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Water–sanitation–hygiene mapping: An improved approach for data collection at local level

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HIGHLIGHTS

- We present an integrated method for WASH-related data collection at local level.
- The survey design combines a waterpoint mapping and a household survey.
- Simple statistical analysis validates the data from the viewpoint of decision-making.
- Data provide policymakers with evidences to inform planning and targeting processes.
- We conclude that integrated data collection mechanisms can be designed to support local policymaking.

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ABSTRACT

Strategic planning and appropriate development and management of water and sanitation services are strongly supported by accurate and accessible data. If adequately exploited, these data might assist water managers with performance monitoring, benchmarking comparisons, policy progress evaluation, resources allocation, and decision making. A variety of tools and techniques are in place to collect such information. However, some methodological weaknesses arise when developing an instrument for routine data collection, particularly at local level: i) comparability problems due to heterogeneity of indicators, ii) poor reliability of collected data, iii) inadequate combination of different information sources, and iv) statistical validity of produced estimates when disaggregated into small geographic subareas.

This study proposes an improved approach for water, sanitation and hygiene (WASH) data collection at decentralised level in low income settings, as an attempt to overcome previous shortcomings. The ultimate aim is to provide local policymakers with strong evidences to inform their planning decisions. The survey design takes the Water Point Mapping (WPM) as a starting point to record all available water sources at a particular location. This information is then linked to data produced by a household survey. Different survey instruments are implemented to collect reliable data by employing a variety of techniques, such as structured questionnaires, direct observation and water quality testing. The collected data is finally validated through simple statistical analysis, which in turn produces valuable outputs that might feed into the decision-making process. In order to demonstrate the applicability of the method, outcomes produced from three different case studies (Homa Bay District –Kenya–; Kibondo District –Tanzania–; and Municipality of Manhiça –Mozambique–) are presented.

1. Introduction

Water and sanitation improvements together with good hygiene (WASH) produce evident effects on health population (Cairncross et al., 2010; Curtis and Cairncross, 2003; Esrey et al., 1991; Feachem, 1984; Fewtrell et al., 2005). However, universal access to safe drinking water and basic sanitation remains a huge challenge in many low income countries (Joint Monitoring Programme, 2012a), where vast numbers of people are not properly provided for by these basic services. To help end this appalling state of affairs, the sector has

Abbreviations: JMP, Joint Monitoring Programme for Water Supply and Sanitation; MICS, Multiple Indicator Cluster Survey; NGO, Non-governmental organization; UNICEF, United Nations Children's Fund; WASH, Water, Sanitation and Hygiene; WP, Waterpoint; WPM, Water Point Mapping.

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been facing a gradual process of decentralisation, where the responsibility in service provision moves to local authorities. It is believed that decentralised governments have an informational advantage over the central government with regard to local needs and priorities, for which reason they are assumed to supply services in accordance with demand, allocate resources more equitably, and ultimately conceive and implement policies with a focus on poverty reduction (Crook, 2003; Devas and Grant, 2003; Steiner, 2007). To effectively do this, local governments need to make evidence-based decisions, which primarily depend on the availability of accessible, accurate and reliable data that are routinely collected, disseminated and updated. Amongst others, these data may be employed to i) measure progress and performance, ii) improve transparency in budgetary procedures and promote increased investments in the sector, and iii) allocate resources to deliver services where they are most needed. Today, reliable information on key indicators at local level often lacks, but even when it is available, the uptake for such data by policymakers is, at best, challenging (WaterAid, 2010). Limited capacities of recipient governmental bodies, inadequate sector-related institutional framework, and lack of data updating mechanisms are common reasons that hamper an adequate appropriation and continued use of the data for planning and monitoring purposes (Joint Monitoring Programme, 2011; World Health Organization, 2012).

In an effort to address one of the shortcomings cited above, i.e. the lack of reliable data, this study deals with the design of adequate methodologies for routine data collection. A variety of tools and techniques have been developed in recent years to collect primary data for the WASH sector. Amongst others, the Water Point Mapping –WPM– (WaterAid and ODI, 2005), the UNICEF-supported Multiple Indicator Cluster Survey –MICS– (United Nations Children's Fund, 2006), the Rapid Assessment of Drinking Water Quality –RADWQ– (Howard et al., 2003, draft), and the Water Safety Plans (Bartram et al., 2009). However, methodological problems arise when they are implemented at local scale to produce reliable inputs for planning support.

First critical shortcoming is related to the type of data required to monitor the sector, since different information sources may be required (Joint Monitoring Programme, 2012b). Household surveys are by large the most commonly used tools for collecting WASH data (Joint Monitoring Programme, 2006; Macro International Inc., 1996; United Nations Children's Fund, 2006). But a focus on households is not sufficient to answer many relevant questions, and hence needs to be supplemented with data from other sources. For instance, an audit at the water point might provide insight into operational and management-related aspects of the service. A methodology to efficiently combine these two types of information sources should have potential for wider implementation.

