39th WEDC International Conference, Kumasi, Ghana, 2016

ENSURING AVAILABILITY AND SUSTAINABLE MANAGEMENT
OF WATER AND SANITATION FOR ALL

Towards universal coverage – Self-supply as part of the solution for the hard-to-reach in Zambia

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REFEREED PAPER 2369

Zambia has a real challenge to reach universal access by 2030, through community water supplies alone, requiring rates of progress in construction of more than six times the present rate. Supplementary approaches are needed. Piloting of Self-supply acceleration in one of the poorest districts in the country resulted in high levels of grassroots response, and positive reactions from government. Support services, including up-grading of artisan and advisory skills, promotion of improvement options and provision of loans enabled some 120 wells to reach JMP standards and many more up-graded to provide safe water. Results overall suggest that this approach can offer a supplementary and cost effective way for the country to achieve the SD Goal especially amongst some of the most difficult communities to reach.

Background – the SDG challenge for Zambia

In the past 25 years great progress has been made in Zambia to construct waterpoints to serve a further 3.9 million people, arriving at a total coverage of some 51% of the rural population (UNICEF/WHO 2015). The percentage trends in coverage tend to obscure the fact that the numbers of unserved using unprotected groundwater have not decreased over this period, but actually have increased by almost a million, due to significant population growth. To achieve the 2030 SDG of universal coverage presents a real challenge since the predicted rural population (CSO 2013) will require new supplies to reach a further 7.6 million people (almost twice as many) in the much shorter period of just fifteen years.

Zambia's main difficulty arises from low rural population densities, which tend to be a characteristic of many of the remaining unserved areas in Sub-Saharan Africa. With a country average of 12.2 people/km^2 or just over 2 households/km^2 in rural areas, the number of inhabitants within 500m of a centrally sited waterpoint tends to be well below the national design target of 250. Whilst earliest-covered communities tended to be the larger and more vociferous ones, the remainder are increasingly the smaller more scattered and more remote ones. In Milenge District Luapula, user numbers have already fallen to 125/well. As the number of users per new borehole and handpump falls, the per capita cost rises. Providing water to a group of 50 people in this fashion costs five times as much as to a group of 250. Yet the funding available for rural water supply is reducing, not rising.

With these characteristics in mind, several efforts have been made in Zambia to look at cost-effective ways to provide at least a minimum level of protected water supply to those without access to adequate community water supplies (CWS) in sparsely populated areas. This implies solutions for smaller user numbers with lower unit costs and more user contribution to them – as in Self-supply (SUTTON 2009). Such solutions do not replace community managed approaches but offer supplementary options where per capita costs become too high.

Piloted solutions in Zambia

Under DFID and UNICEF funding, piloting has been carried out in several provinces with less than 10 people/km^2 (Western, Northern, and North-western) but principally in Luapula Province, Milenge District which has a population density of 6.9/km^2 (UNDP 2013) This district is one of the poorest in the poorest province in the country. Yet the piloting aimed to establish the degree to which people would be prepared to

finance their own improvements to water supply, and so presented a true test of viability of the approach in very unfavourable economic conditions.

Luapula is a province with generally good access to shallow groundwater, but one which is also often the origin of cholera out-breaks in the country. Ensuring the safety of water supply is therefore of particular concern to health and local government services, both through improved well-protection and household water treatment. Piloting mainly focussed on the establishment of enhanced support services (OLSCHEWSKI 2015) to enable households to construct new supplies or improve existing ones. In the first pilot (peri-urban Mansa 1998-2001, DFID funding) this was undertaken by the Ministry of Health and the Department of Water Affairs but in later phases by WaterAid Zambia (WAZ), through the district council, and VAREN. The services were principally those of advice to be given by district councils, local Development and WASHE (Water, Sanitation and Health Education) committees and WASHE technicians, combined with promotion and advice by a specially-trained corps of well-diggers, masons and environmental health technicians (EHTs).

Efforts were concentrated on building up support services for low level improvements to protection and access. The marketing messages therefore chiefly related to water quality improvement, plus safety of children or animals from falling into well shafts and did not include any reference to the advantages of productive use and possible recouping of investment. Cost of improvements averaged some $150 which was initially to be covered by well-owners directly, but constraints of time to obtain results and of households waiting for harvests led to the formation of loan systems and extended repayment time. However households also used their savings, sold small animals and obtained money from other family members to cover costs.

Recent piloting was undertaken firstly in Milenge West (2008-2010), in an area of difficult access (no good roads or markets) and in 2012-14 in Milenge East (poor access and very limited commercial activity). Total rural population of the district was some 52,000 in 2015, and the piloting covered 8 out of 13 wards. Before the pilots were started coverage was 11%, but two major JICA drilling programmes, in 2010 and 2012/13, increased coverage to 72%. Communities with improved supplies and those without were included in a UNICEF-funded survey in late 2015 to assess the impact and potential of the approach (SKAT 2016).

