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**DELIVERING WATER, SANITATION AND HYGIENE SERVICES
IN AN UNCERTAIN ENVIRONMENT**

Introducing hygiene elements into sanitation monitoring

J. Craven, R. Giné, A. Jiménez & A. Pérez-Foguet, Spain

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With the 2015 Millennium Development Goal deadline approaching, discussion has turned to how to improve monitoring strategies post-2015. Key aims are to find ways to include hygiene in sanitation monitoring, evaluate the sustainability of improvements and encourage the formulation of pro-poor policy. However, at present, no robust indicator of hygiene (particularly hand-washing) has been found, and it is unclear whether current methods encourage sustainable, pro-poor interventions. This study compared various potential indicators using a dataset collected through household surveys in Kenya, with a view to testing the current approach's predictive ability in hygiene and recommend indicators which could be used to monitor hygiene directly. The results suggested that the current approach does not reliably predict a good standard of hygiene, but that the presence of a hand-washing facility with soap could be used as a practical, global hand-washing indicator.

Introduction

Sanitation monitoring is essential to provide the data required to design and implement effective sanitation policies. However, the information available is often very limited, and so organisations implementing changes must do so in the face of considerable uncertainty. Therefore, it is of great interest that the information available is as relevant and applicable as possible, so as to stimulate interventions with the maximum possible impact.

Current sanitation monitoring methods focus on sanitation “hardware” (for example, latrines and sewerage systems) whilst neglecting the “software” (hygiene knowledge and behaviours). However, hygiene is key in preventing the spread of water related diseases, and studies have shown that hygiene interventions have more positive and sustainable health impacts than hardware interventions do (Fewtrell, et al., 2005; Zwane, et al., 2007). Although evidence exists that piped sewage systems have important health benefits, the evidence of the impact of latrine construction is not so convincing (Zwane, et al., 2007; Anker, et al., 1980; Bateman, et al., 1993; Billig, et al., 1999; Knight, et al., 1992), and so it must be questioned whether latrine ownership alone can constitute adequate access to sanitation. Furthermore, concerns have been raised over the sustainability of hardware construction interventions: if the culture of latrine use does not exist in the community, people will not necessarily consistently use the latrine or keep it well maintained (Chambers, 2009).

Personal hygiene (principally hand-washing), on the other hand, is the only protective barrier which can effectively block all faecal-oral routes of disease transmission (sanitation hardware only prevents faeces contaminating the environment; transmission via fingers is also common), and research has demonstrated that increased hand-washing significantly diminishes the incidence of diarrhoea (Zwane, et al., 2007; Luby, et al., 2004; Khan, 1982; Han, et al., 1989). Hand-washing with soap is also considered to be an extremely cost-effective way to combat disease, with an estimated cost of only \$3 per DALY averted (Cairncross, 2006), and it may be indicative of more sustainable improvements in sanitation, since it requires a long-term behavioural change.

Criticisms of current monitoring and ways forward

Data in the current JMP “sanitation ladder” system is widely available and consistent. However, it is disputed whether the approach reliably distinguishes better sanitary conditions from worse, and whether it encourages the most effective interventions to be made. The main criticisms of the approach are:

1. It is hardware-based and no account is taken of cleanliness or hygiene, which may encourage further investment in hardware provision to the detriment of hygiene education (Cotton, et al., 2008);
2. It does not reliably indicate improvement sustainability, a particular problem in the sector (Brocklehurst, 2012; Cotton, et al., 2008; Shordt, et al., 2004);
3. It encourages progress at the high end of the sanitation spectrum, at the boundary between “improved” and “unimproved” sanitation, and as such does not help to define tailored interventions in the vast area of “unimproved” sanitation (Vandemoortele, 2003; Shordt, et al., 2004; Giné, et al., 2011).

Hygiene-based monitoring attempts to address these criticisms by prioritising hygiene awareness and hand-washing behaviour. First and foremost, hygiene-based monitoring removes the focus on hardware and makes success in hygiene education visible; secondly, hygiene behaviour is more directly linked to underlying attitudes to sanitation, which are more sustainable than hardware constructed by external agencies; and thirdly, removing the focus on high-standard hardware avoids stigmatising areas with very poor coverage as “lost causes”.

