A HIDDEN RESOURCE:

Household-led rural water supply in Ethiopia

Sally Sutton | John Butterworth | Lemessa Mekonta

A Hidden Resource:

Household-led rural water supply in Ethiopia

Sally Sutton | John Butterworth | Lemessa Mekonta

International Water and Sanitation Centre

Sutton, S., Butterworth, J. and Mekonta, L. 2012. *A hidden resource: household-led rural water supply in Ethiopia.* IRC International Water and Sanitation Centre, The Netherlands.

Published on behalf of the study partners by IRC International Water and Sanitation Centre.
Copyright © IRC International Water and Sanitation Centre (2012).

This work is licensed under the Creative Commons conditions of: Attribution-NonCommercial-Share Alike
View copyright terms here: http://creativecommons.org/licenses/by-nc-sa/3.0/nl/deed.en

The contents of this publication do not necessarily reflect the views and policies of IRC International Water and Sanitation Centre.

ISBN: 978-90-6687-080-2

Copy editor: Angelica de Jesus, IRC International Water and Sanitation Centre, The Netherlands
Illustrations, design, and layout: Tasja van der Veen, Bingo! graphic design, The Netherlands

To order printed copies of this publication, please contact publications@irc.nl

You can download a free copy of this publication from www.irc.nl/publications

IRC International Water and Sanitation Centre
P.O. Box 82327 2508 EH The Hague, The Netherlands
general@irc.nl
www.irc.nl

CONTENTS

ACRONYMS		**IV**
SOME KEY DEFINITIONS		**V**
FOREWORD		**VI**
PREFACE		**VII**
EXECUTIVE SUMMARY		**VIII**
KEY FINDINGS AT A GLANCE		**XIII**
ACKNOWLEDGEMENTS		**XIV**
1.	**INTRODUCTION**	**1**
1.1	The national context for Self Supply	1
1.2	Research in Oromia and the Southern Nations Nationalities and People's Region (SNNPR)	4
1.3	Definitions	7
2.	**THE POTENTIAL OF SAFE AND LOW-COST WATER SUPPLY DELIVERY**	**9**
2.1	Introduction	9
2.2	Water quality in wet and dry seasons	9
2.3	Reliability – a year-round supply?	20
2.4	Supply adequacy	23
2.5	User satisfaction	23
2.6	Rating of supply performance	24
2.7	General findings	25
2.8	Conclusions on benchmarking	26
2.9	Key discussion points and suggested recommendations	26
3.	**UNDERSTANDING THE DEVELOPMENT AND USE OF FAMILY WELLS**	**29**
3.1	The history of household initiatives in water supply in SNNPR and Oromia	29
3.2	Well ownership and investment	30
3.3	Well sharing	32
3.4	Water consumption and water use	34
3.5	Drivers and benefits of own supply	37
3.6	Summary of main findings	39
3.7	Key discussion points and suggested recommendations	40
4.	**ACCELERATING SELF SUPPLY**	**43**
4.1	Creating an enabling environment	43
4.2	Demand Creation	44
4.3	Capacity building	45
4.4	Suggested roles and responsibilities	46
4.5	Financing options	50
4.6	Summary of main findings	50
5.	**SUMMARY AND OUTLOOK**	**53**
5.1	Summary of situation analysis and opportunities	53
5.2	Self Supply Working Group	54
5.3	Visions for Self Supply	54
5.4	Next steps	54
FURTHER READING		**56**
REFERENCES		**57**
APPENDIX 1: Federal Democratic Republic of Ethiopia/Ministry of Water & Energy national policy guidelines for Self-Supply in Ethiopia		**59**
APPENDIX 2: Modified sanitary inspection system		**70**

ACRONYMS

AWD	Acute Watery Diarrhoea
BGS	British Geological Survey
BOFED	Bureau of Finance and Economic Development *(regional)*
BoWR	Bureau of Water Resources, now BWE *(regional)*
BWE	Bureau of Water and Energy
CapEx	Capital expenditure
CapManEx	Capital maintenance expenditure
CDF	Community Development Fund
CFT	Community Facilitation Teams
CMP	Community Managed Project
CLTS	Community-led total sanitation
CLTSH	Community-led total sanitation and hygiene
DHS	Demographic Health Survey
GTP	Growth and Transformation Plan
ETB	Ethiopian Birr (unit of currency in *Ethiopia*)
HEP	Health Extension Package
HEW	Health extension worker
HWTS	Household water treatment and storage
IDE	International Development Enterprises
LPCD	litres per capita per day
MICS	Multiple Indicator Cluster Survey
MFI	Microfinance institution
MoFED	Ministry of Finance and Economic Development *(Ethiopia)*
MoU	Memorandum of Understanding
MoWE	Ministry of Water and Energy *(Ethiopia)*
MoWR	Ministry of Water Resources *(Ethiopia)*
MSW	Machine-dug Shallow Well
MUS	Multiple Use water Services
NGO	Non-Governmental Organisation
NWI	National WASH Inventory *(Ethiopia)*
PSPN	Productive Safety-Net Programme
RADWQ	Rapid Assessment of Drinking Water Quality
RiPPLE	Research-inspired Policy and Practice Learning in Ethiopia and the Nile region
SME	Small and Medium Enterprise
SNNPR	Southern Nations Nationalities and People's Region
SS	Self Supply
SSAP	Self Supply Acceleration Programme
SSP	Support service providers
TC	Total coliform
TTC	Thermo-tolerant coliform
UAP	Universal Access Plan
UNICEF	United Nations Children's Fund
WASH	Water, Sanitation and Hygiene
WASHCO	WASH Committee
WHO	World Health Organization
WIF	WASH Implementation Framework
WWT	*Woreda* WASH Team *(Ethiopia)*

SOME KEY DEFINITIONS

A traditional well is constructed by traditional methods, usually unlined (or only partially lined), excavated without de-watering equipment, and with low levels of protection. 'Traditional' refers to the technology of construction.

A semi-protected well has an impermable (usually concrete) apron and impermeable parapet (usually oil drum or concrete/ masonry and mortar) parapet, plus a close fitting cover (often lockable), set in a concrete top slab.

A fully protected well has the features of a semi-protected well, plus an impermeable apron which drains only into an impermeable drainage channel discharging more than five metres from the well.

A conventional community well is usually of large diameter (> 1.2 metres) lined with concrete rings, protected by an apron and drainage and mounted with a handpump.

A family well is any well developed by an individual primarily for the family, but usually also shared with other neighbours. This is almost always constructed by traditional methods, but may end up with a mechanised pump, and even with a small reticulation system. 'Family' refers to the well ownership.

A rope pump is a simple water-lifting mechanism, which may be installed on traditional or other wells, and reduces human contact with source water.

Levels of contamination (after WHO/UNICEF 2010):
- **Very low risk water.** Water with zero TTC/100ml.
- **Low level contamination.** Water with less than 10 TTC/100ml.
- **Highly contaminated water.** Water with more than 100 TTC/100ml.

A Woreda is an administrative unit equivalent to a 'district', usually being the lowest level at which BWE has professionally staffed offices. A woreda is further split into kebeles, the smallest unit of local government, equivalent to a ward or neighbourhood.

FOREWORD

At the Sanitation and Water for All High Level Meeting held on 20 April 2012 in Washington DC, the Government of Ethiopia included "establishing Self Supply as a service delivery mechanism for rural water within the national WASH programme—and alongside community-managed approaches—in order to reach more than 30% citizens without safe water access" as one of its commitments.

The Government of Ethiopia strongly recognizes the importance and the role of a Self Supply system operating with low cost technologies in accelerating progress to achieve the Growth and Transformation Plan (GTP)/Universal Access Plan (UAP) goals. This is because Self Supply has significant potential in approximately half of the country where rainfall and shallow groundwater are most plentiful.

Our intention is to embrace and support the efforts being made by thousands of Ethiopian families to develop their own family wells through their own hard work and investment; which they can then freely share with their neighbours. This development spirit is supported by the Government. Our intention in recognising Self Supply in sector policy and in launching the Self-Supply Acceleration Programme (SSAP) is to make it easier for families to invest and to get the support and services they need, and especially to encourage the construction, upgrading and better protection of family wells which can make Self Supply safer and more accessible.

This report brings together the findings of studies from two of the country's regions with high-potential for Self Supply, Oromia and SNNPR. These studies have significantly increased our knowledge about the existing practices and performance of family wells, and have provided evidence and recommendations which we are using to support implementation of activities to accelerate the contribution of Self Supply towards coverage and economic development. Further research and piloting is required and encouraged. The MoWE also intends to explore the potential for group-led investment in low-cost water supply that will have similar characteristics to Self Supply but serve up to 50 households through approaches that are cheaper and more appropriate to small and scattered communities than conventional communal water supplies.

A Self Supply Working Group (SSWG) led by the MoWE was established in order to enhance development and implementation of the potential of Self Supply as one component of the National WASH strategy as embodied in the Universal Access Plan (UAP) and WIF. SSWG is co-led by IRC International Water and Sanitation Centre, and members of UNICEF, WHO, RiPPLE and CoWASH. Additionally, a WASH stakeholder network was identified to support a future Self Supply Acceleration Programme (SSAP) through a designated focal point in MoWE.

The National Policy Guideline for Self Supply in Ethiopia (included at Appendix 1 in this report) was drafted by the SSWG and endorsed by the MoWE in February 2012. The guideline sets out elements for implementation of SSAP. The National Guideline together with the WIF now provides valuable recognition and guidance for developing Self Supply as an endorsed approach to water service delivery. The focus of Self Supply as a household-led investment coupled with private sector support for Self Supply creates a different challenge for the water sector. Yet, there is much to learn and gain from collaborating with colleagues in the health, agriculture, and finance sectors who are leading compatible initiatives such as Community-led Total Sanitation (CLTS), Household Water Treatment and Storage (HWTS), small-scale irrigation, and micro-finance for local economic development.

This is a challenge that the Ethiopian water sector is committed to taking on. The Government is developing further the cost-effective strategy for Self Supply, ensuring that the strategy is hydrogeologically and socially feasible, and makes a significant and recognised contribution to WASH coverage and economic growth by 2015.

H.E. Honourable State Minister Kebede Gerba, Ministry of Water and Energy, Addis Ababa, 8 August 2012

PREFACE

Ethiopia is one of the world's fastest growing economies. During the period 2001-2010, Ethiopia's economy ranked fifth in the world with growth averaging 8.4%. Ethiopia was predicted to be the third best performing economy in 2011 with growth around 10%. According to forecasts from the Economist (2011) quoting the International Monetary Fund, Ethiopia will also hold a similar position (averaging 8.1% growth) over the next five years. In any fast growing economy, people are inevitably doing more things for themselves. People want to get ahead and create wealth for their families. One of the ways in which people are contributing to this growth, given a largely rural population and a precarious climate, is through the development of their own water supplies.