Another key limitation is that of comparability (Joint Monitoring Programme, 2006), since a variety of indicators are being simultaneously employed to measure different aspects of the level of service. More often than not, to assess trends over periods of time or to compare indicators regionally has therefore remained challenging. As a first step against this comparability problem, the Joint Monitoring Programme for Water Supply and Sanitation (JMP) formulated a set of harmonized survey questions (Joint Monitoring Programme, 2006) to provide worldwide reliable estimates of drinking-water and sanitation coverage at national level (Joint Monitoring Programme, 2012a). In so doing, JMP has improved the processes and approaches to monitoring the sector, though the definitions employed have been criticised as being too infrastructure-based. (Giné-Garriga and Pérez-Foguet, under review-b; Giné-Garriga et al., 2011; Hunt, 2001; Jiménez and Pérez-Foguet, 2012). Today, an ongoing consultative process is debating a consolidated proposal of targets and indicators for the post-2015 monitoring framework (Joint Monitoring Programme, 2011; Joint Monitoring Programme, 2012c).

The techniques employed for data acquisition also play a key role in terms of data reliability and validity (United Nations Children's Fund, 2006). A well-designed questionnaire helps elicit a response that is accurate and measures the things one seeks to measure. On the other hand, interviews with predetermined and closed-end questions are not conducive to study respondent's perceptions or motivations (Grosh, 1997), thus pointing out the need for employing alternative survey instruments to avoid bias in survey's outcomes. For instance, water quality should be bacteriologically tested (Howard et al., 2003, draft; Jiménez and Pérez-Foguet, 2012; Joint Monitoring Programme, 2011); while study of handwashing through structured observation may help avoid over-reporting of "desirable" hygiene behaviours (Manun'Ebo et al., 1997).

Finally, there is an issue with the statistical precision of the estimates. A common monitoring need in local decision-making is to assess separately the performance of the lowest administrative subunits (e.g. communities, villages, etc.) in the area of interest (e.g. district, municipality, etc.). Since the number of these administrative subunits is generally large, the level in which information needs to be disaggregated is high, and one is therefore faced with the need to balance precision against cost when deciding the size of the sample (Bennett et al., 1991; Grosh, 1997; Lwanga and Lemeshow, 1991). Moreover, a scientifically valid sampling methodology is necessary to achieve reliable estimates. For household surveys, a cluster sampling design has proved a practical solution (Bennett et al., 1991; Lemeshow and Stroh, 1988; United Nations Children's Fund, 2006). And water point mapping exercises, where a comprehensive record of water sources is undertaken (i.e. no sampling), have also been successfully implemented to monitor the distribution and status of water supplies (WaterAid, 2010).

In sum, a need for further research into feasible alternatives for data collection to the currently used strategies has been highlighted (Joint Monitoring Programme, 2011), and the purpose of this study is to present a new specific approach for the WASH sector at local level, as an attempt to overcome previous shortcomings. It takes the WPM as a starting point to record all available water sources at a particular location, which results in the need of covering the whole area of intervention. This information is then combined with data provided from a household-based survey, in which a representative sample of households is selected to assess sanitation and hygiene habits. In brief, taking advantage of the current momentum of WPM as field data collection method in the water sector (Government of Liberia, 2011; Government of Sierra Leone, 2012; Jiménez and Perez-Foguet, 2011; Pearce and Howman, 2012; WaterAid, 2010) and the growing interest among development stakeholders in harmonizing sector monitoring (Joint Monitoring Programme, 2012c), this study suggests a cost-efficient alternative to simultaneously perform a WPM together with a household survey, thus producing a comprehensive WASH database as a valuable output for policymaking. To test the applicability and validity of the proposed approach, three different case studies in East Africa are presented.

In Section 2, basic concepts of the evaluation framework employed in this study are outlined. The methodology proposed to collect WASH primary data is described in Section 3. It presents the three case studies and highlights key features of the approaches adopted in each one of them. Section 4 computes statistical validity of the method and, in so doing, provides useful guidelines on data exploitation for decision-makers. Integral to this discussion there are a variety of alternatives to disseminate achieved results, in an effort to provide clear and accurate policy messages. The paper concludes that efficient data collection mechanisms can be designed to produce reliable estimates for local planning processes. Their implementation in the real world, however, is to a certain extent elusive; and specific challenges that remain unaddressed are pointed out as ways forward.

2. Evaluation framework

This section introduces core aspects of the evaluation framework proposed to locally assess the WASH status. First, the two methodologies for