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MAXIMIZING THE BENEFITS FROM WATER AND ENVIRONMENTAL SANITATION

A critique of approaches to measuring effective hand washing in Mpumalanga, South Africa

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Diarrhoeal disease was ranked fifth on the list of causes of premature mortality in South Africa in 2000. High standards of hygiene and access to safe water and sanitation services can be related to a reduced risk of diarrhea. Based on the understanding and interpretation of good sanitation, hygiene and related practices in South Africa, all sanitation programmes and interventions in the country focus to some degree on hand washing practices and behaviours. Health and hygiene interventions are implemented from the knowledge that hand washing can act as a barrier to several of the transmission routes of diarrhoeal pathogens. As a result, many sanitation interventions in South Africa begin with a baseline assessment which includes a review of present sanitation, hygiene and related practices. This paper focuses specifically on the measurement of one aspect of health and hygiene awareness in South Africa, namely hand washing behaviours. The paper is a critique of methods used in assessing these household behaviours in two villages in the Mpumalanga Province of South Africa.

Introduction

South Africa's mortality profile reflects a quadruple burden of disease arising from HIV/AIDS, chronic disease, pre-transional conditions relating to poverty and under-development, and finally injuries (Bradshaw et. al., 2000). Loss of life in the country, due to pre-transitional disease, can be attributed to diseases and conditions such as TB, diarrhea, lower respiratory infections and low birth weights. Diarrhoeal disease was ranked fifth in the list of causes of premature mortality in South Africa in 2000 (Bradshaw et. al., 2000). It is also a major cause of death among children under the age of five (Choi, 2003).

The World Health Report for 2002 identified unsafe water, sanitation and hygiene as one of 10 risk factors that account for more than one-third of all deaths worldwide (WHO, 2002a). High standards of hygiene, access to safe water and sanitation services can be related to a reduced risk of diarrhea (Choi, 2003). Since transmission of diarrhoeal disease occurs in the domestic domain, it may be prevented through changing domestic hygiene behaviours with all of the transmission routes of diarrheal pathogens being blocked by changes in these practices (Curtis et. al., 2000). Barriers which can be employed for this purpose include safe disposal of faeces, washing hands at crucial times, protecting water suppliers, water treatment, fly control and a clean surrounding environment.

As a result, basic sanitation in South Africa, and thus sanitation programmes and interventions have the purpose of the provision of a basic sanitation facility which is easily accessible to a household; the sustainable operation of the facility, including the safe removal of human waste and wastewater from the premises where this is appropriate and necessary, and the communication of good sanitation, hygiene and related practice (DWAF 2003a).

The South African government presently offers all poor households in the country a sanitation subsidy to assist in accessing basic sanitation services. Approximately 12,5 % of this subsidy is made available specifically for "soft cost" including health & hygiene issues. The national Guidelines for Using the Household Sanitation Subsidy, which are presently undergoing review, indicate that municipalities must resource pre-project sanitation hygiene awareness and demand creation activities as well as ongoing post project sanitation hygiene promotion and monitoring (DWAF, 2003b).

Based on the understanding and interpretation of good sanitation, hygiene and related practices in South Africa, all sanitation programme and interventions focus some attention on hand washing practices and behaviours. Health and hygiene interventions are implemented from the knowledge that hand washing can act as a barrier to several of the transmission routes of diarrhoeal pathogens (Curtis et. al., 2000). According to Curtis et. al. (2000), hand washing acts both as a primary barrier through the removal of faecal matter after contact with faeces, and a secondary barrier to transmission through hand washing before preparing food, handling fluids, feeding and eating.

Hand washing with soap may not be a new idea, but this simple hygiene act at critical times can save millions of lives annually. Research has shown various statistics for a reduction in diarrhoal disease as a result of hand washing. Research by Aldemon et. al. (1997) showed that hand washing with water and soap reduces diarrhoeal disease by

35%, while a systematic review conducted by Curtis and Craincross (2003) showed that interventions to promote hand washing with soap resulted in a 47% decrease in risk of diarrhoeal disease.

