

The Design, Development and Transfer of a Sanitation Hand Washing Dispenser to Rural Areas in South Africa

M WILKINSON¹, N MOILWA² AND B TAYLOR³

^{1,2,3}CSIR Natural Resources and the Environment, PO Box 395, Pretoria 0001 ¹Email: mwilkinson@csir.co.za ²Email: nmoilwa@csir.co.za ³Email: btaylor@csir.co.za

South Africa is a country of extremes where many people in rural areas still lack basic services such as water and sanitation. It is estimated that 5 million South African do not have access to basic water services, while 17-18 million lack basic sanitation services. South Africa launched the WASH programme with one of the aims being to increase the incidence of hand washing at the right times so as to significantly decrease the incidence of water-related diseases. This paper looks at hand washing behaviour in villages in two municipalities in South Africa and shows the technology development which evolved out of the difficulties experienced by households in the country in terms of basic hand washing requirements.

INTRODUCTION

It is estimated that 5 million people in South Africa do not have access to basic water services, while 17-18 million lack basic sanitation services (Kasrils, 2003) In 2001 there were 4,7 million households with inadequate sanitation, and at least 1, 5 million households (approx. 5.7 million people) without any form of sanitation facility (Statistic South Africa, 2003). Those with inadequate sanitation facilities use bucket systems, unimproved pit toilets or the bush.

Sanitation services in the South African context mean:

- Provision of a toilet facility;
- Health and hygiene education; and
- Correct management of domestic wastewater and rubbish.

To ensure that sanitation services are delivered to un-served rural households, government made provision in the form of a subsidy.

South Africa has a number of significant programmes concerned with the delivery of water supply and sanitation, including the Community Water Supply and Sanitation programme (CWSS) of the Department of Water Affairs and Forestry (DWAF). Government complemented this with the promotion of health and hygiene through its WASH (Water, Sanitation and Hygiene for all) programme. The focus of WASH is less about broad level advocacy and concentrates instead on niches and leverage points that support existing sanitation initiatives. In short, the programme focuses on washing hands with water and soap.

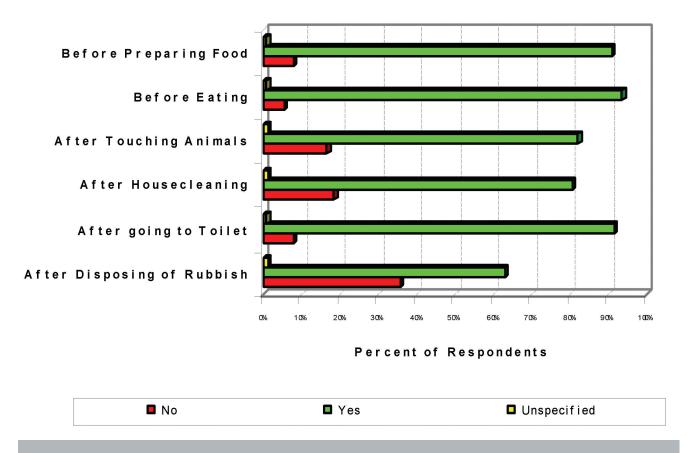
AN INVESTIGATION OF HAND WASHING IN THE MPUMALANGA PROVINCE OF SOUTH AFRICA

Two District municipalities in the Mpumalanga Province of South Africa were investigated. Data were collected from five villages in the Nkomazi Municipality and from Msogwaba village in the Mbombela Municipality. More than a thousand households were interviewed on issues relating to water and sanitation service provision, disease and hygiene behaviours. Data were analysed using SPSS.

Respondents to a questionnaire were asked questions relating to hand washing behaviour, which included whether they washed their hands:

- Before handling of food and food preparation?
- Before eating? After visiting the toilet?
- After housecleaning work?
- After disposing of rubbish?