There has been steady development and expansion of the understanding of the contribution of family wells and a Self Supply approach in Ethiopia over the past decade. Some key milestones have been: the family well campaign that resulted in the construction of over 85, 000 family wells in Oromia over the period 2004-2006, and almost 10, 000 community hand dug wells, highlighting demand and potential but also subsequent problems in scaling-up and sustaining efforts (Mammo, 2010; Arma Engineering and Sutton, 2010); the Wolliso national workshop that agreed on a definition of Self Supply, as "Improvement to water supplies developed largely or wholly through user investment usually at household level" (Workneh & Sutton, 2008); and the Universal Access Plan (2009-2012) that drew upon experiences with Self Supply in other countries and specifically promoted low cost technologies at both household and communal levels (MoWR, 2009).

In 2010, two major research studies were launched in Oromia and SNNPR respectively to fill key gaps in knowledge relating to the performance of family wells and the opportunities and challenges in scaling-up the contribution of a Self Supply to water coverage in the country. Both studies involved extensive collaboration or were carried out with government support at regional and *woreda* levels. The Oromia research was undertaken with support of UNICEF (UNICEF, 2010) and the SNNPR study had the support of the RiPPLE research programme (Sutton et al., 2011). This report combines the findings of these two complimentary studies. It was prepared as an input to the second national Self Supply workshop held in Addis Ababa from 5-6 October 2011. The workshop participants discussed the potential for accelerating Self Supply, based on the study findings and the policy context.

A key outcome of the second national workshop was the formation of the Self Supply Working Group tasked to develop a Self Supply Policy Guideline (included at Appendix 1) to support inclusion of the concept in the newly revised WASH UAP. This guideline was approved by the MoWE in February 2012, and has been followed by the preparation of a project proposal for Self Supply Acceleration programme by the Ministry. The studies have therefore been a first step in significant moves to bring Self Supply into the wider rural water supply strategy to make a significant contribution to WASH coverage and economic growth by 2015. The Self Supply Acceleration Programme is now part of and hosted under the Ethiopian WASH Programme.

The new WASH implementation framework (WIF, MoWE 2011) already provides valuable recognition for developing Self Supply as a complementary approach to water service delivery. The household focus and nature of household-led investment and private sector support needed to accelerate Self Supply and make it safe, provides a different challenge for the water sector to tackle. Key to this effort will be learning and collaborating with counterparts in health, agriculture and finance in compatible initiatives such as Community-led Total Sanitation and Hygiene (CLTSH), Household Water Treatment and Safe Storage (HWTS), small-scale irrigation and micro-finance for local economic development. Led by MoWE, working with its partners and supported by the Self-Supply Working Group, the WASH sector is taking up that challenge and this report provides valuable additional perspectives to the evidence upon which the new initiatives will be based.

Zewditu Yilma (Ministry of Water and Energy), Inge Klaassen (IRC International Water and Sanitation Centre), and Tamene Gossa (UNICEF) on behalf of the Self-Supply Working Group, Addis Ababa, 8 August 2012

EXECUTIVE SUMMARY

This report brings together the findings of two complementary research studies on the role of Self Supply in rural water services provision in different regions of Ethiopia. Self Supply involves households taking the lead in their own development, including investment in the construction, upgrading and maintenance of their own water sources, lifting devices and storage facilities. Traditional wells, which are usually family-owned, are the most common type of source and are the focus of this report. Various types of lifting device are used, starting from a rope and bucket. Rope pumps are being promoted as a step ahead, and in some specific areas, diesel or electric pumps are common. Until now, there has been relatively little information available about the performance of family or traditional wells, with water quality studies, for example the Rapid Assessment of Drinking Water Quality, RADWQ (WHO/ UNICEF, 2010), tending to focus on community sources such as handpumps.

Each of the studies involved extensive collaboration and was carried out with government support at regional and *woreda* levels. The first study was undertaken in Oromia with support from UNICEF (2010) and the second was undertaken in SNNPR with the support of the RiPPLE research programme (Sutton, Mamo, Butterworth and Dimtse, 2011). The studies examined 1) the performance of existing family wells developed through a Self Supply approach, including associated technologies such as the rope pump; 2) socio-economic issues and processes of family well development by households; and 3) the enabling environment, and whether it is conducive to taking the Self Supply approach to scale. Various methodologies were employed including water quality analysis of traditional wells and improved community level sources for comparison, and household surveys focusing on both traditional well owners and sharers of these sources.

Performance of family wells

Important new information is now made available on bacteriological water quality and other aspects of the performance of traditional wells. The key findings are that:

- **Traditional wells can provide safe water, but often do not.** Most traditional wells have not been constructed with prevention of contamination in mind. Even with no protection, in the wet season a significant proportion of traditional wells (19%) were found to have low bacteriological contamination levels (< 10 TTC/100ml) and this rose to 34% where simple measures had been taken to reduce the return of spilt water or run-off to the well. Some 43% of rope pumps also delivered water of low risk. Conventional handpumps provided low risk water in 72% cases, and very low risk (0 TTC/100ml) water in 47%.
- **Bacteriological water quality is generally improved in the dry season.** Two thirds of traditional wells in SNNPR were found to show significant improvement in water quality during the dry season linked to specific well features (65% of traditional wells in Oromia and 53% in SNNPR with low contamination). On the other hand, just under a third of monitored traditional wells in SNNPR showed an increase in levels of contamination in the dry season, linked in part to the type of parapet. Where traditional wells were subject to a higher turn-over of water through abstraction by mechanised pumps in the dry season over 80% of surveyed wells have only low levels of contamination (and 56% with zero TTC).
- **Much of the contamination of traditional wells may be relatively easy to prevent.** No traditional wells were found to have properly protected headworks to avoid the return of dirty water to the well. Family well owners have had little advice on simple measures of protection, and almost all were looking for technical advice and ideas on what to do. Survey results indicate the effects of poor site hygiene and in some cases of poor installation, design or practice for community as well as family wells. Improvements in training of artisans and promoting hygiene education amongst well owners and users could deliver considerable improvements for all.
- **Moving people up the water supply ladder is an effective strategy** in terms of reducing water quality risks and maximising coverage. There is an improvement in water quality moving up the technology ladder from the

most basic traditional wells to semi-protected wells and family wells fitted with rope pumps, to protected wells fitted with handpumps or mechanised pumps. Acceleration of Self Supply gets people quickly onto the ladder providing better access to water, and in the case of family wells to plentiful and convenient supplies for domestic, hygienic and income-generating purposes. Any step on the ladder up to 'piped into the house' may not be safe in all cases (communal and private) and at all times, and so requires continual working to improve quality, quantity and reliability. Self Supply offers people the opportunity to move themselves up the ladder, filling the gap where community supplies are inadequate, inconvenient, unreliable or non-existent. It also offers flexibility to use the supply for productive purposes, the income generated offering the chance to move yet further up the ladder or improve other aspects of family life.

- **Rope pumps have potential, but current practices lead to poor performance** on the ground and significant levels of contamination. Less than half of the pumps sampled (43%) provided water of low risk (< 10TTC/100ml). Rope pump water quality and reliability are both weak at present, but simple solutions for improvement were identified. Most rope pumps (even when known to be used for drinking water supplies) were poorly installed. Strategies need revisiting to make rope pump introduction more successful, sustainable and safer (for drinking water supply, amongst other uses).
- **Existing standard sanitary surveillance systems do not adequately reflect health risks for traditional wells** with their non-standard installations and large number of varying characteristics. Compared to use with conventional handpump installations, standard sanitary surveillance was found to be less reliable for rope pumps and very unreliable for traditional family wells. New systems of assessment are needed. A broader system was developed through the studies replacing the 'yes' and 'no' answers for ten parameters with a five-point scale for 15 aspects of traditional wells (See Appendix 2).
- **Family wells are more reliable in many areas than communal wells with handpumps.** Some 81% family wells provided water throughout the last five years in SNNPR and Oromia, compared to 56% of all installed handpumps or 72% of those found operating. Combining four indicators which reflect overall performance (water quality, reliability, adequacy and user satisfaction) shows that communal handpumps, rope pumps and traditional wells with rope and bucket score more similarly than when assessed against water quality alone. Better water quality in one is compensated for by better reliability in another. Handpumps and then rope pumps do offer the best service at present. Results suggest that with small improvements in protection, family wells could provide a comparable and sustainable level of service all year round.
- **Mechanised wells, rope pumps and traditional family wells with basic protection can all provide acceptable supplies and warrant being included in coverage calculations.** Family wells fitted with diesel or electric pumps were found to have better quality than communal handpumps, and so should count towards coverage immediately with consideration given to improving protection further. Wells fitted with rope pumps and those with adequate aprons, drainage and top slab with lid (semi-protected) have the capacity to provide safe supplies with low risks and so could be counted where they reach a minimum standard. Concerted efforts are, however needed to improve installation of rope pumps; promote upgrading of wells to include a basic impermeable apron, parapet and drainage; and encourage proper maintenance and hygiene around all wells, including those which are nominally protected.

Development of family wells by households

Households on their own initiative are currently investing in their own well construction and to a very limited degree, in improvement. Demand is poorly developed, however. There are no promotion activities underway comparable to efforts to promote CLTS for example. Both studies investigated the key socio-economic factors in the development of wells by households. Key findings are:

- **Family wells are cost effective.** The capital investment in wells ranges from as little as US$ 10-40 (less than US$ 1 per head) for the most basic traditional wells up to over US$ 750 for wells with mechanised pumps. Families have made these investments, often over a period of time and in steps, with a high level of sustainability, especially, but not only, where linked to productive use. The capital costs (per capita) of providing communal wells fitted with handpumps (90% covered by government or a development partner) are about four times greater than the cost of semi-protected wells (100% covered by the household). The lower unit cost (capital expenditure) and lower recurrent costs (operational expenditure and capital maintenance) of family wells make this option complementary to community supplies, and affordable to a range of individuals.