The key questions of the survey to assess potential contribution of Self-supply to the SDG6 include:

- Are households interested to improve their traditional supplies and prepared to pay for it?
- Do such improvements have positive effects on communities and could they contribute to coverage?
- What support is necessary to enable supply improvements to JMP ‘improved supply’ status?
- What does this support cost, compared with conventional community supplies to the same population?
- How does government view this approach?

Findings from piloting

Investor response

Initial attitudes towards self-financed problem- solving were not particularly enthusiastic, as there was a high level of ‘donor dependency syndrome’ to overcome. However once one ‘early adopter’ had been convinced, and people could see what could be achieved, demand grew rapidly. Of over 300 well-owners, 92% expressed interest in self-financing supply improvements and of these two-thirds made some level of improvement within a year and a half. Response speeded up when a loan system was introduced as it meant outlay could be spread over one harvest or more. When good loan management was established 88% repayment was achieved before the end of the repayment period (WATERAID 2014).

The level of response suggests that there is a real perceived value in having a nearby supply, especially your own. This converts into an interest in improving it and a willingness to spend money and effort on up-grading low-cost water supplies, even where community supplies have been constructed and financial resources are limited. 40% of improvements moved supplies from unimproved to improved supply under JMP definitions in one step (see Box 1) through householders own investment. Whilst the chief (and often the only) investor is the well owner, the supply serves an average of 9 households (50 people) and so benefits more than the investor household alone. 14% of the district benefited, in small groups, from an improvement in a short period of time, with many others wanting to copy them.

In addition household water treatment and storage (HWTS) were found to be adopted by many. Almost half of households had treated water with chlorine or by boiling and half of these did so on a regular basis.

Self-financing with support services can result in affordable improved supplies even in areas of greatest rural poverty. In better rural economies and peri-urban areas response is likely to be greater and quicker.

Box 1. JMP definition of an improved supply

A protected dug well is a dug well that is protected from runoff water by a well lining or casing that is raised above ground level and a platform that diverts spilled water away from the well. A protected dug well is also covered, so that bird droppings and animals cannot fall into the well.

Source http://www.wssinfo.org/definitions-methods/watsan-categories/

Well performance

The main aspects of concern to sector professionals are water quality and reliability of supply. It is generally assumed that boreholes will perform significantly better, and this is true where no advisory service, deepening expertise or masons trained in wellhead protection are available. Open wells will always be at some risk, but good practice in water drawing and hygiene can reduce those risks significantly to a level where a JMP standard well might be considered as a household or small group level 'safe supply' standard. Such a well has an impervious parapet, apron, drainage, and top slab with cover (see Photo1). A windlass may provide an additional level of protection. Low cost pumps were not available in the pilot area.

In terms of bacteriological water quality, dry season sampling of 162 wells shows that good protection, management and site hygiene practices can ensure safe water and if continually applied, can also apply in the wet season.

Photo 1. Improved traditional well

Photo 2. Unimproved traditional well

Overall in water quality terms, (See Fig 1). the measured performance of improved traditional wells and boreholes with handpumps showed little difference. The greatest difference was between unimproved wells (see photo2) and those with most protection The practice being promoted by EHTs of hanging the rope and bucket in the well when not in use is spreading widely and much reduces the risks of contamination. Both faecal coliform counts and nitrate levels indicate no contamination from the growing number of latrines which are at low density. In terms of reliability in an area of shallow groundwater and low piezometric gradients, water table fluctuations tend to be relatively small. 81% had provided water continuously over the past 5 years. Whilst 90% of handpumps were operational for most of the year, 4% broke down in one month and each took on average 8 days to repair. The density of traditional wells means that generally another waterpoint is usually accessible if one goes dry. However the practice of those siting boreholes seems to be to put them as near an existing traditional source as possible, since they, unlike the owners, do not regard them as an asset. Thus they a) increase drawdown locally and b) do not provide nearer water for those without their own supply. The result is that boreholes tend to compete with traditional wells not augment their supply, but both offer a valuable back-up system when either is not working.

