Monitoring access to rural water supplies in Ethiopia[1]

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This paper examines recent rural water supply monitoring experiences in Ethiopia from the perspectives of global, national, and local actors with their different data requirements. It reviews the advantages and disadvantages of the key monitoring efforts including the World Health Organization (WHO)/United Nations Children's Fund (UNICEF) Joint Monitoring Programme (JMP), official sector reporting until 2010 using data collected through regional inventories and updates, and since 2010 the National WASH Inventory (NWI). A review of the past two decades unpacks these approaches to examine how the different methods have generated different numbers for use, access or coverage of rural water supplies. The investment made in the NWI is critically reviewed and lessons highlighted for future updating and use of water and sanitation data. Although the NWI has been a huge leap forwards, the paper concludes that the future is still likely to be about parallel monitoring processes at global, national, and local levels rather than one all-encompassing monitoring system. Post-2015, the trend may be for monitoring to become more complex with additional indicators addressed. In this context, the paper highlights the importance of continually ensuring a good understanding of different monitoring approaches and their findings through clear analysis, good communications and multi-stakeholder reconciliation processes that make appropriate linkages. The paper aims to make a small contribution to that effort.

[1] This paper is prepared as a background paper for the "Monitoring Sustainable WASH Service Delivery Symposium" organised by the IRC International Water and Sanitation Centre from 9 to 11 April 2013 in Addis Ababa, Ethiopia and a related event "The National WASH Inventory (NWI) seminar: lessons learned and maximising value" to be held on 8 April 2013. The paper summarises some of the findings that will be presented in presentations by Tamene Hailu, National WASH Inventory Coordinator, Ministry of Water and Energy and John Butterworth, Ethiopia Country Director at the IRC International Water and Sanitation Centre.

1. Introduction

This paper examines monitoring of water supplies in rural Ethiopia - where a majority of the country's population and most of the people without access to good water supplies live - from three different perspectives:

- the global level – where a principal interest is to compare progress on access to safe water and sanitation across countries
- the national (federal) level – where some key policy-making and financing decisions are centralised
- the regional and *woreda* (district) levels - where the focus is on (decentralised) service delivery to keep the existing infrastructure working and extending supplies to people without access.

At the global level, the Millenium Development Goals (MDGs) renewed interest in measuring results (Picciotto, 2002; Kusek and Rist, 2004) which, for water and sanitation targets, has meant obtaining reliable water and sanitation coverage[2] figures. In 1990, the World Health Organization (WHO) and UNICEF started to collaborate on the Joint Monitoring Programme for water and sanitation (JMP) to track global progress towards the water and sanitation MDGs on a country-by-country basis (WHO/UNICEF, 2010a). As in other countries, the JMP estimates for Ethiopia have sometimes differed significantly from the official government figures used for national planning and policy-making. After 2015, the MDGs will be replaced by something else and monitoring re-jigged accordingly. Sustainable Development Goals (SDGs) are currently being designed.

Monitoring of water, sanitation and hygiene in Ethiopia has been transformed since 2010 by the National WASH Inventory making available for the first time a consistent set of data from (almost) the entire country[3]. Prior to this date, national figures were assembled from regional inventories, reports and updates. There were known to be serious inconsistencies between different regions and in some places, the data were based more on estimates than measurements.

As a result of the NWI, rural water coverage has been revised downwards significantly. Combined urban and rural coverage is now determined to be 54 per cent, compared to the 68.5 per cent that was reported for 2010 on the basis of earlier data. Rural water supply coverage is now known to be only 49 per cent compared to the 65.8 per cent reported earlier. While it is not so encouraging to learn that more Ethiopians lack access to water and that the challenge of reaching universal access is even greater than we earlier realised, the improved dataset provides a potentially valuable resource for planning and improving access through better targeted investments and better policy decisions. Made available and put to use, it could in itself help to accelerate progress.

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[2] Coverage (expressed as percentage) is used by the JMP as shorthand for the numbers of people using different types of improved water facilities. Coverage and access are also used to refer to the official Gov. of Ethiopia estimates of the people with access to a water supply scheme (see Box 1 for further discussion). Readers should be aware that coverage, the term we have preferred, is measured in different ways by these agencies.

[3] Somali region was not included.

Service delivery – necessarily decentralised to more local levels - requires more and finer detailed data than that used at regional and national levels for policy and planning decisions. As well as the on-going development of new infrastructure, monitoring at this level needs to support efforts to improve operations and maintenance to tackle the growing 'sustainability' crisis with more systems breaking down on a regular basis (Moriarty *et al*., 2009; Mason *et al*., 2013). Regional water resources bureaux and *woreda* governments need more than just overall base-line information on their WASH infrastructure and assumed levels of coverage. They need to know where there are unmet needs and how these can be addressed, and when, where and why systems have deteriorated or failed, so that resources can be allocated effectively.

The paper focuses on reviewing recent history in rural water supply monitoring in Ethiopia, highlighting why different efforts and methodologies have generated different numbers. Insights from the global, national and more local levels are drawn together to highlight how we can link and learn from monitoring efforts at these different levels, and when they, and the needs they serve, might be just too different to be integrated.