As a result, many sanitation interventions in South Africa begin with a baseline assessment which includes a review of present sanitation, hygiene and related practices. There is no standardized format for this review and very few follow-up assessments of behavioural changes and impacts which have resulted from the sanitation programmes health and hygiene interventions. The paper focuses specifically on one aspect of health and hygiene awareness in South Africa, namely hand washing behaviours. The paper is a critique of methods used in assessing these household behaviours. The paper does not focus on the actual behaviours but rather on the methods used in two assessments of hand washing behaviours. The assessments were conducted in Mpumalanga focusing on measuring hand washing during (1) a baseline survey and (2) a follow-up impact assessment of a health and hygiene promotion programme.

Measuring effective hand washing

There are a number of international studies relating to the measurement of hand washing. Hand washing techniques advocated by FANTA (1999) include two elements, namely washing hands at critical times and the technique of washing of hands. Washing hands at critical times involves performing this task (FANTA, 1999):

- Before preparing food
- Before eating
- Before feeding children
- After defecation
- After cleaning the babies' bottoms

The second element to assessment of hand washing behaviours is measurement of the technique used in performing the task. The techniques advocated by FANTA (1999) for hand washing are:

- Use of water
- Use of soap or ash
- Washing of both hands
- Rubbing of both hands together at least three times
- Drying of hands hygienically – by air drying or using a clean cloth

Finally, EHP 2004, mentions a third element to appropriate hand washing which necessitates an assessment of the availability of supplies required for hand washing. Washing of hands at critical times is reliant on the availability of the following (EHP 2004):

- Water from a tap or container
- Soap, ash or other detergent
- A device that facilitates unassisted hand washing such as a basin, sink, bucket or tippy tap
- Clean towel or cloth, although this is optional because air drying is an acceptable alternative.

Thus, any assessment of effective hand washing should include measurement or observation of all knowledge and application of this, as well as the techniques and supplies listed under the three elements above.

Method

Two approaches were used in the study to determine hand washing behaviours in the Mpumalanga Province of South Africa.

Method 1: The baseline study

A baseline study was conducted in the Mpumalanga Province in 2003 (CSIR, 2003). The study covered six villages in two district municipalities of the province. The purpose of the baseline study was to determine the status quo of sanitation, hygiene and related practices in these villages prior to implementation of a sanitation programme. The intention being that these data would act as baseline information for tracking sanitation attributed changes in the villages as the programme progressed. The study was a rapid assessment using a household questionnaire to determine:

- the socio-economic status of household;
- water and sanitation supply in the areas;
- water and sanitation behaviours, i.e. storage, treatment etc.;
- the health and disease status of the households; and
- Health and hygiene behaviours.

Household interviews were carried out randomly within the villages, the resulting interviewees ranging in age, gender and roles within the households. Statistical analysis of the data was carried out making use of the SPSS package. For the purpose of this paper, the data for Vlakbult and Phosaville villages were extracted from the dataset generated from the processing of these questionnaires. A total of 317 households, 296 from Vlakbult & 21 from Phosaville, were interviewed during this assessment. The number of interviewees comprised approximately 10% of households in each village.

Interviews were carried out by locally based field workers who had been trained to administer the questionnaire.

The dataset which is most relevant to this paper is that which covers hand washing behaviours. The data were collected by asking household representatives 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.

The list of activities was read out to the interviewee, with them responding yes or no to washing their hands after each activity. The results of the data analysis are shown in Figure 1.

Method 2: The health & hygiene impact assessment study

Another study that relates to hand washing was conducted in Mpumalanga in June 2004 covering the same Vlakbult

and Phosaville villages (Caillet-Pariel, 2004). At the time of the H&H Impact Assessment study a sanitation programme was being implemented in the villages. This programme includes a health and hygiene education and awareness programme offered to local community health workers which included a:

- General health module on (1) Personal domestic and community hygiene issues such as hand washing; bathing and laundering; and (2) Community hygiene.
- Safe drinking water and waste disposal module which covered water collection, storage, treatment, and waste water disposal;
- Disease module (spread and impact) covering Faecal-oral routes of disease transmission and Vector borne diseases;
- Module on Safe disposal of children 's faeces; and
- Participatory approaches covering how to conduct Focus groups and Small community discussions.