Keeping in mind that there were no sanitation interventions in either of these areas at the time of the assessment, and thus no health and hygiene education programme had been carried out in the villages, one could expect that a low percentage of households washed their hands after these activities. However, Figures 1 and 2 show that between 60% and 95% of respondents indicated that they washed their hands before/after carrying out the activities listed above. Researchers quickly realised that these figures did not reflect whether hand washing actually took place, but rather the fact that respondents knew that they should wash their hands.



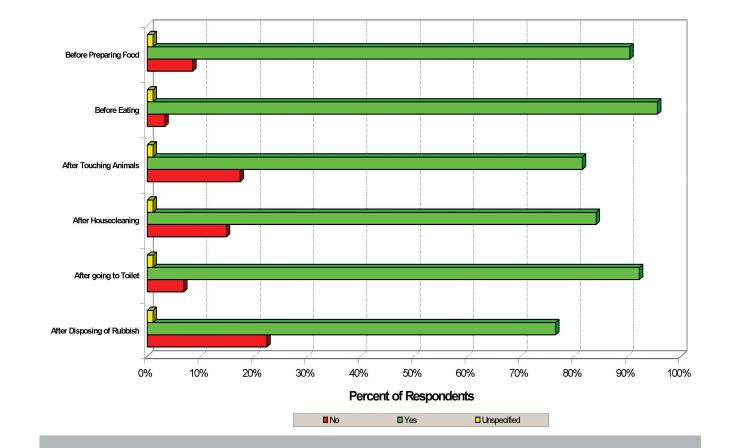


Figure 1: Hand Washing Behaviour of Respondents in Msogwaba village of Mpumalanga Province. Source: CSIR, 2003a

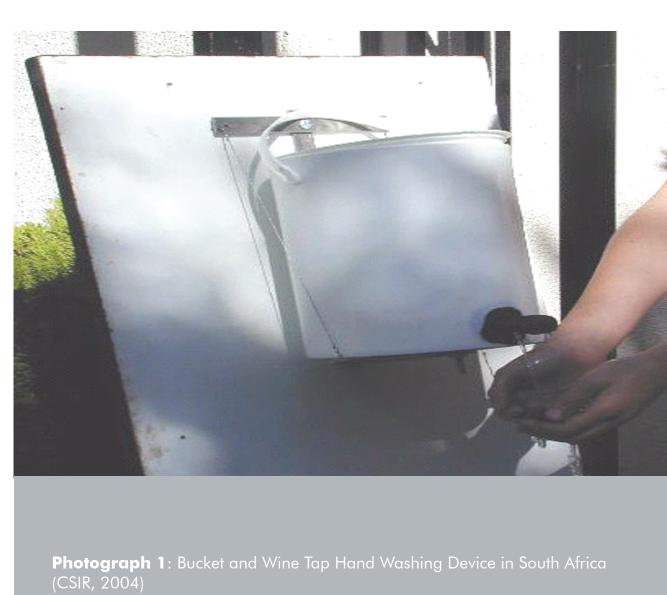
Figure 2: Hand Washing Behaviours in five villages in Nkomazi Municipality of Mpumalanga. Source: CSIR, 2003b

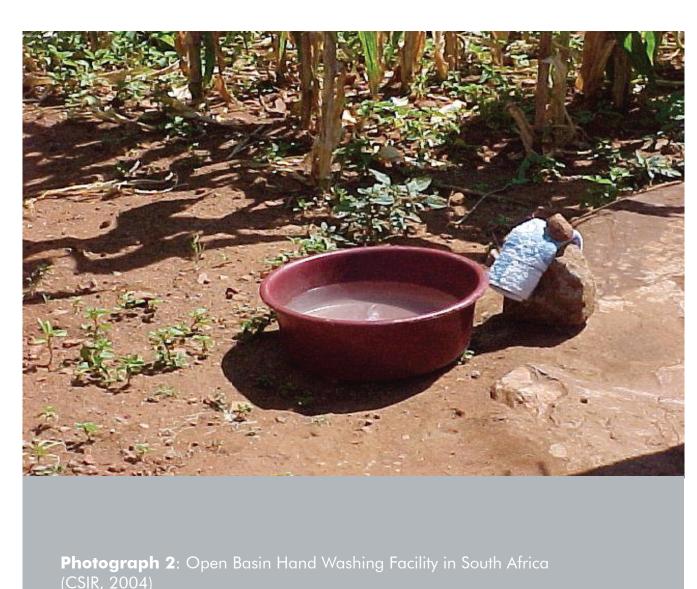
A study conducted in Zaire where results of direct observation of hand washing behaviour of mothers were compared to survey results, support the above assessment. The study concluded that mothers generally over-report desirable behaviours (FANTA, 1999). The problem is clear: interviewees tended to answer according to what the interviewers expect, and do not always reflect the truth. Aldemom et al (1997) also notes the private nature of these activities and the constraints that it presents to evaluation.