2. International WASH monitoring and Ethiopia

Global WASH sector monitoring was placed firmly on the international agenda during the International Drinking Water Supply and Sanitation Decade (1981-1990), with WHO assuming responsibility for collecting, collating and publishing global sector information. Data provided by each government through questionnaires were meaningful at country level, but hard to compare at international level. As a result, WHO and UNICEF created the JMP, to monitor global progress towards MDG 7 (sanitation was added to Target 7c at a later date).[4] Since 2000, the JMP has based its reporting on user information gathered from household surveys undertaken by national statistical agencies rather than the service provider data gathered by government ministries.

Contrary to common perceptions, the JMP does not collect data. It relies on existing household surveys that are seen as nationally representative, and that include questions on the types of drinking water and sanitation facilities used by households. This information is used to determine the percentage of households/people using *improved* drinking water sources and *improved* sanitation facilities, where improved requires a certain standard to be met. An improved drinking-water source, for instance, is one that, "by nature of its construction or through active intervention, is protected from outside contamination" (WHO/UNICEF, 2010a).

The most recent figures determined by the JMP for Ethiopia on 'use of improved water facilities' are summarised in Table 1.[5] These estimates are extrapolated from surveys over the past two decades (see Figure 1). Since around 2000, the JMP estimates diverged significantly from the MoWE estimates. The JMP figures showed slower progress being made in improving coverage and were contested. More recently as new data has become available

[4] Where the targets are to reduce by half the proportion of people without sustainable access to safe drinking water and basic sanitation.

[5] The Joint Monitoring Programme website at www.wssinfo.org provides extensive information on history, methodology and access to data files for each country.

during the past few months the JMP and MoWE estimates for rural water have converged significantly (see highlighted part of Figure 1).[6]

Table 1 National and globally reported *rural* and *urban* water supply coverage figures for Ethiopia, 2010

	JMP use of improved water facilities, per cent (2010)	JMP use of improved water facilities, per cent (2011)	MoWE water access coverage, per cent (2010)	National WASH Inventory, per cent (2010/11)
Rural	34	39	65.8	49
Urban	97	97	91.5	75
Total	44	49	68.5	54

Sources: WHO/ UNICEF, 2012; WHO/ UNICEF, 2013; Ministry of Water and Energy, 2011a; MoWE, 2012

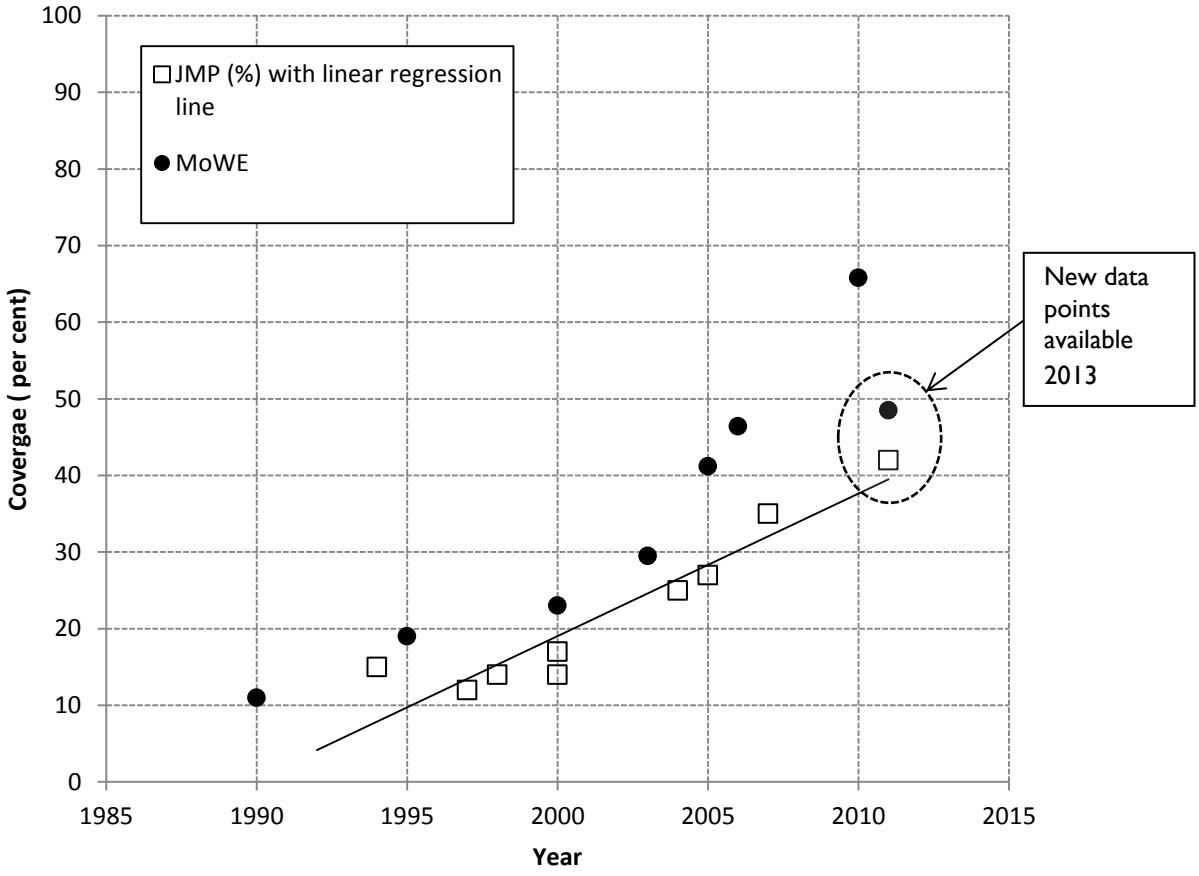

Figure 1 Rural water supply coverage (national and internationally reported figures)

[6] This chapter focuses on rural water supply, but Ethiopia's sanitation figures have also been contested. The disagreement centres on different definitions of 'improved sanitation', with the JMP's international standard stricter than that preferred by the GoE.