- **Initiative appears to be more important than wealth or education.** Traditional well ownership was not found to be confined to the wealthiest. Around 60% (58% in SNNPR and 61% in Oromia) of the wells visited were owned by families in the lowest two quintiles in wealth ranking, and almost half of the well owners were 'illiterate'.
- **Family wells usually provide a free service to the community.** Family wells are usually shared widely with neighbouring households except in areas where almost everyone has their own well. Households were found to give their neighbours access to the well in almost all cases (90% of wells were shared). On average, 'family' wells are shared by some 70 people and water from mechanised wells shared with over 120 people. Water from traditional wells is almost always provided without charge, but 40% of owners of mechanised pumps in Oromia sold water to neighbours to cover the costs of fuel or power. Charges are now instituted for community supplies (regularly monthly payments, or sporadically as repairs are needed).
- **Wells shift families into year-round food security and beyond.** Family owned wells being used for both domestic and productive uses, bring major advantages in increased food security, health, school attendance and better childcare according to well owners. More easily accessible well water has brought about major economic changes with increased animal watering (60% of the 757 traditional wells with rope and bucket are used for livestock in the two regions) and crop production (traditional wells being used for irrigation in 24% cases, and with rope pumps and mechanised wells employed for irrigation in 43% and 68% cases respectively). These patterns of usage and time saved have brought many family well owners from below subsistence level to having food all year round, and even some surplus production to sell.
- **Communal wells may provide drinking water but usage for other domestic purposes may be restricted.** Due to distance, queues and sometimes cost many communal handpumps (85%) only provided a few litres of water for drinking and cooking, with families collecting water for bathing and washing purposes from more convenient alternative sources such as family wells. Communal handpumps are very rarely used for productive uses (in SNNPR, 0% for irrigation and 15% for animal watering). Thus family wells often provide an essential element of domestic supply, providing part of the 15 lpcd to which everyone is entitled.
- **Household water treatment is rarely practised.** Whilst the need is there to disinfect water both from communal and family wells, very few of the households in SNNPR and Oromia were found to treat their water on a regular basis. Only 7-8% of households regularly chlorinate or boil, with 42% and 47% never having treated water in the two regions respectively. Filtering with a cloth was effective in reducing contamination and was more widely practised. Efforts by the Ministry of Health to promote HWTS could be well linked to Self Supply because of both the benefits provided by treatment in reducing risk and because the promotion effort itself is likely to involve similar activities and people.

Conclusions on acceleration strategy

Current family well development is almost totally through householders' own initiative. There is limited systematic encouragement or sustained support identified from government or NGOs, except for some localised exceptions such as through the Productive Safety Net Programme in parts of SNNPR, and efforts to promote rope pumps. In Oromia, rates of construction have tailed off after the effective 2004/ 5 campaign for family well digging. Overall, the enabling environment for Self Supply is found to have improved considerably in terms of national policy, but is still not yet conducive for the successful scaling up of acceleration. Several significant steps forward have been taken including the recognition of 'Self Supply projects' and outline guidelines provided in the new WASH implementation framework, but major gaps remain. Some of the main conclusions based on the studies are:

- **Acceleration of Self Supply can fill some of the more challenging gaps the sector face.** Acceleration of household investment in water supply is found to be particularly relevant to:

1. those living in scattered or remote households
2. facilitate conjunctive use by those that find the level of service offered by public systems (communal supplies) inadequate or inconvenient
3. those who want to develop supplies for domestic and productive uses
4. those living with shallow groundwater or in areas with RWH potential

Private investment provides additional non-government/ donor resources towards underfunded supply provision; a solution for politicians in hard-to-reach areas; a reduction in demand overload (and also of maintenance costs) on community supplies; a new area of investment and income for SMEs; and the opportunity for families to develop solutions and the power of ownership for themselves.

- **There are six elements to creating the necessary enabling environment.**
  1. creating demand through promotion
  2. providing technology options and advice
  3. strengthening the private sector
  4. establishing supportive financial systems
  5. building facilitative government policies
  6. monitoring progress and learning from research into new options and more effective impact

- **A positive and sustained enabling environment is more effective than short-lived campaigns.** The campaign mode of promotion was effective in some aspects (including building up well-digging capacity), but demand is then closely related to campaigning activities and is not self-sustaining. Building up market dynamics, support services and a desire to copy ones neighbour ('I like that, I want to have one too') makes a powerfully enabling environment, which expands and sustains demand and ownership. There is at present a lack of a positive and supportive enabling environment ('You **can** build, and you **can** get help') combined with a well-developed perception of the value added to home life by doing so. All government and NGO interventions towards Self Supply should be careful not kill the 'golden goose' (the interest of families in owning and managing their own water sources), which needs to be developed further.
- **Demand creation needs real commitment and market dynamics.** To create demand at household level and support within the private sector first requires the understanding of decision-makers in government at all levels of the added value of accelerating Self Supply. At present many are not aware or not convinced, so their responsibility for initial support will not be effective. Effective support should aim to reach a 'critical mass', where the market takes off as a result of peer example, rather than just being a result of promotion by government and private enterprise. At that point, further public investment becomes minimal and the initial costs will relate to sufficient numbers of beneficiaries for the per capita costs to fall dramatically.
- **Capacity building will be necessary to introduce a new approach.** Capacity building requirements include both the changing of attitudes towards Self Supply as an approach and the development of new skills. Skills needed include social and commercial marketing for water supply improvement as well as the technical aspects of low cost options for household level supplies, new technologies and maintenance routines.
- **Roles and responsibilities of government will need to be different** and new linkages formed to accelerate Self Supply. Government roles in community water supply (government plans implementation, contracts and funds it, supervises and largely maintains it) differ from those in Self Supply (government only plans and funds implementation of promotion, training and monitoring, not supply construction itself). This, as in CLTS and scaling up CMP/ CDF requires changed attitudes to the devolution of more responsibilities to the end-user and the private sector, and well-developed skills in a less 'hands-on' approach than for community water supply as practised at present. There are also good synergies to achieve with other approaches like MUS and household water treatment requiring a well-coordinated and linked acceleration programme.
- **Micro-credit systems are suitable for Self Supply but not yet much developed for this market.** Currently

micro-credit lenders do not appear to view investments in family wells as feasible to provide a healthy return and secure repayment. This attitude can be changed, and if micro-credit institutions were willing to lend for family wells they could achieve significant impact. The amounts required fit well with the size of loans that these banks provide, and have been used in limited areas for rope pump development by the International Development Enterprises.

Outlook and next steps

Government's role in community water supply development and maintenance is well-established, but new roles are demanded to take Self Supply to scale. To promote and support small scale private investment in water, to improve water quality and increase coverage will require different roles and strategies at all levels of public service as well as new partnerships with the private sector, other government ministries and micro-finance institutions for example. This is a challenge being taken on by the sector led by the Ministry of Water and Energy (MoWE) supported by the Self Supply Working Group (SSWG) which engages other key stakeholders (IRC International Water and Sanitation Centre, UNICEF, WHO, RIPPLE and CoWASH) and a wider network of partners.

Government of Ethiopia, donors and implementing partners recognize the importance and the role that Self Supply can play in accelerating progress to achieve the Growth and Transformation Plan (GTP) and Universal Access Plan (UAP) goals. Self Supply is no longer to be considered as a stand-alone effort but is to be embedded into government programs and addressed in the Universal Access Plan and the WASH Implementation Framework. Building on these recent policy developments, including recognition of Self Supply as a service delivery model and a new policy guideline (Oct 2011), a programme is now proposed to accelerate Self Supply. This appears timely.

Some of the specific issues that will need to be addressed by the Self Supply Acceleration Programme include: reaching agreement on a safe benchmark so that the contribution of family wells can be counted, mapping potential for Self Supply so that support can be directed to priority areas, developing guidelines that cover acceleration strategies, marketing approaches and technologies to support communications and advocacy and making links to interested stakeholders to encourage collaboration and research.

The household focus and nature of household-led investment and private sector support to Self Supply, provides a different challenge for the water sector but one in which there is much to learn and gain from collaboration with colleagues in health, agriculture and finance in compatible initiatives. This is a challenge that the WASH Sector in Ethiopia is expected and ready to take on, with a vision of Self Supply being developed further as a cost effective strategy and making a significant and recognized contribution to WASH coverage and economic growth by 2015.

KEY FINDINGS AT A GLANCE

1. Performance of family wells

- Family wells can provide safe water, but often do not
- Bacteriological water quality is generally improved in the dry season
- Much of the contamination of family wells may be relatively easy to prevent
- Moving people up the water supply ladder is an effective strategy
- Rope pumps have potential, but current approaches are not working
- Existing standard sanitary surveillance do not work for traditional wells
- Family wells are more reliable in many areas than communal wells with handpumps
- Mechanised wells, rope pumps and traditional family wells with basic protection can all provide acceptable supplies and will warrant being included in coverage calculations

2. Development of family wells by households

- Family wells are cost-effective
- Individual initiative appears to be more important than wealth or education
- Family wells often provide a free service to the community
- Wells shift families into year-round food security and beyond
- Communal wells may provide drinking water, but usage for other domestic purposes may be restricted.
- Household water treatment is rarely practised

3. The enabling environment

- A positive and sustained enabling environment is more effective than short-lived campaigns
- Acceleration of Self Supply can fill some of the more challenging gaps the sector face
- Demand for supply improvement needs real commitments and market dynamics
- Capacity building will be necessary for the successful introduction of a new approach
- Roles and responsibilities of government will need to be different
- Micro-credit systems are suitable for Self Supply, but not yet much developed for this market

4. Recommendations and next steps for the Self Supply Working Group

- Reaching agreement on a safe benchmark for family wells
- Mapping potential for Self Supply and identifying priority areas
- Developing guidelines in technical aspects, but also in strategy and marketing are an early priority
- Forging links to initiatives with similar aims, and research and development

ACKNOWLEDGEMENTS

This report brings together the findings of two research studies that each involved large teams of very committed regional, zonal and *woreda* government staff traveling far and wide, and working extremely diligently to complete the field surveys. The authors would especially like to thank the Southern Nations Nationalities and People's Region (SNNPR), Oromia Water Resources and Energy Bureaux, and staff from water and health offices in the *woredas* concerned for their dedicated efforts. RiPPLE offices in Hawassa and Addis Ababa provided vital support to undertake the SNNPR study, and financial support by the UKAid programme of the Department for International Development for this study is acknowledged. The SNNPR research team was led by Eyasu Mamo (BoWE), Desta Dimtse (RiPPLE) and Yeshumneh Terefe (BoFED). UNICEF funded the Oromia study and UNICEF colleagues are thanked for sharing their approaches and designs for research in Oromia, and promoting a collaborative cross-regional approach of which this combined report is a result. The coordination by Tamene Gossa was instrumental. Further acknowledgements are provided in the more detailed research reports that are available for each study.

The report was reviewed by David Macdonald at the British Geological Survey (BGS) and Jo Smet at the IRC International Water and Sanitation Centre. The authors are grateful for their suggestions.

INTRODUCTION

1.1 The national context for Self Supply

Given low current rates of coverage with improved (community level) sources and ambitious targets to provide access to water rapidly to all[1], the water policy of the Ethiopian government has, since 2009, given more emphasis to lower cost technologies and the Self Supply approach in rural areas (MoWR, 2009). In Self Supply (see Box 1), the initiative and investment to build and improve family wells comes from individual households rather than from government. This builds upon existing practice – the digging of family wells is common. But levels of groundwater exploitation still remain well below their potential in most parts of the country, and there is much scope for further development.

Box 1 WHAT IS SELF-SUPPLY?

At the Wolliso national workshop in 2008, the following definition of Self Supply was agreed:
"Improvement to water supplies developed largely or wholly through user investment usually at household level"

The key characteristics are:

- A ladder of incremental improvements in steps which are easily replicable and affordable to users, linked, when necessary, to micro-finance systems and/ or productive use
- Official recognition of lower steps of the ladder as necessary stages towards a level (to be defined) which is recognised as contributing to UAP/ MDG
- Availability of low-cost technical options and information on source construction and upgrading rainwater harvesting and household water treatment
- Management and maintenance based on strong ownership by individual (or community) and local skills
- Demand built through government promotion and private sector marketing

Source: Workneh & Sutton (2008).

