# SANITATION HEALTH & HYGIENE Suplement to

WATERWHEEL







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SANITATION HEALTH & HYGIENE

**Cover**: In celebration of the International Year of Sanitation the Water Wheel looks at sanitation-related research and development.

### Sanitation News from Around the World

### NGO launches sanitation animation

Upfront

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UK-based non-governmental organisation WaterAid has launched a three-dimensional animated film illustrating the disease burden that comes with open defecation, and what communities in Bangladesh are doing to address the issue.

Using still photography to bring the issue of sanitation to life, 'Ten Steps to Total Sanitation' shows how sanitation works at the rural or small town community level. The animation is set in rural Bangladesh and is expected to be a useful tool for raising awareness, inspiring local partners working in the field and educating students.

The short film outlines the problems caused by open defecation and specifies ten steps that communities can take to achieve 'open defecation free status', leading to a reduction in disease. It attempts to crystallise WaterAid's approach to community-led sanitation and simplify a sometimes complex subject matter.

For more information, or to view the short film, visit: <a href="http://www.wateraid.org/uk/about\_us/newsroom/6613.asp#">www.wateraid.org/uk/about\_us/newsroom/6613.asp#</a>

### Latrines trounce toilets in US study

Use a far better solution for many parts of the developing world.

Associate Professor David Watkins, Prof James Mihelcic and PhD student Lauren Fry of the Michigan Technological University's Sustainable Futures Institute analysed worldwide barriers to sanitation. Water- and sanitation-related diseases, such as diarrhoea, cause the death of millions of people, especially children, every year. In particular, the researchers found that a scarcity of clean drinking water is not as big an issue as one might expect. In fact, installing water-guzzling appliances such as toilets can actually promote unsanitary conditions when the effluent is discharged untreated into once-clean rivers and streams. A properly built latrine, on the other hand, keeps sewage safely separate from drinking water.

"Our challenge has been to look at what interventions make the most difference," Prof Watkins said. Their findings show that small changes can be more important in preserving health than big engineering projects, a fact that Prof Watkins, an engineer, relates with some consternation. "As engineers, we like to build stuff. But handwashing is really important, too," he said.

Getting people to change their habits can be harder than building infrastructure, however. "They may not understand the science, and because it is about parasites and bacteria they cannot see, they may not recognise the risks," noted Prof Watkins. The resulting lack of political pressure means that money that could go toward improving sanitation and hygiene is spent on other projects.

The team's paper 'Water- and Nonwaterrelated Challenges of Achieving Global Sanitation Coverage', was published in the American Chemical Society Journal *Environmental Science and Technology*. Do download the article, go to <u>http://pubs.acs.org/</u> cgi-bin/abstract.cgi/esthag/2008/42/i12/abs/ es7025856.html



### Disease-causing proteins found in sewage sludge

US scientists are reporting that conventional wastewater treatment processes do not degrade prions.

Prions, rogue proteins that cause incurable brain infections, such as Mad Cow disease and its human equivalent, variant Creutzfeldt-Jacob Disease, are difficult to inactivate, resisting extreme heat, chemical disinfectants, and irradiation.

Until now, scientists did not know whether prions entering sewers and septic tanks from slaughterhouses, meatpacking facilities, or private game dressing, could survive and pass through conventional sewage treatment plants.

Joel Petersen and colleagues used laboratory experiments with simulated wastewater treatment to show that prions can be recovered from wastewater sludge after 20 days, remaining in the biosolids (i.e. the byproduct of sewage treatment, which is sometimes used to fertilise farm fields).

Although emphasising that prions have never been reported in wastewater treatment plant water or biosolids, the researchers note that existing tests are not sufficiently sensitive to detect the extremely low levels of prions possible in those materials.

### Survey finds major gaps in Angolan hygiene and water treatment practice

A survey of households in Angola Aundertaken by Population Services International, looking at the reasons for treating water and what contributes to the behaviours seen, has found that less than half of those caring for children always treated water with a reliable method before giving it to them.

The survey found a quarter of children under five in the 1 600-plus households



in the capital Luanda in the study had had diarrhoea in the 15 days before the questionnaire was filled in. A high level of knowledge about what constituted safe water and safe practices existed but just 12% of respondents said they consistently practised eight key water treatment and hygiene activities.

### Gauteng water experts assisting DRC

The Gauteng provincial government has dispatched several infrastructure experts to the Democratic Republic of Congo to assist the country with its water and sanitation projects.

This followed a two-day visit by a delegation from the province to the central African country in July. The South African team of experts will specifically assist Katanga with water distribution and sanitation projects.

"With the DRC emerging fresh from civil war and suffering from serious underdevelopment, including basic infrastructure such as roads, electricity, water and sanitation, Gauteng, the fourth-largest economy on the continent, is the obvious choice to spearhead the central African country's recovery process," said the Gauteng provincial government in a statement.

## Education and soap save lives

Intensive hygiene education plus the use of hygiene products can significantly reduce respiratory, gastrointestinal and skin diseases, especially in children under five, a South African study has found.

The three-year study, conducted under the guidance of the Health and Hygiene Promotion Partnership, focused on four impoverished communities in Cape Town. The results were presented at the 13<sup>th</sup> International Congress on Infectious Diseases (ICID) held in Kuala Lumpur earlier this year.

It was found that intensive hygiene education in combination with the use of hygiene products such as soap, surface cleaner/disinfectant and antiseptic, resulted in marked reduction of morbidity and mortality, fewer healthcare visits and related costs.