Source: authors own using data from the JMP (WHO/UNICEF, 2012; WHO/UNICEF, 2013) and the Ethiopian Government (AMCOW, 2011; MoFED, 2003, 2005, 2007a, 2007b; MoWE, 2011a, 2012; MoWR, 2009; MoWR et al., 2006; Rahmato, 1999)

2.1 How accurate are JMP estimates for Ethiopia?

The JMP does not report information of individual surveys but uses all available data points to draw a trend line as shown in Figure 1. Reported estimates are taken from the trend line even if a data point is available for that given year. Values on the trend line are seen as more accurate, as they smooth out any errors of individual surveys.

In Ethiopia, the JMP relies upon data collected by the Ethiopian Government's Central Statistical Agency (CSA), such as the USAID-funded Demographic and Health Surveys (DHS), the World Bank's Welfare Monitoring Surveys (WMS) and the national census. Some long bureaucratic delays in accessing these data have caused problems, since more recent data points would better reflect recent and accelerated national efforts to increase coverage. The most recent survey used in deriving Ethiopia's 2010 coverage estimate dated from 2007 (see Table 2). DHS results from 2011 have since been used in the latest JMP estimate.

Major amendments were made to the JMP calculations for Ethiopia at an Addis Ababa workshop in November 2011, taking into account errors in the classification of protected and unprotected springs in the 2005 dataset, and new data from the 2007 census that had also been made available to the JMP (WHO, 2011). Addressing errors in the 2005 dataset raised estimated total water coverage from 38 percent to 55 per cent of the population (estimates for 2008, WHO/UNICEF, 2010b), but inclusion of 2007 census data pushed the figure back down to 44 per cent for 2010 because that data point shifted the regression line significantly. This was the total water coverage estimate published in the 2012 report (the estimate being for 2010). The rural water figure was 34 per cent. Such examples highlight the sensitivity of the JMP estimates to the few recent data points that are used when trend lines are drawn. While reducing the gap between the JMP estimate and official national estimates to some extent, a major discrepancy remained. New data from the 2011 DHS survey (showing 42 per cent rural water coverage) are used in deriving the JMP figure for 2011 (approved but unpublished) of 49 per cent for total national coverage and 39 per cent for rural water.

Table 2 Data points for rural water supply coverage (national and internationally reported; per cent)

	1990	1994	1995	1997	1998	2000	2000	2003	2004	2005	2006	2007	2010	2011
MoWE*	11		19			23		29.5		41.2	46.4		65.8	48.5
JMP		15		12	14	14	17		25	27		35		42
Sources **		*CEN94*		*WMS97*	*WMS98*	*DHS00*	*WMS00*		*WMS04*	*DHS05*		*CEN07*		*DHS11*

Notes:
* official reported water access coverage (per cent) for selected years from: Rahmato 1999; MoWR, MoH et al. 2006; MoFED 2007a; MoFED 2007b; Tadesse 2008; MoWR 2009; World Bank 2010; MoWE, 2012
** estimated proportion of the population using improved drinking water sources (per cent). Key to original data sources: CEN = Census, WMS = Welfare Monitoring Survey, DHS = Demographic and Health Survey. Figures indicate year of survey e.g. 94= 1994 and 04 = 2004

3. National monitoring before 2010

Ethiopia's national target is to reach 98 per cent rural water supply coverage by 2015 – more ambitious than the MDG target – reaching an estimated 18 million rural people

between 2011-2015 through almost 94,000 new schemes, and almost 58,600 rehabilitated schemes (MoWE, 2011a). As the Ministry of Water and Energy (MoWE) focuses on increasing the number of water points in Ethiopia, it has developed a way of calculating coverage figures that differs to that used by the JMP. The MoWE estimated coverage by the number of water schemes multiplied by their 'design capacity', or the number of people each scheme can serve in theory, regardless of the numbers actually served. In other words, MoWE collected data for, and reports on, service provision (outputs) rather than service use (outcomes) – a methodology summarised in Box 1. Official statistics for the water sector[7] have been based on information pieced together from occasional inventories undertaken by the regional water bureaux, with newly-constructed schemes added to the figures each year. Results were reported upwards and collated nationally by the MoWE.