In Self Supply, government's role becomes one of establishing the rights-enabling environments for households to invest, creating the conditions to accelerate the construction of family wells, and promoting practises that make their use safe. In policy, the reformulated strategy for the Accelerated Implementation of the Universal Access Plan (MoWR, 2009) made low-cost technologies, implemented at household and community levels, the preferred first option for new rural water supplies. The idea was to make scarce funding resources go further, because as well as being relatively low-cost, most of the construction and operating costs of family wells are borne by households and not by government or its development partners.

In reaching for universal coverage, it is unlikely that a single model of supply (e.g., community) will be the cost-effective way of serving 100% of people in any given *kebele* or *woreda* with widely varying patterns of settlement and hydrogeology. An overlapping patchwork of different systems is likely to be the most appropriate, and where households are scattered over large or remote areas, family wells and rainwater harvesting are especially appropriate.

1 Rural water coverage was reported at 65.8% in 2010, compared to 15.5% in 1991. The target to be achieved by 2015 is 98% (MoWE, 2011a). The UNICEF/ WHO Joint Monitoring Programme reports much lower coverage based on a different methodology and reporting period.

Being located closer to the home, the water drawn from family wells also tends to be used for productive activities such as vegetable gardening, food processing, small scale irrigation and livestock watering and livestock, as well as for drinking and other domestic uses. Such water uses, and development of private sector support services tend to support economic development consistent with the new Growth and Transformation Plan (GTP) of the Ministry of Finance and Economic Development (MoFED, 2010), which now provides an overall framework to guide national development, including water.

There are also important concerns associated with Self Supply. The key concern relating to the approach is that of the safety of water from traditional wells for drinking. There is less information available for traditional family wells than 'improved' community sources, and there are unknowns about water quality risks in both. The lack of precautionary measures for and knowledge of contamination make traditional wells less safe than those specifically constructed and protected as drinking water sources, but that does not mean that their performance could not be improved through better protection. Although often based only on anecdotal evidence, concern is also expressed that promoting Self Supply might lead to overexploitation of limited groundwater resources that are also vulnerable to climate change and land degradation. This is, however, unlikely among scattered households, where domestic use is still the main purpose of the supply, and irrigation remains small in scale. Greater development for irrigation and the widespread adoption of larger capacity mechanised pumps is a different matter. As well as understanding these concerns better and addressing them, the complementarity between Self Supply and other models of service delivery, especially community managed sources, needs to be maximised.

Despite the policy intentions, and perhaps partly due to these concerns, implementation of the Self Supply approach has, until now, lacked a clear model or strategy. Models for accelerating family well construction and use have not been developed despite the Universal Access Plan (UAP) policy in 2009. As a result there has been less reliance upon Self Supply in the draft update of this policy – the UAP 2 (MoWE, 2011a). An overriding problem is that since budgets (such as the UAP) focus on capital investments in new construction, there is little awareness or incentive for *woredas* and regions to include Self Supply as an option in their plans (which are collated and passed upwards to devise the national plan). There does not yet appear to be an adequate mechanism for regions and *woredas* to request funding for Self Supply supporting activities (such as promotion, training and advisory support), which would be complementary and cost-effective in generating coverage alongside new capital investment in community water supplies. The former could be facilitated by linking Self Supply support service development more closely to the accepted communal supply options, and/ or with initiatives of the health, sanitation and irrigation sectors, in training, monitoring, and promotion – although these also face budgetary challenges.

Box 2 MoWE SELF SUPPLY POLICY GUIDELINE

A new Self Supply policy guideline from the MoWE includes recommendations on:

- Protective measures to minimise contamination risks
- Future inclusion of household water supplies in the national water point inventory
- Synergies with other approaches such as the CMP and CLTS initiatives for greater cost effectiveness
- Levels of subsidy and micro-finance
- Demand creation

Source: MoWE, 2012. N.B. The full guideline is included in Appendix 1 of this report.

A further disincentive has been that, in the past, the contribution of Self Supply has not been captured in sector monitoring. Promotion of Self Supply at scale has stalled partly due to the fact that such sources were not counted in monitoring access. Huge strides in developing access through family wells in Oromia for example (Mammo, 2010) were not built upon or sustained, at least partly for this reason. Since coverage has only been calculated based on the numbers of improved community sources, new family wells were not, according to the statistics, improving access. Since 2011, the new National WASH Inventory (NWI) has included a question to collect information on the number of protected family wells used as the primary household drinking water source (MoWE, 2011b). This will yield important new information on the reality of access to water in the country, although it will still not reflect the true density of family wells since unprotected wells (the vast majority) for domestic and other purposes will not be included. There is, as yet, no agreement on which family wells should be considered as safe sources, and therefore contribute to coverage. The inclusion of some family wells in the NWI however creates potential to do this in the future, should an acceptable benchmark be established. That is one key gap that this study addresses.

In general the lack of information on the forms of Self Supply that already exist and limited piloting of approaches (beyond technology options) to see what works best, has meant that guidelines on how to establish a more enabling environment for Self Supply have been missing. This report provides a foundation for future discussions on the development of implementation plans for the scaling up of Self Supply, including the establishment of pilots where required. Then stakeholders at all levels will be able to see more clearly how accelerated household investment can be achieved and contribute to coverage and economic growth by 2015. The policy guideline (see Box 2) drafted by the Ministry of Water and Energy's (MoWE) Self Supply Working Group (see Appendix 1) and based on the findings of the studies, is an early step in this process. This guideline was adopted by the MoWE in February 2012.

Box 3 SELF SUPPLY IN THE NATIONAL WASH IMPLEMENTATION FRAMEWORK

The draft WASH implementation framework (April 2011) sets out the following:
"Self Supply in WASH refers to the un-subsidised construction of a household water supply, or a water supply shared by a small number (typically 2-4) of households. The technologies used vary. Water sources include: hand-dug wells; manually augered wells; and rain water harvesting using roof catchments. Lifting devices include: rope & bucket with, or without, a windlass; simple bucket or rope and washer pump; and, in some instances, more sophisticated diesel, electrical or solar powered pumps.

The responsibility for establishing a self-supplied water source lies with the household(s) involved. Government involvement is limited to the provision of advice on technologies and water safety such as:

- promoting well lining and other forms of protection.
- advising householders on the risk of consuming microbial or chemically contaminated water and on how to reduce the risk at the water source and the point of consumption.
- in some instances, facilitating markets for the purchase of hardware and services.

In general, the government actively promotes the concept of Self Supply, noting these points about quality and safety. As the investment and associated risks are borne by participating household(s), Self Supply is unfettered by rules and regulations. The situation changes when water is sold to consumers, however. In this case, government policy and legislation apply in terms of licensing and water safety.

Although Self Supply projects do not draw on WASH funds for investment they are an important and integral part of the National WASH program. The current status, future status and promotion of Self Supply should be reflected in *kebele* and *woreda* WASH plans. To the extent possible, the national WASH Inventory captures Self Supply with results reported, recorded and tallied as achievements toward the targets of the National WASH growth & transformation plan."

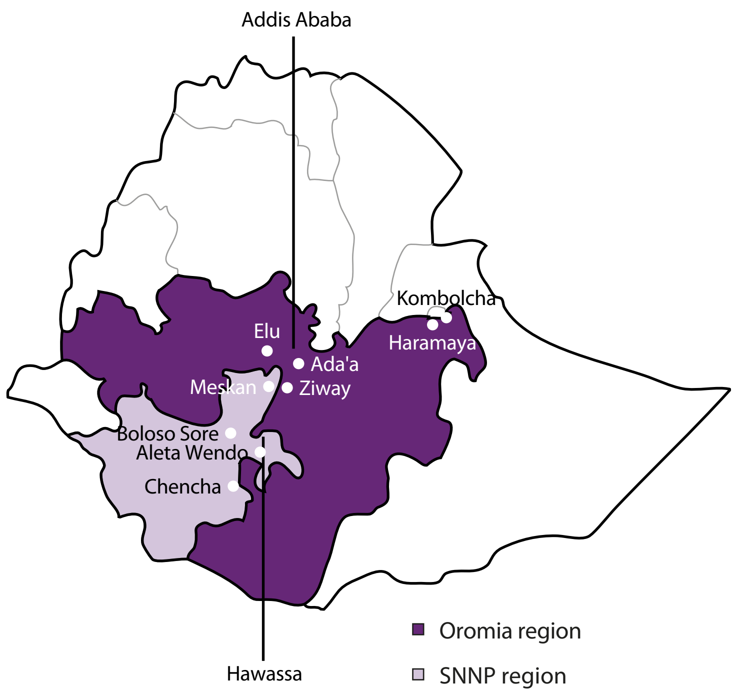
Source: MoWE (2011c).

The policy environment is highly dynamic as the country seeks to refine its approaches. The various policies and associated plans are now being aligned to become consistent with respect to Self Supply. This report was designed to help provide additional information for the process. UAP2 does not yet feature Self Supply strongly despite this being one of the ways to link Water, Sanitation and Hygiene (WASH) better to economic development as set out in the Growth and Transformation Plan (GTP). Nevertheless the new draft WASH implementation framework (see Box 3) does identify *Self Supply* as a service delivery model alongside *woreda-managed projects* (to be handed over for management by communities) and *community management projects* (community projects that feature community-managed grants for contracts to develop sources). The framework also sets out some key principles for how this should be done.

1.2 Research in Oromia and the Southern Nations Nationalities and People's Region (SNNPR)

This report combines the findings of two complementary studies, one undertaken in Oromia with support from the United Nations Children's Fund – UNICEF (Arma Engineering & Sutton 2010) and one undertaken in SNNPR with the support of the *Research-inspired Policy and Practice Learning in Ethiopia and the Nile region* research programme – RiPPLE (Sutton, Mamo, Butterworth and Dimtse, 2011) (see Figure 1.1). Both studies have involved extensive collaboration or been carried out with government support at regional and *woreda* levels. This report was originally prepared as an input to a national Self Supply workshop held from 5-6 October 2011, and has subsequently been finalised in the light of the discussions held and reviewers' comments. It summarises findings from the two regional reports and also refers to two reports on the introduction of the rope pump (Mammo 2010, Sutton and Hailu 2011), which contain more details on the rope pump technology introduction countrywide and within SNNPR and their successes and failures.

Figure 1.1 Map showing study sites



Box 4 SUMMARY OBJECTIVES OF OROMIA AND SNNPR STUDIES

The studies overall aimed to:

1. assess the current **performance** of family wells (and associated protection and water lifting technologies including rope pumps) and propose an acceptable benchmark or standard for family wells that is based upon analysis of microbial water quality, other relevant aspects of well performance and well characteristics including assessment of the applicability of sanitary surveillance.
2. provide a better understanding of **socio-economic issues** (including equity and sharing) and processes of family well development by households to inform how best agencies can support and accelerate scaling up in ways that build upon existing capacities and practices; and
3. scope out options for scaling up and accelerating Self Supply through analysis of the present and required **enabling environment**, including access to support services and finance.