A total of 685 households participated in the study. Community facilitators monitoring illness symptoms weekly and reinforced disease-prevention behaviours established through participatory learning and action focusing on handwashing/bathing with soap, cleaning toilet and food surfaces, and treating skin problems with antiseptic. Children under five in all communities had significant reductions in gastrointestinal and skin illnesses over time.

#### **SANITATION DIARY (1)**

#### WORLD SANITATION NOVEMBER 4-6

The annual World Toilet Summit & Expo will take place in Macau. The summit is an annual gathering of experts with focused discussions that promote clean toilets, sanitation issues and hygiene. *Enquiries: Ms Ginn Lee; Tel:* +65 6393 0214; E-mail: ginnlee@worldtoiletevents. com; Visit: www.worldtoiletevents.com

#### WATER, SANITATION & HYGIENE <u>NOVEMBER 11</u>-13

Streams of Knowledge and the NGO Forum for Drinking Water Supply & Sanitation are organising the Second International WASH Practitioners' Marketplace and Fair to be held in Bangladesh. *E-mail: info@streams.net* 

#### WATER & SANITATION NOVEMBER 18-20

The Sixth Earthwatch Conference on Water & Sanitation will be held in Abuja, Nigeria. Enquiries: Mayowa Peter-Cookey; Tel: +234 805 513 9316; Fax: +234 84 754610; E-mail: mayowa@ earthwatchnigeria.org; peter@earthwatchnigeria.org

### **Billions needed to address backlogs**

Nearly R70-billion is required to address South Africa's remaining water and sanitation backlogs, according to Minister of Water Affairs & Forestry Lindiwe Hendricks.

Speaking at a meeting of the Plumbing Institute of South Africa, the minister said that an estimated R17-billion would be required for water supply infrastructure (internal services only), R25-billion for sanitation, and an additional R25-billion for bulk regional infrastructure. "That is a significant amount of money that will be required for the water and sanitation backlogs over the next few years. Over and above that billions are going to be spent on water resource infrastructure such as dams, canals, pipelines and other infrastructure as well as maintenance of that infrastructure."



About 3,3 million households still lack access to basic sanitation compared to 1,3 million households that lack access to basic water services. Government is aiming to eradicate these backlogs by 2014.

The growing number of households gaining access to water and sanitation will require a competent, well regulated and significantly larger plumbing and related industry to address a growing demand, said Hendricks.

"It is clear that government alone cannot respond to the needs of all these households that now have water and sanitation services. The private sector and typically small plumbing businesses will be called in to provide services."

### WHO unpacks water, sanitation's role in burden of disease

The World Health Organisation's (WHO's) first ever report depicting country-bycountry estimates of the burden of disease due to lack of safe water, sanitation and hygiene, Safer Water, Better Health: Costs, Benefits & Sustainability of Interventions to Protect and Promote Health, provides the epidemiological evidence and economic arguments for fully integrating water, sanitation and hygiene in countries' disease reduction strategies.

"One tenth of the global disease burden is preventable by achieving improvements in the way we manage water," writes

#### **SANITATION DIARY (2)**

#### SANITATION IN ASIA NOVEMBER 18-20

The International Water Association (IWA) 'Sanitation Options in the Asia Pacific' Conference will be held in Hanoi, Vietnam. The conference is designed specifically to cater to the developing countries within the East Asia and Pacific region. *Enquiries: Ryan Yuen; Tel:* +65-9686 9647; *Fax:* +64-6885 2526; *E-mail:* hanoi2008@iwahq.org; Visit: www.iwa-seawun-hanoi2008.com

#### URBAN SANITATION NOVEMBER 19-21

An International Symposium themed 'Sanitation for the Urban Poor: Partnerships and Governance' will be held in Delft and Amsterdam. The symposium is organised by the IRC International Water and Sanitation Centre. *E-mail:* symposium@irc.nl or Visit: www.irc.nl/symposium2008

#### SANITATION IN AFRICA DECEMBER 10-13

The newly-established African Sanitation Knowledge Network will hold its first networking conference in Vilanculos. *For more information, or to become a member Visit:* <u>www.asknet-office.net</u> Dr Maria Neira, WHO Director: Public Health & Environment, in the foreword. "Ensuring poor people's access to safe drinking water and adequate sanitation and encouraging personal, domestic and community hygiene will improve the quality of life of millions of individuals."

According to the publication, children, especially those in developing countries, suffer a disproportionate share of the disease burden related to water, sanitation and hygiene. Diarrhoea and malnutrition alone account for about 2,3 million preventable child deaths per year.

Up to 88% of cases of diarrhoea worldwide are attributable to unsafe water, inadequate sanitation or insufficient hygiene. These cases result in 1,5 million deaths a year, mostly of children. In turn, malnutrition causes about 35% of all deaths of children under the age of five years. An estimated 50% of this malnutrition is associated with repeated diarrhoea or intestinal nematode infections as a result of unsafe water, inadequate sanitation or insufficient hygiene.

It is important to note that large-scale

engineering solutions are not always required to make a difference, and interventions that work in rural areas may be very different from those in urban areas. While most communities strive for waterborne sewerage systems, these can be sources of disease if they are not managed and maintained effectively.