These trained health workers were expected to transfer health and hygiene to the individual households once the sanitation programme began in the village. Health workers formed part of the project staff and were paid a salary during the programme.

The main purpose of the Impact Assessment study was to evaluate the impact of this health and hygiene promotion programme at a household level and based on the data collected from the baseline survey, be able to determine change in hygiene behaviour as a result of this programme. Data on water, sanitation and hygiene in the studied villages were collected using Participatory Rural Appraisal (PRA) techniques. The PRA techniques were chosen because they are suited to the mission of collecting data on hygiene behaviour. PRA tools used in this particular study were based on those used for hygiene monitoring and evaluation as advocated by Almedom et al (1997). This included:

- Observation Walks
- Stakeholder interviews
- Focus group discussions

Triangulation was done using the interviewer's observations. The observation walks were used to orientate the interviewer regarding the location of village facilities, where different groups lived (those with or without a yard tap), and allow the observation of hygiene behaviour, for example during water collection. The problem encountered was that both villages were large and the researcher could only cover a small area of each. A total of 56 households, 28 from each of the villages were interviewed. Before the assessment, households were pre-divided into four equal categories according to the sanitation facilities and the intervention; i.e:

- People interviewed in the baseline study and who had a toilet facility;
- People interviewed in the baseline study and who did not have a toilet facility;
- People not included in the baseline study and who had a toilet facility;
- People not included in the baseline study and who did not have a toilet facility.

The households which were to be interviewed for this study were chosen using the above categories, by locally based health workers trained during the sanitation programme. Neuman (2003) presents this type of sampling as nonprobability sampling. More precisely, it is quota sampling. This is to "get a preset number of cases in each of several predetermined categories that will reflect the diversity of the population."

The interviewer was a French first language speaking student from the University of Cranfield in the United Kingdom. She was accommodated within the villages for the duration of the impact assessment. This allowed for discrete observations of health and hygiene behaviour practices and habits within the villages. These informal observations were used to support or refute formal data collected through the questionnaire.

For the focus group discussion only women were asked to participate because they are more involved in the health and hygiene issues.

During the structured interviews with the individual households, the interviewer asked the same questions relating to hand washing as those used in the baseline survey. However, respondents were not given a list of activities to which they should respond positively or negatively relating to hand washing. Rather, interviewees were asked before or after which activities would they normally wash their hands. This required the interviewee to list the activities without prompting from the interviewer.

This divergence between the baseline and the present study methodology will influence the results shown later in the paper. As a result a comparison of the two hand washing behaviour results should be handled with sensitivity. The paper focuses rather on the method of assessment and the effect of this on the hand washing results shown below.

Results

Baseline study

From the baseline study responses, 50% of households indicated that they had a sanitation facility in their backyards, 45% indicated that these were pit latrines, while 3% had VIPs. The remaining 49% of households had no sanitation facility in their yard, with 41% of these using the veld for relieving themselves; 44% making use of other people's toilets; 4% making use of communal toilets and the remainder making use of other means (6%) or rivers and streams (2%).

At the time of baseline survey no sanitation intervention had occurred in either of the villages. As a result, households and interviewees had not been exposed to a sanitation related health and hygiene education programme. The Researcher therefore expected that few interviewees would respond positively to hand washing behaviour questions. However, Figure 1 below shows that between 70% & 91 % of the 317 interviewees indicated that they washed their hands before/after the listed activities.