The two regional studies were coordinated and employed similar methodologies. Both studies aimed to investigate the major questions associated with Self Supply, i.e. the risks and performance in comparison to community water sources, as well as examining the ways in which family wells are currently developed and the related socio-economic issues (Box 4). Box 5 provides further details on the two studies and links to reports which contain full details of the regional contexts in physical and socio-economic terms, as well as findings of the individual studies.

Box 5 KEY INFORMATION ON OROMIA AND SNNPR SELF SUPPLY STUDIES

Oromia Part 1
Woredas: Elu, Ada'a, Haramaya

Survey methods and sample size: 400 sources and households for questionnaire surveys (different from the questionnaires for Part 2 and SNNPR); 100 water quality samples from family wells (78), communal sources (10) and households (12); 12 focus group discussions

Sampling approach: Selection of four representative *kebeles* in each woreda with additional *kebeles* included if required to reach target sample size

Survey timing: Rainy season, 2010

Field survey teams: Professionals (36) from health and water offices in woredas for data collection supported by 4 consultants

Water quality analytical methods: Samples taken for laboratory analysis in Addis Ababa or Dire Dawa to determine Total Coliforms (TC) and Thermo-tolerant Coliforms (TTC) as well as pH, turbidity and electrical conductivity measurement

Coordination: Study undertaken by ARMA Engineering PLC with support from SWL consultants

Further details: See Arma Enginering & Sutton 2010 and a study on rope pump manufacturing capacity undertaken by Mammo (2010).

Oromia Part 2
Woredas: Haramaya and Kombolcha

Survey methods and sample size: Survey of 50 mechanised pump supplies and 50 traditional well supplies in the dry season; 166 water samples included 100 source samples and 66 point of use; Survey questionnaires included 158 households, comprising well and pump owners and well sharers, using the same questionnaires as for SNNPR

Survey timing: Dry season, April 2011

Main water quality analytical methods: Water samples carried in sample bags to two centralised analytical teams, using portable kits – Wagtech

Field survey teams: Six trained enumerators plus one water quality expert, a driver and a supervisor per woreda

Further details: Mekonta (2011); Arma Engineering and Sutton (2010).

SNNPR

Study woredas: Aleta Wendo, Boloso Sore, Meskan and Chencha (plus Ziway in neighbouring Oromia)

Sample size: For source survey, 440 sources including 347 traditional family wells, 35 wells with rope pumps, 58 communal sources (handpumps); A household survey questioned 153 households (85 family well owners, 25 further well owners with rope pumps, 20 neighbouring households sharing family well supplies, and 23 households relying upon communal sources)

A smaller follow up survey covered 90 duplicate samples of traditional wells in the dry season, 50 household water samples (especially from those adopting Household water treatment and storage [HWTS] practices) and 50 previously un-sampled rope pumps in Southern Oromia (Ziway)

Sampling approach: Purposive sampling based upon identification of woredas (and *kebele*s) where family wells were known to be used for drinking, and rope pumps were installed (Chencha and Ziway included to sample more rope pumps) and where community wells were functioning; All known relevant sources sampled in four *kebele*s and more *kebele*s added as necessary to reach target total

Survey timing: Main survey in September/ October 2010 (rainy season, and expected worst case water quality scenario) with follow-up survey in April 2011 (dry season scenario)

Main water quality analytical methods: Wagtech kits for bacteriological analysis of total and thermo-tolerant coliform colony counts

Field survey teams: Regional or zonal Bureau of Water Resources (BoWR, now BWE) staff for water quality analysis, working with woreda level water and health officials

Coordination and support: Research team led by BoWR staff with support of RiPPLE regional coordinator in Hawassa, BoFED, SWL consultants, IRC International Water and Sanitation Centre and the consultant coordinating the Oromia study

Associated studies: Related studies investigated rope pump introduction (Sutton and Hailu, 2011), financial services, stakeholder perspectives and regional potential for Self Supply

Further details and socio-economic context: see Sutton, Mamo, Butterworth and Dimtse (2011); Arma Engineering and Sutton (2010), Mekonta (2011) and Macdonald (2012).

1.3 Definitions

Throughout this document references are made to various levels of water supply encountered in the survey. These relate to the concept of a water technology ladder, which covers the well itself and water lifting devices. It increases in complexity and cost as one moves upwards, but also implies greater ease in accessing water and reductions in risks and levels of contamination. The levels discussed are defined as follows in Figure 1.2:

Figure 1.2 Water technology ladder in the surveys

TYPE	DESCRIPTION	CONTAMINATION RISKS
1. Unprotected traditional well		
	Unlined hand-dug well with no apron, and often no parapet or top lining; may have oil drum, pot or wooden superstructure to stabilise and prevent water running back in.	Inflowing water and seepage, hand contact and other sources of dirt on bucket(s) and rope, windblown debris and animals falling in.
2. Semi-protected traditional well		
	Unlined hand-dug well with top lining including impermeable parapet (until the oil drum rots), closable top opening, joined to an impermeable apron; Apron seldom of adequate width.	Seepage of contaminated surface water around the well head; hand contact and other sources of dirt on bucket(s) and rope.
3. Rope pump		
	Rope pump usually sealed into well, sometimes without top slab; may be mounted on traditional or fully protected well, or on a drilled well; not usual for top slab to be raised above ground level or for effective drainage, so returning surface water has easy access back to the well, which is often constructed primarily for irrigation.	Seepage of contaminated surface water around the well head, and around the pump if poorly installed.
4. Diesel or electric pump		
	Small mechanised (electric) pump mounted on traditional well; degrees of protection vary markedly, and in general relate more to stabilising well head for safety of the pump than for reducing risks of contamination.	Seepage of contaminated surface water around the well head and around the pump if poorly installed.
5. Handpump		
	Afridev or India Mk 2 on 3 or larger diameter community well or borehole, with full lining, apron and drainage.	Seepage of contaminated surface water around the well head and around the pump if poorly installed.

2. THE POTENTIAL OF SAFE AND LOW-COST WATER SUPPLY DELIVERY

2.1 Introduction

The primary concern of sector professionals in rural water supply is the provision of a safe and adequate supply. Most emphasis is put on the 'safety' aspect, although little information is available on performance, in bacteriological terms, of existing protected or unprotected systems. This study has looked partly at four elements of performance. These are:

1. **bacteriological water quality** and the factors that affect it;
2. **the reliability** with which water supplies deliver a year-round service;
3. **the adequacy** of the supply for all domestic purposes; and
4. **the satisfaction of householders** with the supply.

Satisfaction of users is essential if they are to sustain continuous use and long-term operation and maintenance. Failure in any one of these aspects indicates an inadequate service. However within the rural context, especially in small, scattered communities it would be unreasonable to expect any supply to score 100% in all four aspects; but that is the target to be aimed for and all aspects need to be weighted equally.

The approach followed by this research was to take national water supply service standards as the ultimate goal, but using observed community supply technology performance as the yardstick against which lower technologies were measured. All supply types need to make improvements. The question is whether family wells with various levels of technology can reach similar levels of performance to those of officially accepted technologies. The 2005 well-digging campaign primarily aimed to improve access to water as a first step with the opportunity to then add on household water treatment to ensure good quality, a move necessary even for supposedly 'safe' community supplies. This section of the report, combined with greater detail found in the regional reports, provides the necessary information to enable a decision to be made on: whether household supplies reaching a certain technical level can be considered a substitute for community supplies among scattered households or augment them where their performance and density, or budgetary constraints and rates of progress, require it.

2.2 Water quality in wet and dry seasons

2.2.1 Selected indicators for the study

The studies concentrated on the bacteriological and physical aspects of water quality. Of the nine *woredas* studied, eight are located outside the Rift Valley and considered by the BoWE to offer low risks of high levels of arsenic or fluoride, and so chemical analysis was not conducted. Ziway, the only *woreda* selected in the Rift Valley, was chosen primarily to examine in greater detail the risks of bacteriological contamination of water abstracted by rope pumps. Apart from levels of chlorination in disinfecting water. In general it was assumed that the chemical characteristics of shallow groundwater would tend to be the same regardless of the degree of protection of the source. The studies were therefore designed to look more at the variation in bacteriological quality related to the degree of protection.

The Ethiopian Specification for Drinking Water Quality of the Ministry of Water and Energy, MoWR (2002) is primarily geared towards the sampling of piped supplies with point sources (springs, boreholes and wells) only 'if the situation demands'. It stipulates both total and thermo-tolerant coliform levels, based on WHO guidelines (WHO, 1997). The WHO guidelines (2011) now only refer to TTC, as TC has been found to be naturally occurring. This report therefore only considers TTC/100ml as an indicator of contamination. The Rapid Assessment of Drinking Water Quality by WHO/UNICEF (2010) also uses TTC as its main indicator, and counts 0 TTC/100ml as very low risk and <10 TTC/100ml as 'low risk'.

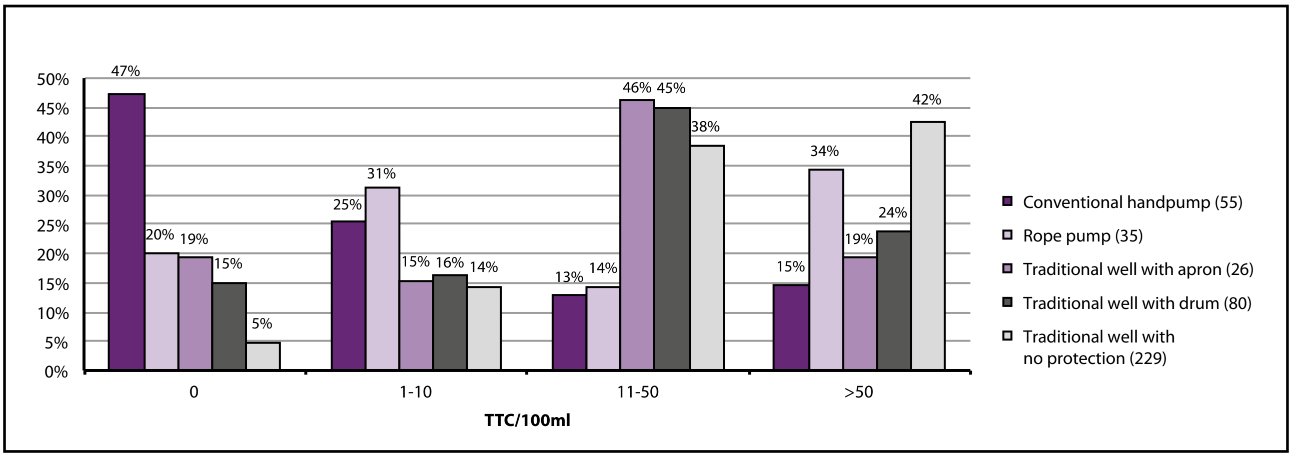
In order to provide a benchmark from the lowest level of technology already approved as a level of service for communities, handpump supplies were included in the survey to define their performance and allow a comparison with traditional family wells and rope pumps.

