackett, Isabel C., 'Low-cost urban sanitation in Lesotho', Water and Sanitation Discussion Paper No.10, World Bank, Washington DC, 1994). Unfortunately, applied research of this sort is not now receiving much international attention.
6. Median values for the Total Annual Cost per Household (TACH) published in a World Bank global research project were: pit latrines: 26.0; conventional septic tanks: 370.0; conventional sewerage: 362.1 (1978 US$), Kalbermatten, John M., DeAnne S., Julius, and Gunnerson, Charles G., *Appropriate Sanitation Alternatives: A technical and economic appraisal*, The John Hopkins University Press, 1982. This analysis, like most others, omitted the cost of the 'software' needed to ensure project success, and also the cost of sullage disposal for on-site solutions. It is inconceivable, however, that these omissions would offset the cost advantage of the on-site solutions (14:1 in the case of pit latrines).
7. Franceys, R., Pickford, J., and Reed, R., *A Guide to the Development of On-Site Sanitation*, WHO, Geneva, 1992.
8. World Bank data shows that, in many cities, the cost per cubic metre of next source of water will be two or three times higher than that now in use (Bhatia, Ramesh, and Falkenmark, Malin, 'Water resource policies and the urban poor', *Water and Sanitation Currents*, World Bank, Washington DC, 1993).

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