In the Mpumalanga study, hand washing behaviour was linked to the availability of sanitation facilities within the yard, availability of potable water for hand washing on a daily basis and the availability of hand washing facilities at household levels. The survey results are shown in **Table 1** below. Clearly, most households did not have adequate sanitation services or hand washing facilities and at the same time, did not receive potable water on a daily basis. Water supply to a source i.e. yard or street taps was intermittent with households usually only receiving water once or twice a week. This has created a culture of water storage in South Africa.

Service	Msogwaba Municipality (% Of Respondents)	Nkomazi Municipality (% Of Respondents)
Respondents with No Toilet Facility	33 %	49,2%
Respondents with a Toilet in Backyard (Pit latrines)	63,2 %	49,7 %
Respondents with Intermittent Supply of Potable Water	80,6 %	66,2 %
Respondents with no Hand Washing Facility	68 %	81 %

Table 1: Sanitation & Water Service Provision and Availability of Hygiene Facility in the Nkomazi and Mbombela Municipalities (CSIR, 2003a & 2003b)





In the assessment of the availability of hand washing facilities to carry out hand washing activities, more than 65 % of Msogwaba respondents and over 80% of Nkomazi respondents did not have hand washing facilities (CSIR, 2004). This same assessment found that most sanitation programmes in South Africa did not make provision for the supply of hand washing devices to support the hygiene behaviours programme. Devices that were being used in these programmes included:

- A bucket with a wine tap attached (see Photograph 1);
- A Built-in hand washing facility; or
- An open basin or bucket (see Photograph 2)

One of the key findings of research undertaken in South Africa by the WASH programme was that the reasons that people do not wash their hands is because they do not have easy access to water after going to the toilet (CSIR, 2004).

THE DESIGN AND DEVELOPMENT OF A HAND WASHING DEVICE

In South Africa, there is limited experience with hand washing devices in terms of the development of devices and the introduction of devices to sanitation projects. There was an urgent need to test these devices, to learn from experience with their implementation to date and to look at their application within school and household sanitation programmes.

Operating from the understanding of the need for hand washing devices and good sanitary hygiene behaviour in South Africa, the CSIR embarked on an initiative to design and develop a hand washing device that would be suitable for rural sanitation programmes. The device needed to provide householders with a cheap and hygienic source of water for the washing of hands.