2.2.2 Bacteriological water quality in the wet season, with different levels of protection

In making any type of comparison between the ranges of water quality found in different source types, it should be borne in mind that only conventional hand pumps on lined wells or boreholes have been constructed specifically with drinking water standards in mind. This relates not just to the technical specification of the installation, but also to the associated education given to users on how to avoid contamination. Traditional wells have taken few such precautionary measures, being constructed more for convenience: with stability of the well head and children's safety (from falling into the well) in mind, more than protection from contamination. None were found to have adequate well head protection to avoid the backflow of surface water into the well directly, or through shallow infiltration. Observed water quality therefore reflects current performance which may be lower than that which such supplies could deliver if small changes in construction and user behaviour were made.

Figure 2.1 shows that, as might be expected among the main supply types, there is a progressive improvement in water quality as levels of protection (and cost) increase. Samples taken in the wet season were assumed to represent the worst case scenario. At that time, some 72% of conventional handpumps on fully protected wells provided water of low health risk (combining wells in the categories 0 and 1-10 TTC/100 ml), and 47% of very low risk (0 TTC/100ml). In contrast, only 5% of unprotected wells and around a fifth of semi-protected wells or rope pumps gave water with zero TTC/100ml (see Figure 2.1). However more than half of all rope pumps (52%) and a third of semi-protected wells (34%) offer a low health risk. This can be viewed in two ways. One view is that risks are very much higher from traditional wells, even with a rope pump. However it may also be said that the number of wells with little or no contamination shows that with good practices and construction, even lower cost solutions can provide good water[2].

Figure 2.1 **Water quality in different source types**

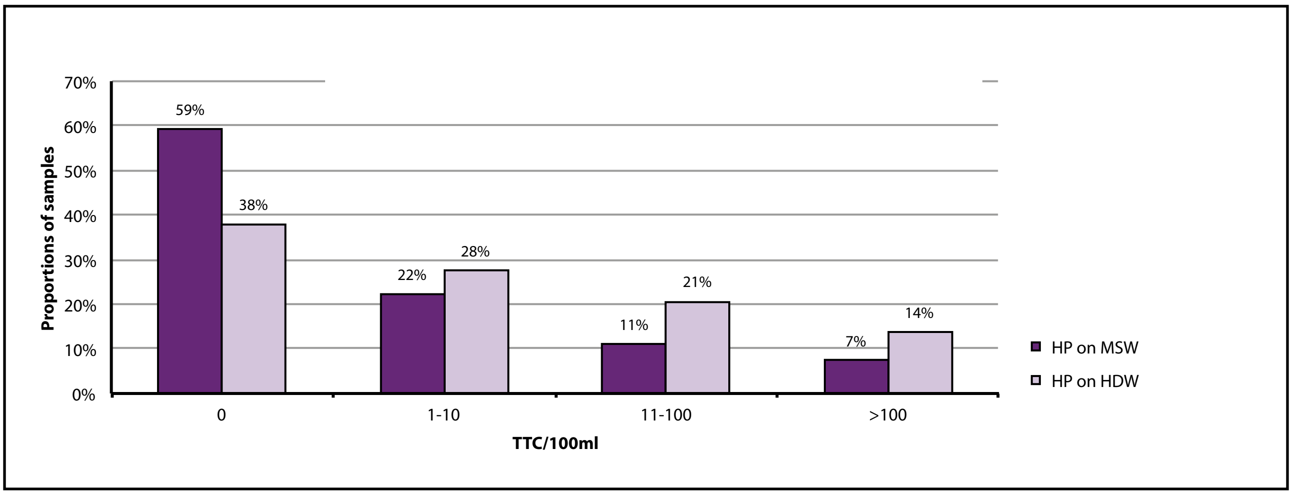


2 Greater detail is give in Sutton, Mamo, Butterworth &Dimtse (2011) (Section 5.1); and Mekonta (2011). Section 5.

Handpumps. Whilst there is a marked improvement in water quality with increased protection from contamination, even handpumps on boreholes and sealed fully-lined wells with drainage do not consistently provide safe water; one in ten is found to be highly contaminated. This pattern of risk levels was compared with a combined data set of country-wide results for handpumps from RADWQ (WHO &UNICEF 2010) and from a more local study in the Shebedino *woreda* Sidama Zone (Plan International, 2006). These two data sets combined gave a similar pattern to the SNNPR data in terms of low and highest risk, suggesting the study information is representative of the more national picture.

In the SNNPR survey, handpumps on hand-dug wells were differentiated from those on drilled shallow wells (MSW) and were found to be significantly more at risk (see Figure 2.2). Water from pumps on hand-dug wells was twice as likely to be moderately to highly contaminated, compared with that from drilled shallow wells. This suggests that hand-dug wells may always present higher risks of contamination. Good construction and good practices can minimise, but not eliminate the risks. In all well types – both conventionally and traditionally constructed – greater care is needed in sealing the well and practising on-site hygiene, if safe water is to be consistently made available from wells.

Figure 2.2 Handpumps of hand-dug and drilled wells

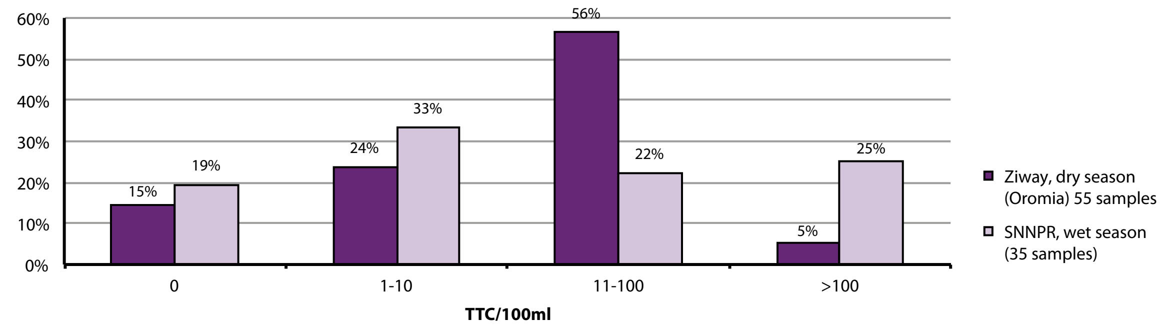


Rope pumps as presenting slightly more of a risk than conventional handpumps. The results suggest this is so. The rope pumps sampled for the study areas were mostly not installed to a standard suitable for drinking water sources. In some cases, especially in Ziway, they were installed primarily for irrigation, but were used also for domestic purposes. In other cases, where they were meant for domestic purposes, simple precautions to reduce risks of contamination was not observed. Thus the tops of wells are often below ground level or with the ground sloping towards the pump (100% of pumps in Chencha) so that water can accumulate around the top slab and seep into the top of the well. There are seldom any aprons or drainage systems around the top slab (<10%), and water spilling from the rope or inadequate spout on the riser pipe may easily return to the well (see Figure 2.3). Not surprisingly the well is often contaminated. In Aleta Wendo, however, the four rope pumps sampled were found to be better sited above ground level on well-drained slopes (see Figure 2.3) with good site hygiene, and gave consistently good quality (0-2 TTC/100ml) in both wet and dry seasons.

Figure 2.3 Chencha rope pump installed below ground level, and with no spout on riser pipe *(Photo: Hailu, S.)*

Of the first sampling in the wet season, from Aleta Wendo, Boloso Sore and Chencha, 52% of rope pumps delivered water of less than 10 TTC/100ml. In Ziway where most pumps are for irrigation purposes, only 39% did so, but these also showed a much lower number were highly contaminated in the dry season (see Figure 2.4).

Figure 2.4 Water quality from rope pumps on unlined hand-dug wells (SNNPR wet season, Ziway, dry season)



The studies indicate the need for much better practices in well head protection and rope pump installation and additional monitoring to get a true picture of the degree to which rope pumps can consistently deliver safe water. The performance of Aleta Wendo rope pumps in the wet and dry seasons suggests that this is quite possible.

Traditional wells have been classified as having specific levels of protection. Technology options in protection were found to be mostly *woreda*-specific (see Table 2.1), partly because of ground conditions and partly because well owners tend to copy their neighbours' ideas. Many wells, especially in parts of Boloso Sore, Meskan, and Elu had little or no protection against run-off into the well. Contamination from nearby animal droppings and other debris thus easily entered into the well. Low abstraction rates meant that such contamination could have long lasting effects. However in wells protected under the Productive Safety Net Programme in Boloso Sore, and through the efforts of many well-owners in Haramaya and Ada'a, better protection was found to be afforded by oil drums or masonry parapets with small aprons, thereby reducing the risks of returning contaminated water from the surface. Figure 2.5 shows that semi-protection (drum or masonry parapet plus apron) significantly reduces contamination in the wet season, halving the proportion of water with high levels of TTC (from 42% to 19%), and increasing those with no faecal coliform by a factor of almost four.

Figure 2.5 Semi protected well in Aleta Wendo
(Photo: Sutton SWL Consultants)

Table 2.1 **Well head characteristics by *woreda* (some wells with more than one feature)**

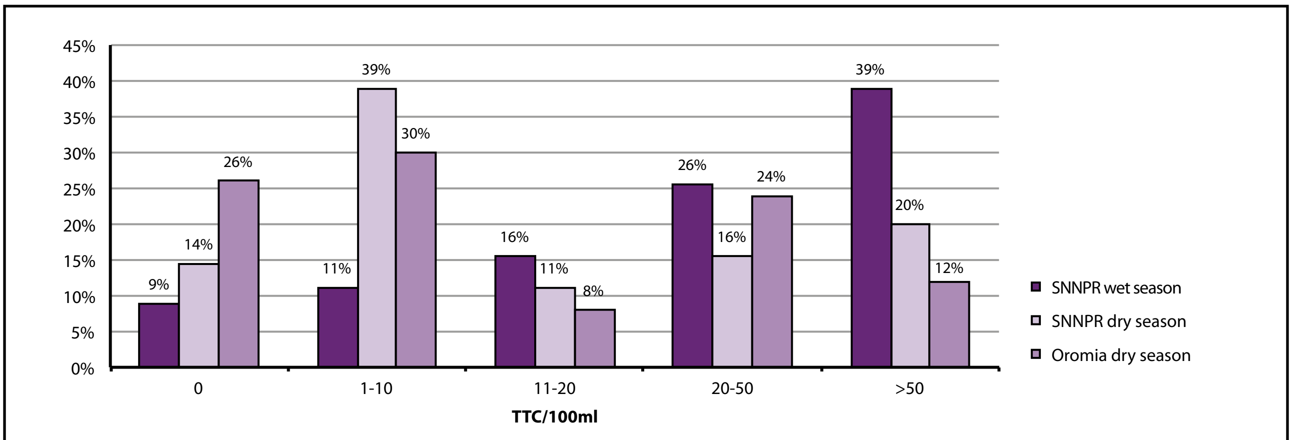
SUPERSTRUCTURE	SNNPR			OROMIA			
	Aleta Wendo	Bolos Sore	Meskan	Ad'a	Elu	Haramaya	Kombolcha
Wellmouth protection	111	108	119	81	141	86	50
Earth mound	3%	37%	93%	0%	0%	1%	4%
Oil drum	30%	43%	1%	0%	72%	0%	33%
Wooden box	46%	9%	3%	20%	89%	5%	4%
Concrete/stone	4%	10%	0%	52%	0%	56%	43%
Broken pot	0%	18%	0%	0%	0%	0%	0%
Cover	86%	76%	10%	64%	62%	79%	86%
Apron (concrete)	2%	20%	0%	60%	0%	45%	30%
Top Lining							
Masonry/wood	0%	0%	82%	10%	66%	38%	30%
Lifting devices							
Pulleys	0%	0%	2%	82%	0%	65%	26%
Rope pumps	3%	6%	0%	0%	0%	0%	0%
Diesel pumps	0	0	0	0	0	25	25

Note: Shading of cells is to highlight dominant features.