Box 1: Coverage as defined by the Ministry of Water and Energy

Ethiopia's Universal Access Plan (UAP) defines the minimum standards for rural areas as at least 15 litres of safe water per person per day within 1.5km of their home. However, the terms 'access' and 'coverage' are often confused. In the revised UAP (MoWR, 2009) the MoWE defines 'water supply access coverage' as *potential* access while 'water supply coverage' refers to the situation where people *use* 15 litres/capita/day (lpcd) from a source within 1.5km that meets WHO quality standards. The former definition is the current basis for data collection and reporting, while the Government is working towards the latter definition. The method used does not actually monitor the different elements in the national target, i.e. quantity (15 lpcd), quality (potable) or distance (1.5km in rural areas). In any given area, whether a *woreda* (district) or entire region, calculations of coverage according to federal guidelines use the number of water systems to calculate the number of people served, using fixed multiplication factors representing the average number of beneficiaries per scheme type (for example, 270 people for a hand-dug well fitted with a hand pump, 457 people for a drilled shallow well fitted with hand pump and 3,313 people for a deep well with a piped distribution system). Coverage is then calculated by dividing the population that could be served, potentially, by the total population estimate for the same area (MoWR, 2009).

This standard methodology is crude but does have its advantages. Counting water sources is relatively simple, reliable and low cost. An update is derived easily by adding the numbers of people assumed to be covered by new systems as they are constructed. However, there is no means to discount the systems that are broken down. The inclusion of schemes that are non-functional can lead to overestimates, and there are major concerns about the reliability of multiplication factors that ought to be based on extensive, regularly published and up-to-date research. By definition, standard factors lead to overestimates and underestimates in different places. This method is most unreliable at local level and where systems serve larger numbers of users, such as those with distribution networks (with greater variance around the average assumed number of users). Overestimates are also generated where sources are not distributed in line with the distribution of the population, but are clustered in specific locations (e.g. along roads where access for drilling rigs is better).

[7] There is no WASH sector as such but rather some cross-ministerial collaboration involving health, education and finance. Sectoral reforms are underway to instigate a sector-wide approach to programming.

Coverage as reported by the MoWE is also shown in Table 1 and 2 (and Figure 1) alongside the JMP coverage figures and data points. In rural areas, in particular, there has been a major difference in the two estimates[8] with JMP estimating 34 per cent use of improved sources or about half the MoWE access coverage estimate, namely 65.8 per cent in 2010. For the country as a whole, represented in Table 1[9], the JMP estimate for 2010 of 44 per cent with access to improved water facilities is much lower than the MoWE access coverage figure at 68.5 per cent. With such large differences the MoWE has tended to dismiss the JMP access figures (although these are all based on GoE data collected by the CSA) pointing in particular to their failure to reflect recent gains.

3.1 Reasons for differences with JMP figures

Differences between the official MoWE and JMP figures are best understood as resulting from differences in definitions, methodological approach and data access (Butterworth *et al*., 2010) as well as population estimates and timing which sometimes make it impossible to compare estimates for the same year.

- While the MoWE standard for rural areas is 15 lpcd, the international standard is 20 lpcd. However, both approaches lack measurement of the actual water volumes consumed as well as other key parameters to monitor access such as water quality or distance. Crude approximations or proxies are relied on if these are considered at all.
- The JMP has its own specifications for improved sources, including family-owned wells, that must be functional at the time of the survey, while MoWE counts only communal systems even if they are not functional at the time of the inventory.
- The JMP uses household surveys to assess what facilities people use, while the MoWE monitors the number of schemes and calculates 'water supply access coverage' using assumptions about user numbers per scheme and the estimated population. Both methods have limitations. The number of users of water points rarely matches their design population. Actual data on numbers of users is not widely available in Ethiopia, but similar methodological discussions have shown very significant discrepancies in other places[10]. The sampling strategy used for household surveys seeks statistical representation at the national level, but disaggregation – while possible at sub-national level – does not extend to the local and/or implementation level. These household surveys do not yield information on water sources such as the functionality data needed for operational purposes.
- Ethiopia, like many other developing countries, suffers from a lack of high-quality data and institutional hurdles may hamper the sharing of the limited data available, as has been the case between the JMP and the CSA[11], leading to severe delays. While more recent data were available within the CSA, the JMP only could only use the 2005 survey as its most recent data point in its 2010 publication (JMP, 2010). As a result, the JMP

[8] In urban areas JMP have reported higher coverage than MoWE.

[9] Results are weighted heavily towards rural areas in accordance with the distribution of the Ethiopian population (82 per cent rural in 2010 according to the World Bank, 2012)

[10] In a workshop in Mozambique organised by Unicef with the national statistical office (INE) and the water department (DNA) calculations were reported showing that in rural areas the actual number of users per water point was on average 253 in rural areas and 2386 in urban areas which in both cases was significantly different from the 500 users per water point used as a design criteria (Bostoen, 2008).

[11] CSA have a policy to charge for data, and UN agencies have a policy not to pay.

estimates have been less accurate than they could have been had all available data been included, as the older data could not reflect recent achievements.

Given the lack of understanding of the differences between monitoring approaches using user- and provider-based data and their respective strengths and weaknesses, it has sometimes been impossible to establish consensus between individuals and organisations working at different levels and with different perspectives on which set of figures is more likely to represent reality. But the question of which estimate is more accurate may not be the right question to ask. It would be more useful to compare and triangulate the results from different monitoring approaches, reflecting on why actors choose certain approaches (Welle et al., 2012), and on how well they inform decisions on access to sustainable WASH services. In the next section we turn to one potential solution to the uncertainty: the Ethiopian National Water Supply, Sanitation and Hygiene (WASH) Inventory (NWI).