According to the WHO publication, investing in drinking water and sanitation offers not only health but also economic benefits. For example, health agencies could save US\$7-billion a year; with 320 million productive days gained each year in the 15- to 59-year age group. Time savings resulting from more convenient drinking water and sanitation services total 20 billion working days a year; with values of deaths averted, based on discounted future earnings, amounting to US\$3,6-billion a year. The WHO shows a total payback of US\$84-billion a year from the US\$11,3-billion per year investment needed to meet the drinking water and sanitation targets of the MDGs.

To access the publication go to http://whqlibdoc.who.int/publications/2008/9789241596435\_eng.pdf

### Special day to celebrate cleanliness

Millions of children in 20 countries across five continents will join hands to encourage handwashing with soap on the first-ever Global Handwashing Day (15 October).

The inaugural day, spearheaded by UNICEF, USAID, Centres for Disease Control and Prevention; Water and Sanitation Programme; Unilever; and Procter and Gamble, is set to help take the often over-

looked hygiene challenge of handwashing to the forefront of the international agenda. Handwashing plays an important part in the efforts to reach the Millennium Development Goals relating to health improvements, education and the reduction of poverty and child mortality.



This year, Global Handwashing Day will focus on school children as agents of change and create fusion and full commitment of schools, homes and communities to maximise outreach to children all over the world. For more information, visit <u>www.globalhand-</u> <u>washingday.org</u>





A new manual for the design of small sewage treatment works will soon be available from the Water Research Commission (WRC).

Many of the 1 500 sewage treatment plants in South Africa are classified as 'small' works (up to 5 Mℓ/day capacity). These plants use various technologies ranging from extended aeration, activated sludge, trickling or biofilers and oxidation ponds.

For the last 20 years designers, engineers and chemists have made use of the so-called 'Black Book', *A Guide to the Design of Sewage Purification Works*, which was first published in 1973 and updated in 1987. However, new and improved sewage treatment technologies warranted the update of these guidelines, reports project leader Sue Freese. "There was also a realisation that there was a specific need for a manual applicable to smaller sewage treatment works."

The new manual will include changes or new developments in technology. There will also be some changes in the outlay appearance of the manual. Among the technologies addressed include preliminary treatment, anaerobic treatment of wastewater, ponds and wetlands, sedimentation, activated sludge, fixed-film aerobic processes, sludge treatment, disinfection and chemical treatment. The new manual also includes chapters on pumps and safety as well as general design preliminaries.

The manual is expected to be finalised before the end of the year. Once published, a series of workshops are planned to introduce the manual to industry.

#### SANITATION ON THE WEB

#### www.dwaf.gov.za/documents.asp http://esa.un.org/iys/ The documents home page of the Depart- This is the official Uni

The documents home page of the Department of Water Affairs & Forestry includes information on all policies and legislation related to sanitation and waste services.

#### www.afdb.org/portal/page?\_ pageid=473,969995&\_dad=portal&\_ schema=PORTAL

The first African Water Week was held in Tunisia from 26 to 28 March. This Web page, hosted on the African Development Bank website contains the proceedings of the conference as well as press releases, transcripts of interviews and participants' reactions. This is the official United Nations website for the International Year of Sanitation. The aim of the campaign is to raise awareness and to accelerate progress towards the Millennium Development Goal MDG target to reduce by half the proportion of the 2,6 billion people without access to basic sanitation by 2015.

www.lboro.ac.uk/well/index.htm The WELL Resource Centre Network for Water, Sanitation and Environmental Health has created a special Web page for knowledge and information products concerning sanitation in celebration of the International Year of Sanitation.

#### SANITATION BY NUMBERS

10 million – The number of viruses one gram of faeces can contain. It can also contain a million bacteria, 1 000 parasite cysts and 100 worm eggs.
2002 – The year that sanitation was included as one of the United Nations Mil-

lennium Development Goals. **1,5 million** – The estimated number of cases of diarrhoea in children under five recorded in South Africa each year. This means that more than 100 children die every day from diarrhoeal diseases in the country. **40%** – The percentage of the world's population lacking access to basic sanitation. **10,9 million** – The additional number of people who have received access to decent sanitation since 1994 through the efforts of the South African government.

**0,5%** – The percentage of the country's gross domestic product the Minister of Water Affairs & Forestry, Lindiwe Hendricks, aims to eventually be spent on sanitation services delivery.

**5%** – The percentage of GDP that the lack of access to adequate sanitation alongside safe drinking water is costing sub-Saharan Africa every year, according to UK nongovernmental organisation WaterAid.

**2076** – The year the Millennium Development Goals regarding sanitation will be met in sub-Saharan Africa at the current rate of supply.

**18%** – The proportion of the global population that still practices indiscriminate or open defection.

**900 000** – The number of child deaths due to diarrhoea that could be averted with increased access to proper sanitation and hygiene.

**US\$9** – The return on investment in increased productivity and a reduced burden of healthcare for every US\$1 spent on sanitation.

**12%** – The percentage of the total health budget in sub-Saharan Africa that is paid to cure diarrhoeal diseases.

**R200-million** – The cost of the new Fisantekraal Wastewater Treatment Works being constructed by the City of Cape Town. The new regional sewage treatment works will be operational around mid-2010.



## Sanitation research: Laying the foundation for SUSTAINABLE SERVICE DELIVERY

The Water Research Commission (WRC) is backing basic sanitation-related research to the tune of R6-million a year to support government in its efforts to provide universal access to basic services by 2014. Lani van Vuuren reports.