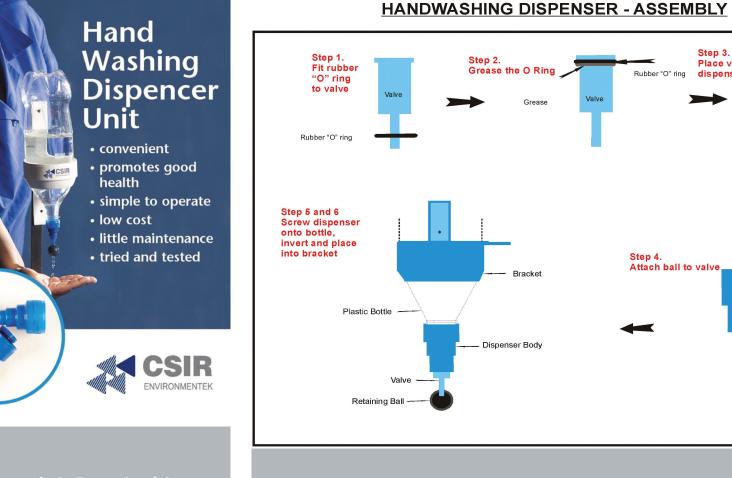
Since the South African government, through the WASH programme, was focused on addressing health and hygiene behaviours through awareness and education, the CSIR had to provide the financial resources for the design and development of the hand washing device. These resources were significant (Table 2) but it was felt the initial capital costs would be outweighed by the long-term benefits to each householder of having hygienic hand washing facilities attached to their toilet structure.

Activity	Cost (Rands)
Patent Search	R10 000-00
Patent	R11 000-00
Hand Washing Cap Mould	R50 000-00
Mould for the Hand Washing Bracket	R40 000-00
Human Resource Cost for Design	R100 000-00
TOTAL	R211 000-00

Table 2: Initial financial outlay required for the design and development of the CSIR hand washing dispenser

The system operates thus: the dispenser, while attached to a 2-litre bottle, releases sufficient water to enable a large number of people to wash their hands (Photograph 3). The dispenser attaches, via a screw thread, to a two-litre plastic cold drink bottle, containing clean water. This hangs upside down on a bracket attached to the wall of the toilet.





Photograph 3: Example of the

Figure 3: Assembly of the CSIR hand washing dispenser. Source: CSIR

The CSIR developed the hand-washing dispenser to address the following criteria:

- It was inexpensive: although the design costs of the hand washing dispenser were relatively high, the device itself is sold for very little (approximately \$1 US). This allows householders to afford more than one device, should they so wish.
- 2. **Simple to operate:** the device is so simple to assemble that the householders themselves can put them together. **Figure 3** shows the assembly process. The CSIR felt that the assembly could be done at a village level, which could encourage entrepreneurs to set up small businesses around the assembly and distribution of the devices.
- Has no tap but limits the flow to levels sufficient to complete the hand washing process: the device operates with an inverted plunger. To release water the householder pushes this plunger up with their hands and, once enough water has been released, by removing their hands, the plunger falls back into place and seals the bottle. This obviates the need for people to wash hands in the same water as in the case of a hand basin or bucket. It also ensures that very little water is wasted, which is a key concern in South Africa where householders have to walk long distances to collect water. The Msogwaba and Nkomazi sanitation baseline study showed that householders were collecting 183 and
- 124 litres per day respectively at a distance of between 103 to 155 metres when municipal water systems were not operational. The Household Hand Washing Dispenser was designed on the principle of reducing infection and the spread of waterborne and sanitation related diseases: the device allows for the release of water for without actual contact with the main water source in the bottle. This prevents cross-contamination of hand washing water.



The main advantage of a system like this is that the dispenser is small, with only one moving part, enabling the product to be inexpensively manufactured and hence the purchase and replacement cost is very low.

Since this system is one of a kind in South Africa, large numbers of the devices have been installed in sanitation programmes across the country. Householders are trained to operate the dispenser and to maintain the system to ensure the long-term operation of the device. Sanitation programme agents are presently purchasing the hand washing devices as part of the R300 subsidy allocation that is made available to householders for health and hygiene awareness and education. The total cost of the device and a bracket for attachment to the toilet structure is just over \$2 US. The device is usually attached outside the toilet facility (**Photograph 4**).

CONCLUSION

Although the South African government promotes hand washing as part of good sanitary hygiene behaviour, no guidance is given as to the devices that could be installed to assist with provision of clean water for hand washing. The CSIR hand washing dispenser is a device developed to assist rural households with washing of hands with clean water. This is one option available to householders. Hopefully, the development of this device will stimulate the design and development of other such devices, which could be offered as alternative options to rural householders.

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