4. The National WASH Inventory

WASH monitoring in Ethiopia has been transformed by the first National WASH Inventory (NWI) which started in 2010. It is a key element of the on-going sector reforms towards a national OneWASH programme. The 2010/11 NWI was a very resource intensive exercise, carried out at an estimated cost of ETB 200 million, the equivalent of nearly $12 million, using more than 65,000 enumerators. It collected both user and provider data through a sector-specific household and water point census. The NWI covered over 92,000 rural water supply systems, over 1600 small town systems and 50,000 schools and health institutions. Some 12 million households were interviewed about their water and sanitation facilities.

The driving forces for the NWI included differences observed between national and the international figures, and federal concerns about results from regional inventories that had been held at different times and using diverse methods. One key objective of the NWI was to determine the access figures in a way that would withstand international scrutiny.

At the time of writing in March 2013, the results of NWI had just been approved in the MoWE following a long consultation process (around 9 months) sharing the results with donors, regions and other ministries including presentation at the sector Multi-Stakeholder Forum held in November 2012. Verification is still awaited by the Central Statistical Agency (CSA) and Ministry of Health. The decision to start to use preliminary NWI figures which show coverage as being significantly lower than previously thought is encouraging. This reflects confidence in the validity of the NWI results and the improved sector baseline that they establish.

Donors have supported the NWI, as they need a credible set of figures to track the use of more integrated activities and pooled funding. Linked to this is an ongoing move towards a more programmatic approach in the sector encapsulated in the WASH Implementation Framework (MoWE, 2011b) which will guide the integration and implementation of all future WASH interventions in Ethiopia. Relying on a single plan, budget and report for WASH – the ultimate aim of the reforms – is only feasible if donors have confidence in the government structures managing their funds. This requires a monitoring and evaluation system that is trusted by the Ethiopian Government and donors alike, especially in providing the necessary information to account for funds for the sector. If all donor funds are pooled

into a consolidated WASH account as envisaged, it will no longer be possible for donors to track their funds to specific implementation sites or activities, and overall sector achievements will become the major milestones. Finally, the NWI is also intended to deliver a monitoring system for the WASH sector that could improve service delivery through more evidence-based planning and policy-making. This means that the exercise must be relevant to the needs of the *woredas* where many responsibilities for improving WASH service delivery, although not necessarily the means, have been delegated.

4.1 Preliminary NWI findings

Some of the insights provided by the preliminary NWI results are:

- A better understanding of the types of rural water supply schemes across the country. Of the 92588 rural water schemes surveyed, some 37 per cent (34229) are hand dug wells with normal hand pumps. The uptake of rope pumps as an alternative is illustrated by the 5639 rope pumps (6 per cent). Shallow wells (boreholes) numbered 8106 and a further 2735 deeper wells with distribution systems were counted (together accounting for 12 per cent systems). Springs with and without distribution networks numbered 10937 and 24596 respectively, together accounting for 38 per cent of rural systems.
- The challenge faced in reaching universal access is bigger than previously estimated. Coverage is now understood to be significantly lower than reported in previous estimates. Total coverage (people estimated to receive a supply of 15 lpcd within 1.5 km) is 54 per cent and in rural areas, 49 per cent. This estimate includes non-functional but repairable schemes. The estimate is not based upon an assessment of water quality.
- Household survey and scheme inventory-based estimates for rural water supply coverage are relatively similar (see Table 3). Based upon the household surveys rural water coverage is assessed as 45 per cent (consistent with the 42 per cent DHS figure although categories are not all the same), rather than 49 per cent.
- Rural water supply systems are widely used by households collecting smaller quantities of water and/or travelling longer distances than national norms proscribe. Rural water supply schemes serve 61 per cent of the population when no regard is taken of quantity or distance norms (see Table 3).
- Sustainability of rural water supply services is a critical area. Functionality rates for rural water supply schemes vary between 66-80% between regions and average 74% nationally.
- School and health institution WASH facilities are an important focus. Some 85% health institutions have latrine facilities while only 32% have water supplies. Similarly 81% schools have latrine facilities (although only 33% have improved facilities) whereas 31% have water supplied.
- Sanitation access is shown to be greater than rural water supply. Some 60% rural households have access to latrine facilities compared to 80% in urban areas (national figure 63%).

Table 3 National WASH Inventory findings based on household survey and scheme inventory (per cent)

	Rural (per cent)	Urban (per cent)	Total (per cent)
Coverage assessed from household survey question	45	82	50
Coverage based on scheme inventory and quantity/distance norms	49	75	54
Usage of rural water supply schemes (excluding quantity and distance)	61	87	65

In the next section, we turn to lessons learned in the implementation of the NWI and its potential to inform policy and practice.

4.2 Reflections on NWI implementation

Originally conceptualised in the 2008 WASH M&E Framework, the initial design of the NWI included just 10 data collection forms and two additional summary formats for household level information (MoWE, 2011c; see Box 2). The formats and choice of questions were influenced strongly by a pilot study in eight *woredas* across Ethiopia, undertaken as part of the introduction of WASH planning within UNICEF-supported areas. Some of the more challenging technical aspects of the NWI were later dropped in consultation with the Ministries of Health and Education and the CSA to allow the use of non-specialist enumerators.