Sanitation has been the so-called 'Cinderella' of basic services in many countries and for a long time the situation in South Africa was no different. When the country held its first democratic elections in 1994 only about 50% of households had access to sanitation. In the first few years of democracy delivery remained slow, hampered by the lack of focus and the division of attention spread over seven different government departments.

The outbreak of cholera in KwaZulu-Natal in 2000 served as a huge wake up call for the country, however. The epidemic resulted in 265 deaths in five provinces, and 117 147 people, mostly in KwaZulu-Natal, were infected. Increased investment in sanitation investment followed. By 2007, about 73% of households had access to at least a basic level of sanitation.

Government admits that the rate of delivery could have been faster if the extensive roll-out of housing was supported by bulk water and sewerage infrastructure upgrading. The eradication of the bucket system in formal settlements, although completed in most such settlements, remains an elusive target for a handful of municipalities.

#### **EARLY INVESTMENTS**

The WRC became actively involved in funding basic sanitation in the 1980s, especially as the main problem areas that required research to deal effectively with water supply and sanitation in developing countries began to emerge in the aftermath of the Water Supply and Sanitation Decade (1980-1990). Experience gained during the decade indicated that problems in service delivery centred mainly on social, cultural, gender, training, institutional and financial issues, with technological issues being of relatively minor importance.

**Sanitation research** 

In the South African context, this was strongly confirmed by the strategic research plan developed by the Research Coordinating Committee for Water Supply & Sanitation for Developing Rural and Urban Communities, established by the WRC during 1994. Early findings on water supply and sanitation coverage emerging from WRC-funded initiatives became the reference standard for policy- and decisionmakers, and were incorporated into, for example, Reconstruction and Development Programme documentation and government White Papers.

#### CONTINUOUS CHALLENGE

Delivering sustainable basic infrastructure to the remaining unserved percentage of the population remains one of South Africa's greatest socio-economic development challenges. According to the Department of Water Affairs & Forestry, the cost requirement to eradicate the sanitation backlog alone amounts to R25-billion. This excludes cost of operation and maintenance.

Municipalities, on whose shoulders the responsibility for basic services delivery squarely lies, are faced with the challenges of accelerating new service delivery while maintaining existing ageing infrastructure amid a burgeoning population, rampant urbanisation and diminishing skills and capacity.

#### ACCELERATING INVESTMENT

The strategic focus of the WRC is guided by these challenges, with a key consideration being to achieve integrated and holistic solutions that aid sustainable development. There is ongoing emphasis on assisting and capacitating local government in the delivery and acceleration of services, education around sanitation and hygiene issues, and the promotion of sustainable solutions.

### "The cost requirement to eradicate the sanitation backlog alone amounts to R25-billion. This excludes cost of operation and maintenance."

According to Jay Bhagwan, WRC Director: Water Use & Waste Management, the WRC has identified four key areas which are anticipated to provide significant challenges in the basic sanitation sector in the near future:

- Acceleration of sanitation delivery through improved policy and processes such as hygiene education, attention to sanitation for the disabled, aged and very sick individuals (for example, those suffering from HIV/Aids);
- Degradation processes in ventilated improved pit latrines (VIPs) and its derivatives. These impact on the operation and life of the pit, as well as the safety of the pit contents for handling and reuse;
- Strategies and technologies for the emptying of VIPs and the safe management of pit sludges; and
- Finding new, appropriate technologies and approaches to manage greywater and drainage in low-income areas.

#### **CURRENT PROJECTS**

The WRC's current basic sanitation research portfolio includes many projects. One example is the development of a

#### Table 1: Households with access to sanitation

	1994	2000	2007
Number of households	10 150 478	11 422 150	12 879 070
Households with access to sanitation	5 065 626 (49,9%)	6 582 297 (57,6%)	9 353 279 (72,6%)
MDG	7 608 052	8 561 204	9 653 204
Household with bucket systems	609 675	490 021	113 085

Source: Development Indicators 2008

guideline tool aimed at empowering water and sanitation services providers in the implementation of sanitation, health and hygiene education programmes in informal settlements. 9

Another research project is focusing on capturing sustainable ways of accelerating the provision of safe and hygienic sanitation to the millions of South Africans who are still unserved. In this multiyear project the bottlenecks to faster delivery are being identified and analysed, and examples of how they have been successfully overcome documented. Tools and guidelines will be produced to help municipalities achieve the required rate of sustainable service delivery. The project will also document ways to reduce the cost of sanitation delivery to urban areas, and informal settlements in particular.

Another research project funded by the WRC is investigating the feasibility of free basic sanitation. The emphasis here is on identifying successful and cost-effective approaches to implementing sanitation subsidies for sanitation infrastructure in order to achieve government's 2014 sanitation target.

Furthermore, research into the understanding and improvement of basic sanitation technologies continues. One such project is seeking to understand the sludge accumulation in VIPs and other on-site sanitation systems to manage desludging once the pits are full. The research aims to tackle the question of sustainability and through the knowledge generated make the sector better prepared to deal with the challenges.

Through the funding of these and other projects the WRC is playing a crucial role in basic sanitation service delivery. "Our research is providing much needed knowledge and technologies which will assist municipalities in making strategic and informed decisions against the myriad of challenges which exist and will emerge in the future," concludes Bhagwan.





South Africa could be chasing a perpetual sanitation backlog if not more thought is given to the rollout as well as operation and maintenance of basic sanitation services, a Water Research Commission (WRC) study has found. Lani van Vuuren reports.