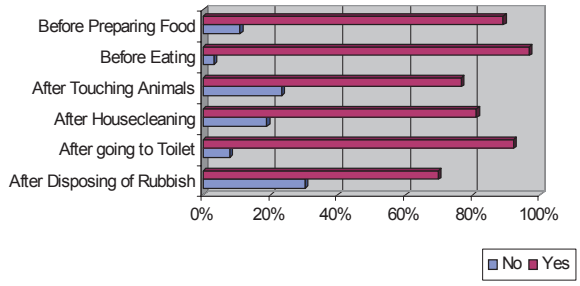

Figure 1. Respondents Knowledge of Hand Washing at Critical Times in the Baseline Study

Source: CSIR, 2003

The activities which the majority of the interviewees associated with hand washing were before eating (97%) and after visiting the toilet (92%). The activities least associated with hand washing were after house cleaning (81%) and after disposing of rubbish (70%). However, it is important to note that all activities scored high when related to hand washing.

From the 92% of interviewees who reported washing their hands after visiting the toilet:

- Approximately 86% had access to basic water service in both the dry and wet seasons. However, reliance on yard taps drop from over 75% in the wet season to less than 45% in the dry seasons. Use of yard taps appeared to be replaced by collection of water from rivers and streams and street taps during this season;
- Approximately 77% indicated that they sometimes did not receive sufficient water for drinking. This was chiefly attributed to maintenance of infrastructure (27%); a water supply problem (25%), and water shortages within the villages (11%). As a result of these problems, villages in South Africa have developed a culture of water storage. The availability of water in terms of quantity is a constraint because it obliges people to store water and to limit their consumption. This limited amount of water for personal hygiene (hand and body washing) and for domestic use (drinking water) is one of the key problems to maintaining good health.
- 52% made use of a 200Litre water storage container, which was usually covered. Approximately 94% of this group thought is was necessary to cover the storage container and to clean it regularly. However, the majority of the interviewees (58%) mentioned that they never washed the storage container or only washed the container once a week. In South Africa, it is also common to scoop water out of the storage container with a small bowl or jug;
- Approximately 71% of this group indicated that household members shared the same cup for drinking. This increases the contamination risk and the possible spread of water related diseases within a household;
- Although 77% of this group indicated some difficulty at time with water supplies, only 49% were treating their drinking water, the majority of these (76%) making use of Jik for this purpose. Jik is an inexpensive household bleach consisting of 3.5% sodium hypochlorite, which is commonly advocated as a method of water treatment during sanitation related health and hygiene training in villages in South Africa and in cholera infected areas (SANTAG, undated; Dept. of Health, 2001; Institute for Water Quality Studies, undated)
- An estimated 25 % of these respondents, who indicated that they washed their hands after visiting the toilet, reported 1 or more incidents of diarrhea in their household in the last 6 months. These respondents attributed the disease chiefly to contamination of water sources (31%) or were unsure of the cause (24%). The remaining listed unclean food (8%), hand washing or hygiene issues (7%); not using the toilet (5%); and cholera or contaminated air (3%). Although there were diverse views on the cause of diarrhea, 92% of these respondents believe that it could be prevented. However, there were once again diverse views on how this could be achieved. These varied from purify water (29%), to visiting a clinic, hospital or doctor (19%) to rehydration mixture (11%) and food hygiene (8%).

The health & hygiene impact assessment study

As a result of this predetermined grouping of interviewees during the Impact Assessment study, 50% of respondents in the exercise indicated that they had a sanitation facility and 50% had no sanitation facility. The majority of respondents with a facility still used the unimproved pit toilets (75%), however, as a result of the sanitation programme a larger number of respondents had access to adequate sanitation in the form of a VIP (21%).

The Impact Assessment results shown in Figure 2 indicated very different results to those obtained from the Baseline Survey. Indeed, people wash their hands especially before and after eating (80%) and after visiting the toilets (79%). The results however showed lower percentages of hand washing behaviours than that of the baseline survey.