This research attacks the problem of sanitation monitoring from a hygiene perspective, evaluating the capacity of the current approach to predict hygiene standards and suggesting hygiene-based indicators to be included in sanitation monitoring in rural areas which can be used to obtain a richer picture of sanitation and hygiene.

Methodology

A case study from the Homa Bay and Suba districts in rural Kenya, involving 2,372 households, was used to test the reliability of various possible indicators. The data was collected between January and March 2011 by a team consisting of staff from the Universitat Politècnica de Catalunya, the District Public Health Officer, the District Water Officer and a local consultant, as part of a project to investigate and improve sanitation in the area. Both districts have found water and sanitation to be a recurring problem, and have recently been prone to outbreaks of cholera (GRECDH, 2011). Respondent households were randomly selected in “clusters” around waterpoints. In addition, to avoid bias, additional clusters were included from areas where improved water points are unavailable.

Qualitative analysis

The study contained various indicators, and so a short-list of the most practicable and promising indicators was compiled, based on evaluation of their objectivity, transferability, reliability and affordability, as shown in Table 1.

Short-listed indicators	Other indicators
Access to improved sanitation facility Presence of HW area Soap/ash available Time since last hygiene training session	Sufficient water available Hygiene knowledge test Hand-wash technique observation

Quantitative analysis

Hygiene knowledge and technique were chosen to test the short-listed indicators against as they were considered to be the most directly linked to real, everyday hand-washing habits. Pearson chi-squared testing was used to determine the power of the correlations since all of the variables were categorical, and correlations with p values < 0.005 were deemed “significant”. In order to separate the sanitation system from the socioeconomic position of the family, wealth and education were controlled for. Wealth was modelled using a wealth index, calculated from various factors including dwelling type and ownership of various

household items, and education was measured as the number of years of education of the head of the household.

Results

The case study focused on hand-washing, which was studied in three ways: by observation of hand-washing facilities, structured observation of hand-washing technique and questions testing hygiene knowledge. Firstly, it was noted whether a hand-washing location was observed in the compound, and if soap was available. Availability of soap was identified as a particularly suitable indicator because hand-washing with soap and water has a significantly larger health impact than hand-washing with only water (Kaltenthaler, et al., 1991; Burton et al., 2011; Curtis et al., 2009). Secondly, hygiene knowledge was quantified by asking respondents an open question about when hands should be washed and scoring the response (one point for each of the following responses: before eating, before preparing food, before feeding children, after defecation, after handling children's faeces). Finally, to study hand-washing technique, the respondents were observed washing their hands and it was observed whether they use water, soap, if they wash both hands and how the hands are dried on something clean. The respondent scored one point for each of these observed and these were summed to provide an index of hand-washing technique.

The correlations between the short-listed indicators and hygiene knowledge and technique were tested, controlling for wealth and education, and the following results were obtained:

1. The observation of soap in the compound was significantly correlated with both hygiene knowledge and technique.
2. Access to an improved sanitation facility, observation of a hand-washing area and the time since the last hygiene training were not significantly correlated with both hygiene knowledge and technique.

Discussion – moving forwards post 2015

This study confirmed that current monitoring methods do not always adequately evaluate hygiene behaviour. In addition, perhaps surprisingly, the availability of a hand-washing area was not correlated with good hygiene: in fact, for example, owners of hand-washing facilities were found to be less likely to know that hands should be washed after defecation (85% against 92% for the entire study population). This strengthens the case for a move away from hardware-based monitoring. The time since the last hygiene training event was not correlated with good hygiene either, suggesting that it is important to maintain the focus on users as opposed to interventions (an intervention-based approach, combining intervention coverage statistics with evaluation of the effectiveness of these interventions, has been suggested (JMP, 2012)). Soap availability, on the other hand, was identified as a potentially suitable indicator for hygiene, replacing the need for direct observation and questioning and thus reducing the time required to complete the survey (which is a concern for global household surveys). However, the use of soap availability as a hygiene indicator is of very limited use in designing sanitation interventions because it gives no information as to why hygiene is a problem in the first place: perhaps due to lack of water, perhaps because it is not believed to be important, or due to any other of the myriad and context-specific issues affecting the hygiene sector. Knowledge testing and observation of behaviour are still important to understand the barriers to hygiene, but are not necessarily practical for global progress monitoring.