2.2.3 Safe water in the dry season

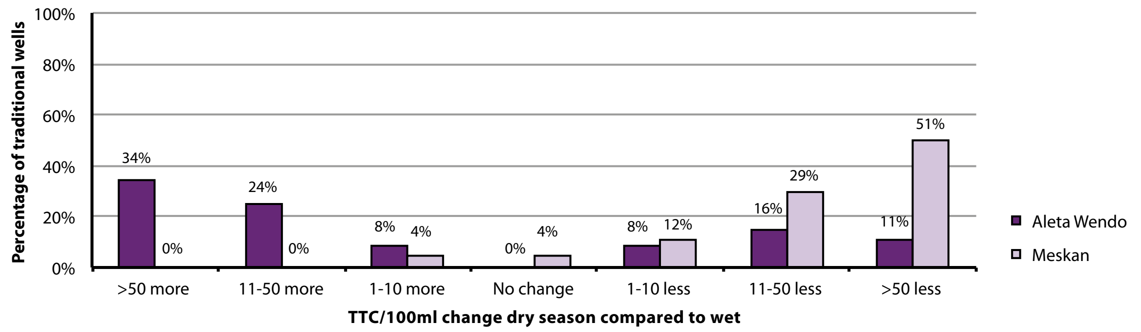
Ninety traditional wells in SNNPR were sampled both in the wet and dry season, and 50 in Oromia in the dry season. Whilst wet season patterns of water quality in SNNPR show a steep rise towards high contamination levels, starting with 9% having no thermo-tolerant coliform, in the dry season the same wells showed a much more gradual increase in risk, and a larger proportion (53% vs. 20%) with only low risk (see Figure 2.6). With over half of traditional wells in both SNNPR and Oromia having less than 10 TTC/100ml, these supplies performed equally in the dry season to the 319 protected springs sampled in the RADWQ study (WHO & UNICEF, 2010), with 53% also falling within this range. The latter technology is counted in 'coverage' according to national statistics, but the former is not.

Figure 2.6 **Comparative wet and dry season bacteriological water quality in 90 unprotected traditional wells in SNNPR and Oromia during the dry season**



Disaggregating the seasonal changes in water quality suggests complex mechanisms at play in contamination. There is a marked contrast between Aleta Wendo wells and those in Meskan (see Figure 2.7).

Figure 2.7 Seasonal changes in bacteriological water quality

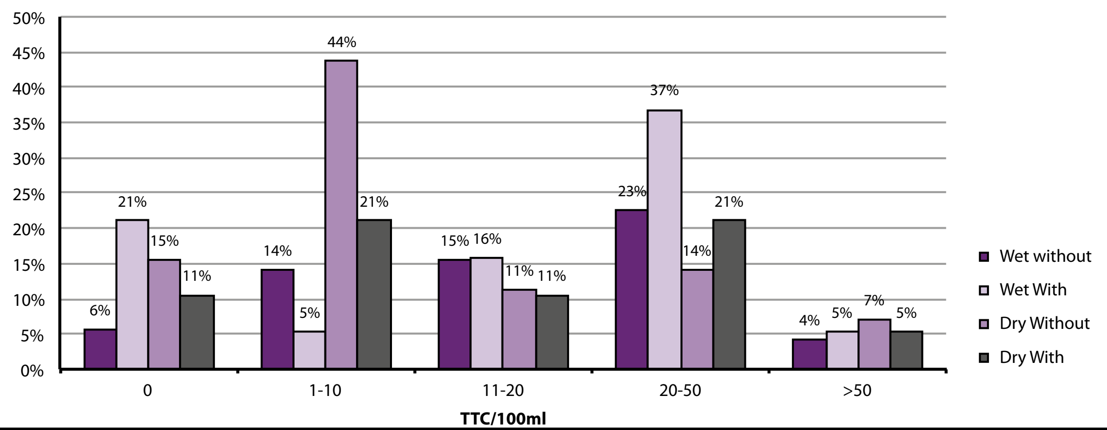


In Aleta Wendo water quality mostly deteriorates in the dry season, whilst in Meskan it improves significantly. The reasons for this need further investigation but the features in Meskan (see Table 2.1) which may explain poor quality in the wet season include:

- an earth surround to the well mouth
- a permeable (dry stone top lining) to stabilise the well;
- the lip of the well is often formed by a single log to make water drawing easier; using the log like a fixed pulley, but not creating an impermeable or properly raised parapet;
- no cover on most wells.

All of these features allow surface water to return to the well as run-off or seepage, and dirt and animals to fall in. Seasonal water level changes are small suggesting that the difference in the unsaturated thickness is not a factor in water quality improvement in the dry season (see Figure 2.8).
In Aleta Wendo the pattern is more difficult to explain. Two-thirds of wells show an increase in contamination in the dry season, and these may relate in part to the way the wooden or metal parapets are constructed over the well mouth. There are much larger seasonal variations in depth to water and saturated thickness n this *woreda*, but no correlation between them and variations in water quality.

Figure 2.8 Changes in bacteriological water quality in wet and dry season in wells with and without parapets in SNNPR



Those wells with better protection (closable lid, top slab, limited impermeable parapet and small apron) in Oromia show even lower dry season contamination (65% with <10TTC/100ml) than those with lower levels of protection in SNNPR (53%) or Oromia (50%).

Observed seasonal variations indicate that contamination in traditional wells has complex causes, but is likely to arise mainly from very local sources of pollution; including run-off, dirty ropes and buckets and debris falling or being blown into wells. These will be short-lived unless there is much organic material in the well or there is very little turn-over of water compared to storage. Other factors may include seasonal practices of animal watering, widening aquifer contamination, or reducing thickness of the unsaturated layer in the wet season. On the other hand, low housing density, wider distance from any points of pollution, and thickness of unsaturated ground all reduce the risks of widespread aquifer contamination in rural settings. If general aquifer contamination were to blame, reduction to zero TTC on a seasonal basis would not occur. It is therefore felt that local contamination remains the main source. Measures which reduce surface water seepage back into the well include: stabilising the well head and keeping the rope and bucket cleaner; these in turn will contribute towards significantly improving water quality. Such measures can be as simple as providing a hook on the well cover or nearby, so the rope and bucket can be hung off the ground, in between use.

Traditional wells with mechanised pumps. Water quality in this type of well is the highest in the dry season, where traditional wells are not subject to contact with rope/ bucket and associated dirt, a higher turn-over of water is observed through abstraction by mechanised (diesel or electric submersible) pumps for irrigation and home use. In Oromia, water quality is the highest found in all the studies, although protection is still minimal. Such wells exhibit water quality almost twice as good as that from un- or semi-protected wells with no pump. Over half of these pumped wells fall into the very lowest risk category (0 TTC/100ml) and 82% of samples have <10 TTC/100ml (see Table 2.2) exceeding even the performance of handpumps locally and nationally.

Table 2.2 **Water quality in Oromia traditional wells (with rope and bucket or with mechanised pumps) in the dry season, compared with wet season SNNPR hand pumps.**

TTC/100ML	UNPROTECTED R+B WELLS (30)	SEMI-PROTECTED R+B WELLS (20)	MECHANISED PUMPS (50)	SNNPR WET SEASON HANDPUMPS (55)
0	27%	25%	56%	47%
1-10	23%	40%	26%	25%
11-20	10%	5%	8%	2%
20-50	30%	15%	0%	11%
>50	10%	15%	10%	15%

2.2.4 Sanitary surveillance for estimating risks

Sanitary surveillance scoring normally uses observation of ten elements of well construction and hygiene to indicate relative risks of contamination. Such a scoring system has been proposed by others (WHO, 2005) as a partial substitute to expensive routine water quality sampling, as well as to highlight aspects of a source which need improvement[3]. However the scoring is designed for conventional wells with standardised forms of protection. The studies therefore also looked at the degree to which this scoring system reflects actual measured water quality for different sources types including family wells.

3 See Arma Engineering & Sutton (2010) (Section 5.3) and Sutton, Mamo, Butterworth &Dimtse (2011) (Section 5.2).

The method used initially takes ten parameters for which a 'yes' answer (e.g., is there a latrine within ten metres?) is counted. The nearer a total score is to ten, the greater the risk of gross contamination. The WHO guidelines (1997) assumed that a score of zero signified no risk, 1-3 low risk, 4-6 intermediate risk and 7-10 a high risk. The difficulty is that the application of this methodology is directed towards standard installations, with a few major variables which may define water quality. Family wells on the other hand have a large number of variables, of varying effects on water quality. Hence not only should more parameters be included in the scoring system, but they may also need to be weighted differently vis-à-vis their effects.

Testing of the sanitary surveillance system against measured wet season water quality provides a reasonably good fit. It can be used with a fair degree of confidence (80%) to predict risks for standard handpump installations[4]. Reducing the need for frequent and expensive water quality analyses, this surveillance system cannot however, completely replace actual measurement.

Within the *woredas* first sampled, distribution of risks using sanitary surveillance for traditional wells appears to show slightly lower risks in Oromia than in SNNPR (see Table 2.3), but in all cases, more than two-thirds of wells fall in the two highest categories, as might be expected; yet in measured water quality, only a third fall in this group. Almost no wells fall in the lowest risk category, yet more than 9% in SNNPR are found to have no contamination even in the wet season, and 14% in the dry season.