Box 2. Data collected in the National WASH Inventory

There are 10 forms used in collecting NWI information, of which 5 relate to rural WASH:

Form 1, Safe Water Supply Inventory for Rural and Small Towns: 8 parameters including name of scheme, type of water supply, coordinates, estimated total number of households using a scheme and number within 1.5km, total yield, functionality and reasons for non-functionality.
Form 2, Health Institutions WASH Facilities Inventory: 8 parameters including type and functionality of water supply facilities, type of latrines and whether separate facilities exist for men and women.
Form 3, Schools WASH Facilities Inventory: 9 parameters, similar to form 2, with addition of student numbers.
Form 4, Inventory of Household Hygiene and Sanitation – Rural and Urban Areas: 6 parameters including name of household, gender of household head, type of latrine/toilet facility, evidence of use, handwashing facilities and safe water management in home.
Form 5, Inventory of Household With Source of Drinking Water – Rural and Urban Areas: 3 parameters including name, gender of household head, and main source of water for household (8 possible responses)

Source: MoWE, 2011c

Given the pioneering nature and scale of the exercise, there are criticisms that can be made and lessons that can be learned. The way the NWI was conceptualised reflects a sectoral development process geared towards the information needs of both ministries and the donor community in Addis Ababa, rather than primarily building understanding of local services and needs among *woreda*-level water staff. This focus had consequences for the data collection process. Rather than having water sector staff collect data on water supply schemes, the NWI relied mainly on *kebele* (sub-district) staff from other sectors (Health Extension Workers and teachers) as enumerators. While this allowed faster implementation of the NWI by overcoming staff and enumerator shortages, if often deprived *woreda* water officers of the opportunity to visit schemes by themselves. The focus on national rather than local needs is also reflected in the questions asked under the NWI, with some opportunities missed to generate information relevant for local planning (see Box 3).

Box 3: Rural water supply in the National WASH Inventory

For rural water supply, Form 1 "safe water supply inventory for rural and small towns", (MoWE, 2011c) captures data on the type of water supply, the GPS coordinates of each scheme, the estimated total number of households using the scheme, the number of those households estimated to live within a 1.5km radius and the total yield of the scheme. The format also records scheme functionality and categories of reasons for non-functionality. This is all useful for calculating coverage. However, it does not provide much of the data required for day-to-day operations at the *woreda* level. For example, there is no information on more technical aspects related to scheme failure, on the existence and functioning of WASH committees, or details on their financial management. Such detailed technical and management information may be irrelevant for monitoring at the national level but is vital for *woreda* water supply officers. In addition, the NWI does not give each water scheme a unique reference number, but refers to them by GPS coordinates. Without a unique reference system, it will be more difficult to use and update scheme information and combine different data sources.

Data entry and analysis proved especially time consuming. There were delays starting data entry due to lengthy procurement processes for new computers, and training needs were underestimated. It took 7 to 8 months just to do data entry of the scheme and institution data. In some regions the household data is still not entered, although summary data has been processed. There are proposals to address some of these issues in the planned inventory for Somali region (the only region not covered to date by the NWI). As well as using the proven but demanding paper-based system, it is proposed to trial the use of ICT technologies in data collection and particularly the use of data collection software on mobile phones. This should eliminate the data entry step since data are entered at the time of the survey into a questionnaire form a smartphone. Potentially this also transforms opportunities for supervision of data collection since the data are uploaded to a server and can be checked in real-time. A reported weakness in the NWI to date, with a third of GPS coordinates missed could also be addressed since these data are automatically collected in a standard format using the same phone.

5. Regional and local data collection and use

Many WASH responsibilities in Ethiopia are decentralised to region and *woreda* levels as a result of the constitutional emphasis on federalism and devolution. From the regional perspective, rural water supply data is required to inform decision-making, to guide budget allocations to *woredas*, and to improve scheme functionality through better maintenance. Major repairs are often organised by regional government, given the greater capacities and equipment available at that level. Meanwhile, the *woreda* is at the frontline of service delivery, with responsibility for managing and maintaining existing water schemes and establishing new ones. However, the ability, capacity and resources available vary strongly between *woredas*.

Although the NWI is a federal initiative, its achievement requires serious effort by regional governments and administrations, with regional government staff coordinating data collection in collaboration with zone, *woreda* and *kebele* staff. In addition, regional governments have covered part of the costs with support from regional NGO partners providing in-kind assistance in the form of additional staff for supervision, vehicles and other logistics. Data entry and analysis are also focused on the regional level.[12]

5.1 Looking back at regional WASH inventories

Before the current NWI initiative, regional inventories were undertaken by some regional governments, albeit in an irregular and ad-hoc fashion (Etherington et al., 2008). Executed independently from the federal MoWE, these also focused on estimating coverage but sometimes included other indicators. One example is the 2009 *Woreda* Inventory Survey undertaken in Southern Nations, Nationalities, and People's Region (SNNPR). Disagreements over coverage figures among *woreda* and regional level sector staff over the previous data had generated political interest in SNNPR and led to the commissioning of a fresh data collection exercise by the regional cabinet. Discrepancies between the reasonably high reported rates of coverage and large numbers of un-served people (that needed tankered supplies) were brought into sharp focus during a severe water shortage in 2009.