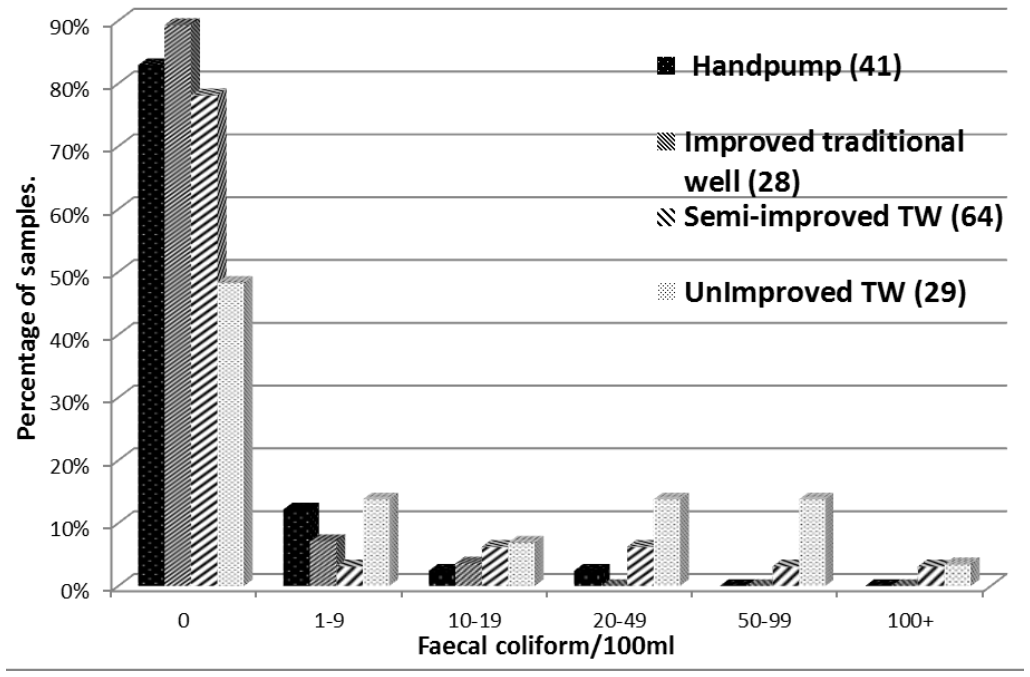

Figure 1. Bacteriological water quality in community and self-supply wells

Impacts on quality of life – the additional push factors for owner investment

For all households, the time saving from having your own well is important, saving the equivalent of up to a full working day a week in water collection. Time saving also translates into many other benefits, especially for women and children. 90% of 100 sample families regarded having their own well as a major health benefit to adults and 95% to their children. Allied to this aspect, 91% of women said they felt less tired partly because of reduced distance but also, for over a third, they remarked on a noticeable increase in the members of the family prepared to collect water, reducing the burden on women. Since journeys are shorter, less open to public gaze and improved wells are easier to draw from, children can help more easily and men can do so without feeling any loss of dignity.

For many it is not just time-saving but the flexibility of when they can draw water. Community waterpoints are often locked after dark to avoid vandalism but wells by the house are available at all times. More time for housework and for childcare are also important aspects for women and almost two-thirds of households reckoned their children missed less school and over a half that the performance of their children at school had improved, as they too are less tired from water collection and are in better health.

The other main impact is on food security. Before access to a new or improved well only 40% of households felt they produced enough food (or could buy it) for the whole year. Afterwards more than 70% reported adequate food security. Productivity increased, not from using the water but through time- and energy-saving. Male well-owners reported having a much higher status within the community (80%), since having your own well allows you to share an asset with others, and shows a degree of wealth and care for the family.

Other impacts- the growth and limitations of the private sector

The involvement of the private sector allows the spreading of ideas and expertise by artisans promoting their skills in order to make a living, and this is reinforced by the social marketing in preventive health care by EHTs. As a result, over time many households copy the example of the innovators. Earlier piloting in a peri-urban area of Mansa has led to the protective wellhead features, which were built into some 60 wells, now being identifiable in most of the thousand or more which have been dug to compensate for an inadequate

reticulated supply. There are now three or more commercial suppliers of concrete lining rings in the town, when in 2000 there were none. Then only some EHTs had ring moulds for their fabrication.

Artisans feel they have better status and initially made a good part of their living from well-digging but needed longer term (> 2 years) support for marketing and for a loan system to reach full sustainability. With a limited period suitable for well-digging and deepening, masons and diggers will not be able to make this a full-time occupation, unless linked also to latrine and slab construction, or in higher density housing.

Government interest

High level provincial officers in several sectors, who know the challenges of the province and of its budgetary constraints very well are keen to incorporate self-financed water supply in their programmes. Changing priorities of the Ministry of Health meant that it had reduced activity on traditional well up-grading which had been triggered by the earlier pilot, but now wishes to revive this as an aspect of EHT extension work. Similarly the Ministry of Local Government Directorate of Housing Infrastructure and Development (DHID) recognises the difficulty of reaching targets without leveraging funds from households and building on the investments they have already made. At national level the interest in supplementary delivery models is growing as the cost and required rates of progress to reach SDG6 in 15 years' time is becoming increasingly recognised. The Principal Engineer in DHID gave a very positive presentation to an international debate on Self-supply and Human Rights in December 2015, based on the findings of this review. The need now is for full endorsement of the approach and its inclusion in RWS strategy.