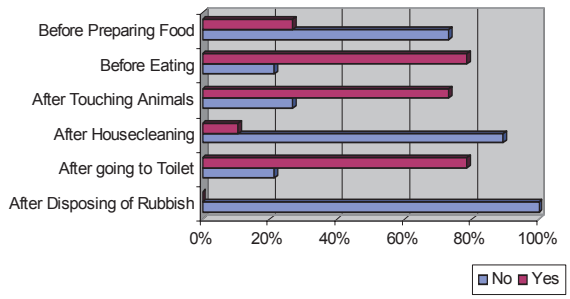

Figure 2. Respondents knowledge of hand washing at critical times during the impact assessment study

Caillet-Pariel, 2004

Researchers concluded that although a health and hygiene programme had been initiated in the villages, the baseline survey results were skewed as a result of the manner in which the hand washing questions were asked. Results from the Impact Assessment study gave a more accurate indication of people's knowledge of hand washing at critical times as interviewees were not prompted to respond positively or negatively to whether they washing their hands before/after a listed activity.

Concerning hand washing after visiting the toilet, 79% of respondents indicated that they do wash their hands after visiting the toilet. From the 79% of interviewees who reported that they wash their hands after visiting the toilet:

- Approximately 90% had access to basic water service in both the dry and wet seasons. However, all respondents indicated that they sometimes had difficulty getting sufficient water for drinking.
- As a result, water storage was common in the villages. From the questionnaire, only 41% of this group of respondents said that they used the same scoop for collecting and drinking water from the storage container. However, the interviewer observed some people taking water from the storage container using a glass or a jug. These people's hands were in contact with the water and most of the time, their hands were dirty. Swerdlow et al (1992) stated that the introduction of hands into the drinking water during washing or scooping is "strongly associated with illness". Moreover, water was not stored in separate containers depending on its subsequent use.
- Approximately 27% of respondents made use of a 200 Litre water storage container; however, 91% indicated that they do cover the storage containers. All respondents of this group believed it was necessary to cover the storage container and to clean it regularly. Surprisingly, although 32% of the respondents washed the container at least once a day, 30% washed the container only once a week.

However the interviewer's observations allowed nuancing this information. Most people in the village wash their hands before eating. This was done in a bucket with either cold or hot water, without soap with the water being shared by the whole household before the meal. It is important to note that it is common in the rural areas of South Africa for people to eat their meal with their hands. As a result, there is a direct contact between the hands and mouth during meals. In addition, only 25% of the interviews washed their hands before handling food. This percentage is small compare to the risk associated with this practice, because the pathogens ingested will be in greater quantity than those ingested via the hand washing water.

Critique of two approaches used to measure hand washing in Mpumalanga

A number of problems were highlighted with the methods used in both of the studies listed above. With reference to the Baseline Survey, these problems included that:

- The manner in which the hand washing questions were administered during the study was not acceptable. Respondents were required to respond positively or negatively to washing hands after certain activities were listed to them. This seems to result in respondents over reporting desired behaviour. Researchers concluded that answers given by respondents were not a true reflection of actual knowledge of "good" hand washing behaviours. This is reinforced when assessing interviewee's responses to the cause and prevention of diarrhoeal disease. Few made the link between hand washing or sanitation and the cause, and none of the respondents listed these as a means to prevent the transmission of disease. Food hygiene or more specifically "clean" food was listed as a means of preventing the disease. According to FANTA (1999) interviewers should not prompt answers to the interviewees as was the case with this survey. The results shown for the baseline survey are purely a reflection of interviewees knowledge of what they think are "good" hand washing behaviours and does not reflect whether hand washing actually takes place after each of the activities. The survey therefore, neither measured knowledge of hand washing at critical times, nor whether hand washing was actually taking place before/after these activities.
- The data did not reflect whether the infrastructure is available for hand washing before/after these activities or what techniques were used by households to carry out hand washing.
- The baseline survey was a rapid assessment of the status quo in 5 villages in this municipality of the province. A total of 44 interviewers had to conduct 459 interviews in just 2 weeks. A total of 22 interviewers were used in Vlakbult, while 2 administered the questionnaire in Phosaville. As a result, a number of locally based interviewers had to be trained to administer the questionnaire. This may have resulted in different interpretations and thus application of questions at a household level.
- A single questionnaire required approximately 20 minute of the interviewee' time to be completed. Households made mention of "questionnaire fatigue" during this assessment as this was not the first time a survey had been carried out in the villages. Mention was made of ongoing questionnaires being completed within the village, with little feedback to the communities and very little visible project activities as a result of the assessment.
- Collection of survey data was done by local community members, however, capturing, collation, analysis and interpretation of the results was done by a different group of people based outside the community. This group of researchers were unable to observe behaviours in the field and were therefore, only able to interpret behaviours based on the results of the survey.