The results of the 2009 regional SNNPR inventory were analysed in at least three different ways. Coverage calculated using the standard water supply access coverage method generated a rural coverage estimate of 36 per cent. An alternative non-standard method which has been tested but not officially approved, is to elicit the estimated number of users[13] of each source (this resulted in an estimate of 30.9 per cent) and also specifically those living within 1.5km (resulting in 20.8 per cent coverage). Under this alternative method, numbers of users are estimated by asking the communities involved, instead of using multiplication factors for users of different scheme types to derive an access estimate. To be reliable this method requires careful questioning as it assumes that the managers of water systems (e.g. WASHCO members) can estimate accurately how many people use a system as their main source of domestic water and their distance from the source. Although not used officially, these calculations illustrate the sensitivity of the results to the method.

[12] One could also ask why household level data was collected separately and not through the normal census or sample survey, which would have made data analysis more efficient. Future surveys might also reduce the data entry burden by deploying new technology available for using smartphones as data entry devices.

[13] User number were estimated by communal WASH Committees (WASHCOs), who are responsible for the day-to-day management of a water scheme on behalf of the user community

The NWI also collects the data needed to use these different methods. The calculation of figures in the 2009 inventory illustrates that access figures, although seemingly objective, are negotiated in reality and, as such, subject to political considerations.

In the past, many regional inventory data have not been used and are not easily accessible (Box 4 discusses a RiPPLE effort to address this problem). One key issue is the underestimation of the resources needed after survey completion and the investment needed to maintain records and archives. Welle et al. (2012) examine why costly and human-resource intensive baselines tend to be underused. Since, in Ethiopia, service delivery follows a decentralised model, the NWI data will be most useful for regional and woreda level stakeholders.

5.2. Potential to use NWI data at regional and *woreda* levels

Making data accessible has been touted as a key feature of the NWI. Initially a simple MS Access-based interim database was designed to enable data entry at regional level and the production of *woreda* report cards, displaying basic information on WASH access through pie charts, graphs, and *woreda* profiles. Data are now being made available through a web-based WASH Management Information System that is accessible to an initial 52 woredas. There is a commitment eventually to make data available electronically within the government through WoredaNet, a satellite network that makes information available to clusters of *woredas*. Uncertainties remain about making data accessible to partners outside the government: the type of data and whether raw data or aggregated information will and should be made publicly available. Answers to the data access questions could be an incentive for increasing NGO collaboration and donor funding in the NWI. Seeing NWI data in use will encourage support for future updating exercises that must draw on all kinds of capacities including staff and vehicles from NGOs.

5.3. Using data: needs and capacity at *woreda* level

When comparing the current stage of NWI implementation with the aspirations for decentralised multi-sectoral planning for WASH, a gap emerges between aspirations and available capacity to develop such integrated, *woreda* or *kebele* level plans. One important way to use NWI data and resulting information is in the development of local WASH plans. While data is entered into the NWI database at the regional level, *woreda* water, health, and education officers will have to familiarise themselves with the information generated and find ways to work with the data in order to use it as a planning tool. Although the level at which data will be aggregated is not yet clear, it seems crucial to make the NWI data available either as raw data or, if aggregated, at the lowest possible level (*kebele*), to be of most use for developing relevant WASH plans.

For those *woredas* with little exposure to such systems, or IT systems in general, this could be quite a challenge, requiring new sets of skills for the staff involved. In addition to logistical issues, such as how to organise trainings, and where this database will be hosted, other bottlenecks may emerge with consequences for integrated planning at *woreda* level. If, for example, regional offices enter WASH data into the database, to what extent will *woreda* officers be able to update the data? As mentioned in Box 3, one practical issue is that water schemes are not allocated a unique reference number in the NWI.

Participants at a RiPPLE workshop that discussed these issues in May 2011 highlighted the immense differences between individual *woredas* in terms of available staff capacity and

logistics (Welle and Bostoen, 2011). Those assisted by donor programmes have benefited from several years of intensive capacity building and logistical support in planning and implementation, including the provision of vehicles, computers, and other basic equipment. *Woredas* without donor assistance, however, have not received any capacity building support and sometimes had no transport or other hardware for their work. *Woredas* that have not yet benefited from such support were found to be in a poor position to use NWI data to undertake formal WASH planning and could benefit from more targeted assistance or inter-*woreda* exchange.

There are also different perceptions on the ownership of NWI data. While the Directorate of Water Supply & Sanitation in the MoWE feels strongly that the *woreda* is the ultimate owner of the current data, the way in which data is currently collected and analysed and the way it will be made available makes *woreda* representatives feel that the data is, in reality, owned at the national level. These different perceptions matter for the future reliability of the NWI because, as discussed above, the current thinking is to develop an IT structure in which the *woreda* will be responsible for the collection, updating and analysis of the WASH data at local level. It is vital, therefore, that the *woreda* uses, and feels responsible, for local data.

The *woreda* water officers who participated in the May 20111 workshop had actually collected water supply data for the NWI themselves because of a lack of *kebele*-level staff in their *woredas*. They found the data collection process very helpful for increasing their understanding of existing local water supply schemes, and in developing collaboration with health and education colleagues. Visiting water schemes allowed water officials to conduct informal discussions with users and WASH committees. These enabled *woreda* water officers to establish or renew contacts, assess the sanitary, operation and maintenance, and financial management situation at each scheme, and to provide quick feedback and advice. It was clear that the process of collecting data for the MoWE (as it is perceived) at woreda level was viewed as a great opportunity to visit water schemes that had not, in some cases, been visited by water officers for months or even years. It also allowed additional data to be collected that was not needed for the NWI but important for the water officers. This informally "collected" information often related to the functioning of WASHCOs and, in particular, to the financial management of WASHCO funds.