S anitation delivery in South Africa has increased sharply since the early 2000s, with about 17 000 units being delivered a year (excluding urban sanitation provided under the national housing programme). According to the Department of Water Affairs & Forestry, 2,8 million households have received at least basic sanitation services since 1994, with a further 3,3 million still to be served before government's deadline of 2014.

Single-pit ventilated improved pit (VIP) toilets continue to be considered the minimum level of sanitation of choice for many municipalities responsible for improving access to services in their rural and peri-urban communities, and over a million VIPs have been constructed around the country since 1994. While they remain and offer a good basic sanitation delivery option, their long-term sustainability pose a number of challenges to policymakers when the pits fill up. This is compounded by the fact that, generally, the contents of the pits or what happens to material in the pits are not well known or understood.

#### "Not much thought was given on the required actions once the pits filled up."

"VIP planning and design dates from a time when government intervention was minimal and toilet construction was mostly owner driven," explains WRC Director Water Use & Waste Management Jay Bhagwan. "Therefore, not much thought was given on the required actions once the pits filled up. This is further compounded by the fact that current interventions put greater emphasis on the civil engineering and project management aspects of VIPs."

In principle, the rate at which the pit contents break down through biological activity should be similar to the rate of filling, thus providing a long service life for the pit. However, field experience has indicated that, in many areas, VIPs are filling up much faster than their design life, notes Bhagwan. This can occur either due to the size of the pit or because of undesirable solid waste and greywater being disposed of down the pit by the household.

**Basic sanitation** 

Once an on-site sanitation system is full, it can no longer fulfil its function of providing safe, hygienic and dignified sanitation for its owners. Thus, despite being in possession of a VIP, the households do not have access to basic sanitation and therefore must be regarded as unserved.

"A shorter lifespan means an increase in maintenance costs should the desludging of pits be required. This is expensive (in some instances costing as much as installing a new pit) and becomes very difficult if the pits and superstructures are not designed to allow for desludging. Often pits have to be desludged manually, which carries a significant health and safety risk. On the other hand, if desludging proves difficult, then the other option is to build new VIPs, which contributes to the sanitation backlog," says Bhagwan.

### WHAT HAPPENS DOWN THERE?

Historically, most research on VIPs has focused on elements above ground (the superstructure), with little data available on the degradation mechanisms or processes occurring in VIP toilets. For this reason, the WRC initiated a number of research studies to develop a more comprehensive scientific base to understand VIP technology and find ways to mitigate the current experiences and develop solutions.

The Pollution Research Group at the School of Chemical Engineering at the University of KwaZulu-Natal conducted field and laboratory investigations of VIPs and their contents in and around the eThekwini municipal area. The objective was to understand the conditions prevailing in the pits and to propose design and operating practices for extending the life of the pits.

A number of studies were undertaken within this project to characterise the material found in a VIP and to infer what processes have occurred in the pit from the time when material is added via the pedestal to the time when it is sampled from some depth within the pit. It was observed that the nature of pit latrine contents varied widely within a pit latrine and between pit latrines.

"Removal of pit contents is extremely hazardous to the health (and safety) of workers and members of the community who have access to the area around the pit latrine during and after pit emptying operations."

The project team observed that pit contents could look very different and have very different chemical and physical characteristics when comparing pits from different communities and even within communities. Many of the variations noted were due to differences in user practices, such as the type of cleansing material used, and the practice of using the pit as a solid waste disposal site in some communities.

Other variations may have been due to the geographical location of the VIP, such as moisture content due to the presence of groundwater.



#### Basic structure of a VIP

#### WHAT IS A VIP?

For a pit latrine to qualify as a ventilated improved pit, it must comply with certain requirements, it must:

- Provide hygienic separation of human waste from contact with people;
  Have a vent pipe fitted with a flyscreen to minimise odour and flies;
- Be built on a secure slab that will resist collapse of the superstructure; and Drouido privacy and dispity for the
- Provide privacy and dignity for the user.



Millions of VIPs are being rolled out to rural communities in efforts to meet government's sanitation target.





A poorly maintained, overflowing pit latrine, filled with nonbiodegradable material.



Contents of pit latrines extracted during pit emptying near Tongaat, KwaZulu-Natal.



Pit latrine contents were sampled from several areas and studied. Differences were also observed between samples taken from the top of the pit, and samples buried within the pit. The differences in the nature of pit contents affect the type and extent of biological processes that may occur. Equally, the processes occurring affect the nature of the pit contents, particularly of the pit contents located well below the surface of the pit latrine.

Why are these observations important? They emphasise the fact that management of pit latrine sludge is not a onedimensional problem, but may require different approaches that are dependent on the nature of the pit contents.

#### **MAN OR MACHINE**

The project team emphasises that the future emptying of VIPs should be taken into account right from the start when the pits are designed. Absolutely unacceptable is a heavy permanent structure single-pit VIP with access only through the pedestal.

If manual emptying is the only method that is practically and economically possible, then the pits should be provided with removable slabs, preferably at least two. Furthermore, the required pit volumes should be achieved by increasing pit area rather than pit depth, as it is very difficult to manually empty a pit which is deeper than 1,5 m without the worker having to get into the pit, and this should be avoided for health and safety reasons.

Removal of pit contents is extremely hazardous to the health (and safety) of workers and members of the community who have access to the area around the pit latrine during and after pit emptying operations. Examination of face masks worn by workers engaged in emptying pit latrines and screening the exhumed contents indicate that viable ova of a number of helminth species, including *Ascaris, Trichuris* and *Taenia* spp (roundworm, whipworm and tape worm) may be present in pit latrine contents.