The baseline questionnaires were administrated using a formal method while the Impact Study was able to use a more informal method. Respondents were asked to list activities before/after which they would wash their hands. They were not offered this list of activities, as was the case

in the baseline survey. Thus they reported on known behaviour rather than on what they "thought" was good hand washing behaviour. Although the survey indicated that most respondents were aware that they should wash their hands before eating and this was reinforced by the observation of this activity at household level, it is very common in the rural areas of South Africa to share the basin of water for this activity. Observation of hand washing behaviours thus indicated a lack of understanding of the techniques required for hand washing recommended by FANTA (1999).

Although the Impact Assessment study was planned and carried out with the utmost care, the results obtained are likely to have been affected by a number of factors. These factors include that:

- The sample size used in this assessment was small. It was only possible to interview 28 people in each of the villages. This amounted to approximately 3% of the population. Where as the baseline sample size was 10% of the population. A small sample size results in each individuals' response having much greater weighting in the analysis, making it difficult to reveal underlying trends and relationships.
- The interviewer was an outsider and more specifically from Europe. As a result, respondents may have modified their answers as they usually associated Europeans with aid agencies and thus the supply of goods or services.
- The respondents' impression of the interviewer affects the answers that the respondent gives. Very rarely do Europeans (and even white South Africans) visit the study villages and they are sometimes viewed with suspicion. This is likely to have had a significant effect on the responses and could only be resolved by using local interviewers.
- The language barrier between the interviewer and the interviewees may have also affected the results. English was not the first language of the interviewer and very few of the interviewees could speak this language. As a result, an interpreter had to be used during household interviews and group discussions. This made it difficult for the interviewer to be fully engaged in the conversations, asking questions where appropriate or following up on issues as they were raised. The translator also did not use English as a home language which resulted in some answers being translated without important nuances or there were errors of interpretation. For example, relating to the disease questions of the survey, the word "prevention" was often mixed up with "cure".

Finally, factors which were common to both studies and may have influences to result of both included that:

- The assessments only took note of one element of hand washing measurement, namely measurement of hand washing at critical times. However, even in this part of the assessment, neither included a measurement of mother-child knowledge of hand washing.
- The assessments also made no reference to the technique of washing of hands. Although a large percentage of the interviewees indicated that they had access to basic water supplied through-out the year, many mentioned interruptions to this supply which has resulted in a culture of water storage in the country. Both assessments made mentioned of the same cup being used for scooping and drinking of water from the storage container. This could result in transmission of disease between household members through contamination of the household water source.
- Finally, the assessments lacked measurement of the third element appropriate to hand washing which was an assessment of the supplies needed for hand washing. Although an assessment of water from the tap or container was part of the surveys, no measure of availability of soap, ash or detergent or a device that facilitates unassisted hand washing was made.

In another study done by CSIR in February 2004, an investigation was carried out into the effectiveness of hand washing devices and their application in the National Sanitation Programme in South Africa (CSIR, 2004). Although the assessment was not carried out in the villages listed in this paper, the results shown for the Mpumalanga Province as a whole, indicated that the majority of respondents interviewed (81%) in the province had no hand washing device at the toilet facility, 4 % made use of an open bucket, 10% used a close bucket with a tap attachment while 3% were "using" other methods of washing. It is therefore possible, that an assessment of hand washing facilities within these villages may have yielded similar results.