The fact that formal data collection opened up processes for informal discussions around water schemes shows that the process of knowledge creation does not just follow one single, formal path. In the test phase of the NWI, *woreda* water officers were not encouraged to analyse the data they collected or use of it in any other way. However, many may well have done so informally outside the NWI process, catalysing local knowledge creation.

Box 4: Encouraging local use of data

RiPPLE experimented with stimulating the local use of currently under-used data, building upon the SNNPR Woreda Inventory Survey of 2009. In collaboration with four *woredas* in the region, RiPPLE assessed and strengthened capacities to analyse and use this WASH data in *woreda* Water, Mining and Energy (WME) offices. The assessment showed that *woreda*-level water staff members tend to lack basic analytical and computer skills needed for water access-related calculations, but found strong interest in analysing WASH data. Six days of

training spread over several months on WASH indicators, calculation methods and presentation skills, using mainly MS Excel but also Google Earth-based maps (primarily WaterAid's Waterpoint Mapper software), helped staff to better understand the situation in their *woredas* and plan for future interventions. Working with their own data, *woreda* water experts experimented with different calculation methods. Participants were surprised by the large differences in coverage figures that resulted, with the inclusion – or non-inclusion – of functionality having a major impact.

The sessions showed that, given this training, spread sheet software like MS Excel can be used successfully by some – but not all – *woreda*-level staff. One *woreda* WME office had gone on to use the report card produced to lobby their *woreda* council for more funds. This approach should not, however, be seen as an alternative to the new MS Access-based software for the NWI. A database is required to enter and store data reliably and safely. However, spread sheets make it possible for *woredas* to produce locally-tailored information and plans in a timely manner. How the NWI makes the database software available at *woreda* level will be important to future use of the data. In some *woredas*, updating data was stimulated by the training courses and undertaken on the initiative of participants. Where this happens there should be a mechanism for updated data to be captured and fed upwards.

6. Conclusions

There is widespread consensus in Ethiopia that better WASH sector monitoring is a vital step to improving sector performance. As a result, monitoring is high up on the sector agenda. The completion of the first National WASH Inventory has been a major achievement. It establishes a clear sector baseline – although validation has to be completed- using methods that were scrutinised by the Central Statistical Agency (CSA) and all relevant line ministries. The results for rural water supply show convergence with the estimates generated by the CSA and JMP from household surveys. Although the estimates are lower than previously reported, with rural water supply coverage now being 49 per cent (and national coverage 54%), confidence is being generated by the MoWEs commitment to a rigorous monitoring process and the convergence with other findings. The NWI exercise has also been a driver of some much needed integration both horizontally and vertically within government and across different administrative levels, and has enhanced the cooperation of NGOs in the sector.

Interest should now turn to the key issues of updating and making use of the data. While a large amount of resources were consumed in undertaking the NWI, it is not clear how the vast amount of data will be updated sustainably in the years to come or how the capacity will be built, in particular at *woreda* level, to actually use the data for relevant WASH planning and implementation. In fact, updating is already now underway with the intention being to update the scheme and institutional data every 2 years. It is unlikely that the household survey will be repeated.

While there might be partial technical solutions to the perennial under-resourcing of data entry and analysis, such as improved data collection tools on portable smart phones that could reduce the data entry burden and associated delays, the governance issues outlined in this chapter are likely to be critical. Updating will be encouraged by active use of the data, but current data is already under-used. Given past inability to make full use of existing data

and a constant danger of politicisation of data, the NWI may not prove as useful as it could be at local level without far more support to develop capacities and clarification of the outstanding questions on aggregation and access.

The next step then is to convince and support the WASH sector to use the available data in the NWI and from other sources. Here the challenge is local. It is about putting available data into practical use to improve actual operations for service delivery, as much as overcoming capacity constraints to make good use of data. That will probably require a greater, and more sustained, effort than that already expended on NWI data collection. The NWI provides only part of the data needed for operational management, and supplementary data will need to be added and combined.

Despite the NWI, the future will probably not be about one all-encompassing monitoring system, but rather different parallel monitoring processes at global, national and local levels. The expected post-2015 revisions to the global monitoring regime with its modified indicators are also expected to impact on the WASH monitoring landscape in Ethiopia. The JMP mandate for global monitoring is likely to extend beyond the MDG deadline of 2015, with a new focus on tracking Sustainable Development Goals while Ethiopia will always be responsible for its own national sector monitoring. Both these systems will co-exist for the foreseeable future, requiring continued navigation of the interface between international and national monitoring. Given their fundamentally different methodologies, the two approaches have sometimes generated quite divergent results, as we have seen in the example of rural water supply.

Continual efforts have been made to better understand the different monitoring processes and viewpoints, and to document, reconcile, and harmonise methods through nationally focused reconciliation workshops between the JMP and national agencies, and other stakeholder workshops. Dialogue between the global and national monitoring levels has been improving and the NWI has contributed. Over time it also happens that results have recently converged as more data has become available and methods refined. However, some differences between these estimates are very likely to persist and such efforts will need to continue. Critical analysis on the use of different methods, and a better understanding of the perspectives of the organisations that generate the results will always be helpful.

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