Basic sanitation



#### Table 1: Factors that may affect performance of a pit latrine

Construction and location	Operation	Maintenance
Construction of walls and base of the pit	Age of the pit	Frequency/history of emptying
Permeability of the walls and base of the pit	Addition of other material (e.g. household waste)	Amount of seed material left after emptying
Construction of slab, collar and superstructure of the latrine	Ingress of (non-urine) liquid via the top of the pit	Additives used to enhance digestion
Height of water table (low/high)	Rate of filling/number of users	Ownership: communal or private
Type of soil	Anal cleansing material	
Presence of bedrock or sandy aquifer		
Proximity of other pits		

Furthermore, the disposal of pit sludge to wastewater treatment works has been found to be unacceptable and uneconomical, both from a transport and a waste handling point of view. A simpler, more economical and probably more beneficial option appears to be the burial of pit sludge as near as possible to the VIP.

#### TO ADD OR NOT TO ADD

One approach being proposed to extend the life of a filling or full pit is the application of commercial pit latrine additives. These may be chemical, microbiological or enzymatic in nature. The additives are promoted as being able to reduce (or even reverse) the sludge accumulation rate in the VIPs, and also to reduce potential problems of flies and odours.

While anecdotal evidence suggests that they may well be effective, independent scientific evidence of their efficacy is scarce. Equally, a number of informal studies have suggested that these additives do not perform significantly better than the addition of plain water or inert additives. The research has found through controlled experimental conditions, that these VIP additives add no benefit to accelerate the rate of degradation of pit latrine contents under either aerobic or anaerobic conditions. Twelve locally available products were tested and none have been found to be effective.

### FOUR FACTORS FOR SUCCESS

The WRC project found that a VIPs ability to safely accumulate and biodegrade human faecal waste was dependent on four important factors:

### STEPS TO SUCCESSFUL VIP IMPLEMENTATION

- The VIP substructure and superstructure must be properly constructed to prevent collapse, control flies and odours, and to facilitate emptying if this will be required.
- Educate users on the use and maintenance of VIP toilets.
- Ensure the presence of an effective solid waste removal programme.
- Budget for maintenance and emptying or rebuilding.
- Train members of the community to conduct simple maintenance work.
- User education poor user practice cause unhygienic conditions to exist in and around the latrine.
- Solid waste management It was found that where there was an efficient solid waste removal programme there tended to be a lower fraction of solid waste in the pit contents. The presence of non-degradable solid waste accelerates pit filling rates and makes emptying the pit more difficult.
- Emptying Large-scale projects have been undertaken to build VIPs for unsewered communities without adequate planning and budgeting in place to deal with the emptying, rebuilding or maintenance of full or damaged pit latrines. It is vital that the provision of sanitation by national government and municipalities is accompanied by a detailed, sustainable and appropriately budgeted

and financed plan for dealing with maintenance and emptying issues that will arise in the expected lifetime of the pit.

Maintenance – For latrines with missing or damaged features, including doors, pedestals and lids, backplates, flyscreens and vent pipes, users not only did not understand the importance of repairing or replacing these parts, but also did not know how to access new parts or the expertise to perform simple maintenance. This suggests that there should be a supplementary programme that ensures a supply of spare parts and the training of maintenance contractors to undertake simple maintenance work.

"These experiences and the research findings are of international relevance," report Bhagwan. "There is a risk that the large-scale rollout of low cost, on-site systems that are poorly designed and poorly understood will not assist in achieving the Millennium Development Goal and national target, but rather prove unsustainable, fail to improve quality of life and create new problems for policymakers and service providers when they fill up or fail."

The WRC is funding ongoing research to deal with this looming challenge.

To access the report, *Scientific Support for the Design and Operation of Ventilated Improve Pit Latrines and the Efficacy of Pit Latrine Additives* (WRC Report No: TT 357/08), contact Publications at Tel: (012) 330-0340; Fax: (012) 331-2565; E-mail: orders@wrc.org.za

Traditional Healers to Spread the Word on Health & Hygiene

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Levi

Sanitation & culture

# Traditional health practitioners have an important role to play in sanitation, health & hygiene initiatives, a study funded by the Water Research Commission (WRC) has found.

xperience has shown that hardware, i.e. the installation of physical sanitation infrastructure, does not necessarily improve community health unless complemented by comprehensive health and hygiene education. If households do not adopt improved hygiene practices, improving their access to safe sanitation will not make much of a difference to their health and well-being.

In South African communities, people's day-to-day practices and behaviours related to health are often influenced by traditional health practitioners. Considered the custodians of communities' culture and indigenous knowledge they more often than not hold a high position of trust and status among the people they serve.

Traditional health practitioners are characterised by modes of healing that include a more or less shared herbal pharmacopoeia, and distinctive practices of divination and possession by ancestral spirits. Indigenous to South Africa in this category are sangomas, inyangas, herbalists, traditional surgeons and faith healers. Other traditional health practitioners found in South Africa are Buddhist, Chinese, Hindu, Muslim and European herbalists, and homeopaths among others.

Despite the existence of a variety of traditional healers in South Africa, they have historically been located on the fringes of the broader medical health system, although they are the first port of call for many South Africans. In fact, research indicates that up to 80% of the country's population regularly make use of traditional health practitioners.