It is critical for researchers to realize that by asking whether people wash hands at critical times alone is not sufficient. Washing of hands could be hampered by other factors such hand washing supplies. Unavailability of hand

washing supplies will impact negatively on hand washing, thus assessing or measuring all elements of appropriate hand washing is important. This will aid both researcher and developers to focus their attention where there are gaps in appropriate hand washing.

Recommended solutions to measuring hygiene behaviour (hand washing)

Measuring sanitation-related hygiene behaviour is critical for two reasons (EHP, 2004):

1. to obtain information for improving the health and hygiene component of a sanitation programme; and
2. to demonstrate whether the sanitation programme made a difference or an impact on health and hygiene knowledge, behaviours and practices.

A number of methods developed to measure behaviour change have been field tested and experience has proved that they are best used in combination to check for consistency and to see whether outcomes are reliable (WELL, 2004). It is important to realize that when measuring hygiene behaviour the use of a combination of tools might yield better results as was the case in the Impact Assessment study in Mpumalanga. INCO 2004 recommended the following tools

to study hand washing behaviour which could be used in combination, based on the extent of the study:

- Questioning to measure knowledge
- Observation of hand washing skills
- Pocket voting to measure actual practice
- Observation of location of soap and water.

Questions in survey should also be structured in a manner which yields the most "honest" response from the interviewee. Supplying interviewees with options to which they may answer yes or no as was the case in the baseline survey has a significant on the results of the assessment. Prompting of responses will result in overstating of the survey results.

Hand washing assessments need to cover measurement of people's knowledge to carry out this task at critical times, as well as observation of whether the actual hand washing is taking place. Assessment must also include measurement of hand washing techniques and availability of hand washing supplies. As mentioned above, a combination of methods may be needed to cover all these in the assessment.

In addition it is important to allow enough time between baseline surveys and the evaluation of hygiene behaviour.

Finally, these types of studies should note that when conducting baseline and impact assessment surveys, training of interviewers is critical to the outcome of the study. Insufficient training of interviewers, in their mother tongue, may have significant impacts on the interpretation questions within the questionnaire and thus the administration of these. This could be detrimental to the results and long-term applicability of these in tracking changes and impacts within a community.

Conclusion

Although different approaches were used to measure hand washing in Mpumalanga, it is clear that neither approach assessed effective hand washing in a holistic manner. Specifically, the baseline survey did not apply assessment techniques such as group discussion, community walks or observation. The Impact Assessment study endeavored to include observation to some extent, however, the assessment was limited to knowledge of hand washing and not the techniques or supplies needed for these activities. Measuring hand washing behaviour requires understanding of the tools which are available to measure these behaviours since the methods used can have significant impact on the results of the assessment.

To better understand the impacts of sanitation and hygiene interventions in South Africa, a more structured standardized methodology of baseline and impact measurement will need to be developed and tested. It is recommended that more resources, both human and financial, be utilized in further test methodologies for baseline assessment and more studies should be carried out to measure the impact of sanitation programmes on sanitation, hygiene and related practices in the country. This would include the use of a multi-disciplinary team in this research, allowing a broader overview of the situation through cross checking of survey information by direct observations.

Finally, sanitation assessment, both baseline and impact, needs to be taken a step further than once off assessments. It is necessary to find methods and tools to be able to track changes within a household or community as a result of sanitation interventions, as well as the means to link a particular intervention or group to this change. To ensure sustainable sanitation service delivery in the country, it may not be sufficient to be able to track what changes in hygiene behaviours, awareness or practices have directly resulted from a sanitation intervention.. It may also be necessary, for future follow-up initiatives and implementation of further sanitation initiatives in other areas, to be able to attribute this change to a particular activity/s within the sanitation programme. The how the change was achieved would be invaluable for targeting and the planning of future sanitation interventions.

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