The Millennium Development Goal deadline in 2015 will provide an opportunity to implement new global targets, indicators and monitoring strategies, and so possible improvements to the current JMP methodology are currently being discussed. The main aims in the sector are to include hygiene in the sanitation monitoring programme, to encourage sanitation interventions which bring the largest socioeconomic benefits, and to throw light on the most vulnerable and most in need (JMP, 2012): in other words, to direct the *right* interventions towards the *right* people.

Targeting effective interventions

Global-level indicators, including the indicators proposed by this study, are generally unsuitable for local intervention design. However, pressure to meet targets may encourage ineffective schemes to be implemented as long as they provide a visible improvement in global-scale monitoring: for example, using “presence of soap” as a hygiene indicator runs the risk of propagating soap provision schemes without associated hygiene education, which is unlikely to change behaviour. This has already happened with latrine construction: for example, the “access to technology” indicator currently used has stimulated the

construction of millions of latrines, despite evidence that they may bring limited health benefits compared to hygiene education interventions (Zwane, et al., 2007; Anker, et al., 1980; Bateman, et al., 1993; Billig, et al., 1999; Wicken, 2008).

To address sustainability problems with sanitation interventions, new approaches have been developed which focus on education to change fundamental attitudes to hygiene and trigger sustainable hardware improvements, such as Community Led Total Sanitation (CLTS), and new monitoring methods should reflect the aims of this new style of intervention. Hygiene monitoring is well-placed to do so because hygiene requires an on-going commitment, and therefore should be indicative of fundamental attitude changes.

Targeting those most in need

In addition, the current monitoring approach favours the provision of high-standard hardware, which will, due to budget restrictions, inevitably reach a smaller number of people. These people are unlikely to be the most in need as interventions are likely to be targeted at the most visible, and those with the resources for latrine maintenance. Therefore, we must consider which communities are made most visible by the monitoring strategy, and make the strategy as pro-poor as possible.

A danger with producing statistics such as “percentage of households with access to adequate sanitation” is that the apparent coverage would be improved most by directing interventions at those *just below* the threshold for “adequate sanitation” (for example, by providing slabs for those who already have pit latrines), rather than at the people with no access at all, who may be considered “lost causes” (Shordt, et al., 2004). Whilst it is important to maintain the “adequate” threshold high to avoid the construction of low-quality technologies, it is important that indicators help the prioritisation of communities, rewarding progress further down the scale as well as at the threshold.

Hygiene-based indicators could help to solve these problems by making hygiene improvements (which require less capital investment from each household, and can be targeted to more deprived communities) visible. Another suggestion is to use additional indicators for “Equity and Non-Discrimination”, differentiated by wealth quintiles (for example “the percentage of the poorest quintile with access to adequate hygiene and sanitation facilities” (JMP, 2012).

Conclusions

Firstly, it should be noted that the dataset used for this research is small, and research in various different locations would be required to confirm whether the results of this study are applicable to other contexts. In particular, these conclusions may not be relevant to urban monitoring, as it has been suggested that urban and rural monitoring should be differentiated (JMP, 2012).

It is vital to remember that sanitation is essentially a health issue, and therefore care must be taken to monitor sanitation aspects which provide real health benefits (as hygiene has been shown to do). However, an important limitation on the study of sanitation indicators is that it is often very difficult to link observed sanitation outcomes to real health impacts. Health impacts take time to show change and study areas will often undergo several interventions over this time and confounding factors such as nutrition, wealth and education make it even more difficult to link improvements in health with specific interventions in sanitation. In addition, more research on the relationship between health and spatial distribution of coverage would be useful, as evidence suggests that community-level or cluster monitoring (measuring, for example, the percentage of people living in communities with an adequate coverage of sanitation) is more strongly linked to health benefits than monitoring at household level (Bateman, et al., 1993). An issue here is collecting enough data within each cluster for statistical significance.

Hygiene-based monitoring may add important information to the overall state of sanitation in the community as it is more directly linked to local attitudes and practices than the existence of latrines, although further study would be required to confirm this.

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Contact details

Joanne Craven
3 Hill Place, Alloa, UK
Email: joanne.s.craven@gmail.com

Ricard Giné
c/ Jordi Girona 1-3, Edif C2, Barcelona, Spain
Email: ricard.gine@upc.edu
www.upc.edu/grecdh