According to consulting firm Sigodi Marah Martin (SMM), which was appointed by the WRC to undertake the study into the potential role of traditional health practitioners in sanitation promotion, these healers are generally more available and more affordable for ordinary people than conventional doctors. They usually also offer more flexibility in payment. "This makes traditional health practitioners a possible key partner in the advancement of sanitation, health and hygiene education."

This conclusion can also be gleaned from traditional health practitioners' involvement in HIV/AIDS programmes in different countries, particularly in Africa. Some challenges for their involvement remain, however, including the paradigmatic differences between the biomedical and traditional health disciplines as well as the historical relationship of traditional health practitioners to the legislative context and formal healthcare infrastructure, notes SMM in the final WRC report.

"The present moment in time when there is legislation being put in place which gives formal recognition to traditional health practitioners offers a definite opportunity to leverage and engage the expertise of these healers in addressing backlog legacies and in the process bridging the critical gap between hardware installations and changing daily community practices around healthy, hygiene and sanitation issues."

To order the report, *Involving Traditional Health Practitioners in Health, Hygiene and Sanitation Education and Promotion* (**Report No: 1521/1/07**) contact Publications at Tel: (012) 330-0340; Fax: (012) 331-2565; E-mail: <u>orders@wrc.org.za</u>.

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#### TRADITIONAL PRACTICES RELATED TO HEALTH, HYGIENE AND SANITATION

he practice of rubbing one's hands with ash and washing one's hands with bile from animals to ensure clean hands was particularly



important in areas where water was not readily available.

Historically, people relied on rivers and streams for bathing and washing laundry, while water from springs was used for consumption. These water sources were respected and there was no dumping of rubbish near rivers and streams. Rubbish was rather dumped in a special place where it would later be burned. tioners told researchers at workshops that children would be told fairy tales to adopt hygienic toilet practices. For example, children were told if they defecated on the ground and not covered their waste with soil they would not be blessed by the angels. Children were also warned that if they urinated in a water source and a crab drunk their urine they would change sex.





# **Rural Poor** Struggling up the Sanitation Ladder

More than seven out of ten people without improved sanitation live in rural areas.

If you are rich and living in a city in sub-Saharan Africa you are five times more likely to have access to safe sanitation than a poor person living in a rural area. This is one of the findings of the latest report of the World Health Organisation/UNICEF's Joint Monitoring Programme for Water & Sanitation.

he report, which has a special focus on sanitation, details global progress towards the UN Millennium Development Goals. It also introduces a new way of assessing global, regional and country progress using the 'ladder' concept for both sanitation and drinking water. The ladder concept shows sanitation practices in greater detail, enabling experts to highlight trends in using improved, shared and unimproved facilities and the trend in open defecation.

The report indicates that many countries are making rapid progress in improving households' access to safe sanitation despite formidable odds. Yet, only 62% of the world's population has access to improved sanitation - that is, uses a facility that ensures hygienic separation of human excreta from human contact (2006 figures). A further 8% shares an improved facility with one or more households, and another 12% uses an unimproved facility, such as an unimproved pit toilet or a bucket toilet. The remaining 18% of the world's population practices indiscriminate or open defecation.

"At current trends, the world will fall short of the MDGs sanitation target by more than 700 million people," said Ann Veneman, UNICEF Executive Director. "Without dramatic improvements, much will be lost."To meet the target, at least 173 million people on average per year will need to begin using improved sanitation facilities.

Most countries that are not on track to meet the MDG sanitation target are in sub-Saharan Africa and in Southern Asia. More than half a billion people in Africa lack improved sanitation facilities.

#### **RICH VS POOR**

The report reveals huge disparities between urban and rural sanitation coverage. The world's urban sanitation coverage has risen to 79%, while rural coverage has reached only 45%. The largest disparity between urban and rural sanitation coverage is found in Oceania, Latin America, the Caribbean and Southern Asia. In 2006, more than seven out of

ten people without improved sanitation were rural inhabitants.

That said, rapid population growth in urban areas pose a growing challenge. The number of urban dwellers using improved sanitation has risen by 779 million since 1990, but has not kept pace with urban population growth of 956 million.

The JMP report also notes that the use of improved sanitation facilities is substantially lower among the poor than the rich. An analysis across 38 developing countries shows that the poorest 20% of the population has only a third of the access to improved sanitation as the richest quintile. In sub-Saharan Africa, inequality is higher still: the richest 20% of the population is five times more likely to use an improved sanitation facility than the poorest 20%.

#### THE FIRST RUNG OF THE LADDER

Open defecation is the last recourse for those without any form of sanitation

Region	Sanitation coverage (%)		Coverage needed to	MDG target	Progress
			be on track in 2006	coverage (%)	
	1990	2006			
Western Asia	79	84	86	90	On track
Latin America & Caribbean	68	79	78	84	On track
Northern Africa	62	76	74	81	On track
South-eastern Asia	50	67	64	75	On track
Eastern Asia	48	65	65	74	On track
Developed regions	99	99	99	100	On track
Commonwealth of Independent States	90	89	93	95	Not on track
Oceania	52	52	69	76	Not on track
Southern Asia	21	33	46	61	Not on track
Sub-Saharan Africa	26	31	50	63	Not on track
Developing regions	41	53	60	71	Not on track
World	54	62	69	77	Not on track

#### Table 1: Regional and global progress towards the MDG sanitation target

Source: WHO/UNICEF Joint Monitoring Programme for Water Supply & Sanitation

- those at the bottom of the sanitation ladder who must endure the daily indignity of defecating in open, often publicly accessible, spaces. Open defecation is of fundamental importance to development because of the health hazard it poses to anyone living nearby. If some members of a community continue to defecate in the open, then the whole community is at greater risk of diarrhoeal diseases, worm infestations and hepatitis than people living in communities where open defecation is not practiced.