Service costs

Table 1 shows that establishing services to support Self-supply well construction and improvement is a cheaper option covering any number of people, but is most cost effective among smaller groups of households. Going to scale is cheaper because it occurs over a longer time scale, integrates more into existing services and allows households to copy each other with little additional cost to government.

Table 1. Life cycle costs (LCC) for self-supply services and community supplies (in $US)

Supply type	User number	Own investment		Government investment	LCC cost
		US$ per well	US$ per user	Per user	
Self-supply – improved traditional well					
Piloting	50	250	5	20	1250
Going to scale	50	250	5	10	750
Community waterpoint	250	200	0.8	47	12000
(borehole with handpump)	125	200	1.6	94	12000
	50	200	4.0	236	12000

At a national scale, looking at availability of shallow groundwater and at areas of lowest population density and coverage, it is estimated that to reach universal coverage in 2030 by community supplies alone the cost will be over $700 million and the rate of progress will need to be almost six times faster than in recent years. By including support to Self-supply (Self-supply Acceleration) the cost can be reduced by as much as 48%.

Lessons learnt

Support services needed

The services provided in piloting were adequate to trigger initial improvements but not to move people on up the ladder towards mechanised water lifting, and low cost irrigation or domestic in-house supplies.

Technical advice and demonstration and training in new technologies are also necessary. This links to increased capacity in the private sector and also embedding Self-supply support in government services in much the same way as CLTS is. People have demonstrated that their own supply is something they are prepared to sacrifice much to achieve, even in the poorest rural areas. However they are unable to make more than very small steps without a loan system which can consolidate their sporadic income from harvests into a more sizeable amount, especially where the period for well-digging does not coincide with the short period over which they are able to sell their produce.

Sustainability of support services

Financial support for 18 months proved insufficient in an area of such sparse population to establish long-term marketing and loans services. If technical support were combined more with government sustainable operation and maintenance programme (SOMAP) and inclusion in CLTS and food security programmes. In this way support services become full integrated, more sustainable and cost effective.

Lack of productive use

The lack in Self-supply promotion to any linkage with productive use and the added income this can bring was partly because of the limited time frame to influence a change from subsistence ways of thinking into forward planning and market development. Where projects are already involved in this aspect or where time is sufficient to develop them, the level of response and of technology reached is expected to be higher.

Greater involvement of traditional affairs

The Ministry of Culture and Traditional Affairs and the traditional communications networks of the Chiefs played an important part in CLTS promotion. Both could be more involved in addressing water supply issues, and feel that support to loan systems were a level of funding very compatible with the grants that Chiefs receive.

National standards

Whilst results show that Self-supply Acceleration can significantly increase coverage in JMP terms, national standards are higher, requiring a handpump and if possible a borehole. To be an approach endorsed by government there would need to be an official acceptance of a ‘household’ safe supply standard which would be similar to the JMP ‘improved supply’, and would bring this basic level of improvement into national coverage figures and so also into waterpoint inventories, budgeting and plans.

Conclusions

Reverting to the five research questions:

- Improvement of own supplies appears popular and affordable to many, especially if loans are available.
- Many positive effects encourage households to improve supplies to JMP levels of protection. However unless a household/ small community group standard of service can be introduced into national policy, these improvements will not count towards national coverage or appear in inventories, budgets and plans.
- The lower (JMP compatible) levels of improvement can be reached through training of artisans, advisory services, and credit systems , but for sustainability, higher level technologies and going to scale greater integration into existing government services (health, water, traditional affairs, agriculture) is needed.
- The more scattered the population, the more expensive it is to provide water supply through community waterpoints as a single solution, and the more Self-supply Acceleration becomes a cost effective alternative.

Overall the results re-inforce the view that if government developed existing services and budgets to include Self-supply acceleration, especially in the northern half of the country, these support services would give the opportunity for a large part of the unserved population to achieve an improved level of supply by 2030.

This would be achieved alongside conventional community supplies, but, largely by householders’ own efforts and at considerably lower cost to government.

Acknowledgements

The support of UNICEF Eastern and Southern Africa regional office (Peter Harvey) and management by SKAT (André Olschewski) is gratefully acknowledged. The Review Of Self-supply in Zambia was undertaken by Skat Foundation Switzerland in conjunction with WaterAid Zambia and SWL Consultants.

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