Statistics show that the proportion of people practicing open defecation has decreased in developing regions, dropping from 31% in 1990 to 23% in 2006. Around the world, 1,2 billion people still have no access to any form of sanitation facility – only 13% of them are in urban areas. In sub-Saharan Africa, 221 million

people are still defecating in the open, the second largest total for any region, 39% of them are in rural areas compared to 8% in urban areas.

The WHO and UNICEF both point out that poor sanitation threatens children's survival as a faecally-contaminated environment is linked directly to diarrhoeal disease, one of the biggest killers of children under the age of five. "We have today a full menu of low-cost technical options for the provision of sanitation in most settings," noted Dr Margaret Chan, WHO's Director-General. "More and more governments are determined to improve health by bringing water and sanitation to their poorest populations. If we want to break the stranglehold of poverty, and reap the benefits of health, we must address water and sanitation."

To access the report, visit



Improved sanitation coverage by wealth quintiles in 38 developing countries

Table 2: Countries with thelargest proportion of populationthat gained access to improvedsanitation, 1990-2006

Countries making the most rapid progress			
Country	Proportion of the		
	population that		
	gained access to		
	improved sanitation		
	since 1990 (%)		
Myanmar	68		
Syrian Arab Republic	48		
Vietnam	47		
Guatemala	44		
Philippines	43		
Angola	42		
Honduras	40		
Pakistan	40		
Mexico	39		

Source: WHO/UNICEF Joint Monitoring Programme for Water Supply & Sanitation



In sub-Saharan Africa the richest 20% of the population is five times more likely to use an improved sanitation facility than the poorest 20%.



### **WRC Sanitation Reports**

#### Report No: 1629/1/08 Research into Urine Diversion Ventilated Improved Doubled Pit Toilets: Physical and Health-Related Characteristics of UD/VIDP Vault Contents

#### (CA Buckley; KM Foxon; N Rodda; CJ Brouckaert; S Mantovanelli; and M Mnguni)

eThekwini Municipality is considered one of the leading municipalities in South Africa in the provision of basic sanitation services. The municipality has selected urine UD/VIDP toilets as the preferred delivery mechanism for certain communities in their area of responsibility. At the end of 2007, there were 58 000 toilets constructed with the plan to build 10 500 new units per year. This project aimed to provide a scientific basis for the design and operation of UD toilets as used by the municipality; evaluate the effectiveness of UD toilets in improving the well-being of the user community and determine the fate of Ascaris spp. eggs from UD toilets.

#### Report No: TT 275/06 Guidelines for the Design, Operation and Maintenance of Urine Diversion Sanitation Systems (LM Austin)

Urine diversion sanitation technology is based on the concept of keeping faeces and urine separate. The main advantages of this approach are, firstly, that the valuable nutrients (nitrogen, phosphorus and potassium) found in urine can be captured and reused, and secondly, that the dangerous pathogens present in faeces are more easily isolated from the environment. This report briefly introduces the concept of urine diversion. This is followed by guidelines for constructing a urine diversion toilet, with sections on building materials and methods for the superstructure, faeces vault, urine pipes, ventilation and fly control, and upgrading of ventilated improved pit and bucket toilets. A number of illustrations accompany the text, including pictures of both good and bad practice.

Operation and maintenance aspects are covered in detail, with sections on dehydration, odour and fly control, cleaning the pedestal, disposal of anal cleansing material, urine collection and disposal, clearing blockages in the urine pipes, and faeces management.

#### Report No: 1635/1/07 Towards a Knowledge and Information Dissemination Strategy for Sanitation

(Hlathi Development Services) Much research has been done to address the major issues responsible for poor progress in the reduction of sanitation backlogs in developing countries. Effective communication and dissemination of this information to decision makers and sanitation implementing agents remain a big challenge for the sanitation sector. The aim of this project was to improve dissemination of sanitation knowledge and information and to develop effective mechanisms for promoting the implementation of best practice by sanitation sector players.



#### Report No: 1523/1/07 The Effectiveness of Sanitation Awareness and Education Programmes in Informal Settlements (Nemai Consulting)

This research project investigated the impact of sanitation education and awareness programmes in informal settlements in South Africa. Seven programmes were reviewed and evaluated and the lessons learnt documented. Government departments, municipalities, water services providers, water utilities, water boards, and non-governmental organisations were contacted.

#### Report No: 1386/1/05 Impacts of Stormwater and Groundwater Ingress on Municipal Sanitation Services

#### (D Stephenson and B Barta) Stormwater inflows and groundwater infiltration into sewers have costly implications for municipalities. One of the main findings of this project was that most water services authorities and water services providers in South Africa resort to reactive maintenance. It was found that stoppages and clogging sewers in South Africa are about ten times higher per unit length than the international average.

#### Report No: 1438/1/05 Strategic Approaches in the Provision of Sanitation Services to Informal and Unserviced Areas

(Alvin Lagardien and Deborah Cousins) According to this study, most of the current infrastructure delivery approaches are not able to integrate the components of health, infrastructure delivery and effective pro-poor community partnerships in any meaningful way. The guideline proposes a practical approach which is simple, yet effective in dealing with the complexities of the sanitation environment.

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