Table 2.3 **Sanitary surveillance total scores for family wells per *woreda***

	TRADITIONAL WELLS WITH ROPE AND BUCKET			TRADITIONAL WELLS WITH ROPE AND BUCKET				MECH PUMP
	Aleta Wendo	**Boloso Sore**	**Meskan**	**Elu**	**Ada'a**	**Haramaya**	**Oromia TW**	**Oromia MW**
0-2	0%	3%	0%	0%	0%	2%	2%	8%
3-4	17%	17%	1%	32%	21%	30%	18%	42%
5-6	56%	28%	38%	53%	45%	38%	54%	40%
7-8	25%	39%	61%	11%	26%	25%	22%	10%
9-10	3%	13%	0%	4%	8%	6%	4%	0%
Total	106	104	119	157	111	125	99	69

As Table 2.3 and Figure 2.9 show, there is a degree of clustering of medium risk scores (5-7) as there is in water quality, but this is coincidental and the system does not pinpoint hardly any of the wells providing water with no contamination, and those indicated as being at highest risk may actually have any level of TTC count, so there is a high random element to the correlation. Among the 90 wet and dry season samplings no correlation was found with total scores or individual elements. Among the larger group median (346 wells), TTC counts do increase fairly steadily as the total risk score rises (Westbury, 2011), but there are too many variables in family wells for the 10 point scoring to be accurate in predicting water quality for individual wells, as Figure 2.8 shows. For this reason, a broader system of sanitary inspection was developed.

2.2.5 Detailed analysis of well protection

The broader system developed in the UNICEF (Arma Engineering & Sutton, 2010) and second phase of the RiPPLE studies as explained in this report replaces 'yes' and 'no' answers with a five-point scale of increasing protection for

4 See Sutton, Mamo, Butterworth &Dimtse (2011) (Section 5.2.2).

fifteen aspects of traditional wells (see Appendix 2). These aspects include:

- Well mouth and Well surround
- Lining and lifting device
- Environmental sanitation and well performance characteristics

Figure 2.9 **Traditional well sanitary inspection score vs. bacteriological water quality- SNNPR**

SI SCORE COLIFORM COUNT	0 - 2	3 - 4	5 - 6	7 - 8	9 - 10
A. 0 TTC/100ml	TWTW	TWTW TWTW TW	TW TW TW TW TW TW TW TW TW TW TW TW TW	TW TW TW TW TW TW TW	TW
B. 1 - 10 TTC/100ml	TW	TW TW TW TW TW TW	TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW	TW TW TW TW TW TW TW TW TW TW TW TW TW	TW
C. 11 - 20 TTC/100ml	TW TW TW TW	TW TW TW	TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW	TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW	TW TW
D. 20 - 50 TTC/100ml	TW TW TW TW TW	TW TW TW TW TW TW TW TW TW TW TW TW	TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW	TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW TW	TW TW
E. 50 - 500 TTC/100ml	TW	TW TW TW TW	TW TW TW TW TW TW TW TW TW TW	TW TW TW TW TW TW TW TW TW TW TW TW TW TW	
F. TNC		TW TW TW TW	TW TW TW TW TW TW TW TW TW	TW TW TW TW TW TW TW TW TW TW TW	

- Very low risk
- Low risk
- Medium risk
- High risk

This system suggests the following key points, based partly on an analysis of wet and dry season variation carried out by Joel Westbury (Westbury, 2011):

- A loose cover on a well may improve safety against animals and children falling in, but it does not improve water quality. In the dry season it may even increase contamination (perhaps, as dirt is knocked into the well as the lid is replaced).

- An old metal drum or wooden parapet significantly reduces contamination during the wet season, but may increase contamination in the dry season. This may be because such protection is usually for wells with unstable top sections, which may also be stabilised with cow dung. As this stabilising section dries out, bits may fall into the well.
- Impermeable (concrete) aprons of adequate diameter and completion (raised lip) were not found. In the wet season a limited number of wells were found with small concrete aprons; these gave significantly better water quality than unprotected wells. A smaller, but still significant difference was also observed between semi- and un-protected wells in Oromia in the dry season. An apron, even with inadequate width and drainage, seems to lead to improved water quality whatever the season.
- Wells with a surround of compacted soil performed better, in water quality terms, in the dry season than those without any such protection; but not in the wet season.
- A short but permeable lining improves water quality in the dry season, but not in the wet season, probably because in the wet season seepage/ flow back into the well creates contamination; this is not so prevalent in the dry season.
- Wells with dry stone top lining are usually not covered, allowing windblown dirt to enter. They do however perform better in the dry season than those with (permeable) parapets, closed by covers leading to the apparent better dry season quality, as seepage/ flow back into the well reduced.
- Small improvements in water quality were also found with increasing numbers of users and higher levels of education in the owning family.
- Depth to water and seasonal depth of water do not appear to have a direct effect on bacteriological water quality.

In general it is apparent that the variables and their differing strengths of influence create an extremely complex interaction. Overall dry season water quality is better than wet season, but within this, the factors which directly correlate with increased risk in the wet season are not the same as those which correlate with increased risk in the dry season. Different mechanisms of contamination are therefore likely to be at work at different times of the year. No sanitary inspection system to date can predict water quality although the relationships become clearer as sample numbers increase. Scoring does however identify the elements with greatest impact in reducing risk as being:

- An apron
- An impermeable parapet
- No solid or faecal waste within ten metres
- A well mouth which is sealed from ingress of dirt or surface water

2.2.6 A ladder of risk reduction

Consideration of the bacteriological water quality in different source types suggests that risks can be summarised as in Table 2.4, providing a ladder of reduced risks as protection levels increase. Cost effectiveness also comes into the assessment: costs increase as steps become more complex, but even small investments by well owners and users can lead to significant improvements in water quality. The cost of a rope pump with 50 people sharing is significantly less than for a communal well, where the owning family pays for well excavation. However not so many people can reach this level of protection without some financial support either as temporary loans or as permanent grants. The financial and other factors influencing uptake of Self Supply are discussed further in the next section.

Table 2.4 **A ladder of risk reduction – wet season risks**

TYPE	LOW RISK <10TTC/100ML		HIGH RISK >100TTC/100ML	RELATIVE COST	COMMENTS
1. Unprotected family well - Unlined well shaft, bucket/ rope/ little well head protection					
	**0TTC/100ml** Average 5%	**<10 TTC/100ml** Average 22% (range 17% Meskan - 30% Aleta Wendo)	**>100 TTC/100ml** Wet season 18%	**Cost** Average $50-60 per owner or 10-12 per w HH ca. <$2 per head	Basic first stage well
2. Family well with drum wellhead - As option 1 but with well head lining with oil drum					
	**0 TTC/100ml** 15%	**<10 TTC/100ml** 32%	**>100 TTC/100ml** 18%	**Cost** Average 1.2 times option 1	Three times safer than option 1 in wet season, but less safe in dry season
3. Family well with drum wellhead and small apron - As option 2 plus narrow apron but no drainage					
	**0 TTC/100ml** 19%	**<10 TTC/100ml** 35%	**>100 TTC/100ml** 5%	**Cost** 1.5 times option 1	Four times safer than option 1
4. Family well with rope pump - As above with rope pump on sealed top slab. Minimum lining to seat top slab (most with no drainage and some without spout).					
	**0 TTC/100ml** 16%	**<10 TTC/100ml** 43% (SNNPR 51%)	**>100 TTC/100ml** 15% (SNNPR 25%)	**Cost** 3-6 times option 1 with average cost about $4.5 per head	3-5 times safer than option 1. Aleta Wendo ten times safer than option 1
5. Mechanised pump (diesel/ electric) - Traditional well, usually lined only at top +/or bottom with limited wellhead protection					
	**0 TTC/100ml** 49%	**<10 TTC/100ml** 79%	**>100 TTC/100ml** 4%	**Cost** 8-10 times Option 1	As safe or safer than option 5
6. Lined hand dug well/ machine shallow well with handpump - Concrete lined well, with sealed top slab and hand pump, but often no lip and drainage channel					
	**0 TTC/100ml** 47%	**<10 TTC/100ml** 72%	**>100 TTC/100ml** 11%	**Cost** 100-150 times cost of option 1. Average about $10-13 per head	9 Times safer than 1. Just over twice as safe as option 3. At present twice as safe as option 4

2.3 Reliability – a year-round supply?

2.3.1 Selection of indicators

Whilst water levels were measured during the surveys, they only give a short-term measure of variability in water levels and availability, in two regions where Belg rains in particular (and to a lesser extent the longer Kiremt rains) have been consistently below average in the last 20 years (Funk, 2012). Three types of anecdotal indicators have therefore been used to assess reliability. Firstly the surveys in Oromia and SNNPR asked about the absolute reliability of sources, in terms of whether a supply had ever dried up (*Oromia Study Part 1*) or whether it had dried in the last five years (*SNNPR and Oromia Part 2*). Additionally, for all supply types, SNNPR users were asked about the number of days in the past year the supply had not provided water. For wells with bucket and rope, this would be the time the well was dry, whilst for those mounted with pumps that had failed, it was the length of time the pump had not been working. A third indicator used was that provided by BoWR, which gave the regional proportion of functioning and non-functioning rope or hand pumps: an unbiased and less localised indicator of performance, since the Oromia and SNNPR surveys only included wells which were functioning at the time of the study. Only the second indicator was applied to all supply types. In the case of 'drying up', users were not necessarily able to differentiate between a pump not delivering water because it had broken down, or because the source was dry.

2.3.2 Functioning

Wells which were surveyed were all functioning at the time of the study. This sample therefore cannot be used to get a full picture of reliability: non-functioning sources were not counted. However BoWR statistics do give an additional measure for protected supplies (rope pumps, handpumps and springs): the proportion of the total wells which were working at the time of the regional survey in 2008/9. In SNNPR, functionality varied considerably from *woreda* to *woreda* (see Table 2.5).

Table 2.5 **Functionality of protected supplies in SNNPR**

	WOREDA				TOTAL NUMBERS	TOTAL PERCENTAGE FUNCTIONING
	A Wendo	B Sore	Meskan	Chencha		
Scheme type						
Handpump on MSW or HDW	71%	48%	98%	67%	518	79%
Rope pump on HDW	50%	50%		67%	79	59%
Spot spring	83%	47%	92%	69%	278	72%
Total numbers	**256**	**225**	**303**	**108**	**875**	**892**

Source: BoWR (2010)

The overall high level of functioning handpumps is partly due to half of all the handpumps in the four *woredas* being in Meskan; and almost all of them working. The low proportion of functioning handpumps resulted in the need to sample outside the target kebeles to achieve adequate numbers for the study.

The low reliability of rope pumps may partly relate to the difficulties many owners find in accessing repair services and spares. However it may also be due to the way rope pumps have been installed. Investigations on rope pumps by RiPPLE (Sutton & Hailu, 2011) show that poor slab design (which impedes access to re-deepen or clean out the well), poor selection of reliable wells for demonstration purposes, and poor installation practices lead to excessive wear on ropes. All these affect supply performance in ways which could have been avoided.

By comparison, traditional wells are often assumed to be very unreliable, partly because they usually have to be constructed without de-watering pumps or lining; both of which would allow deeper penetration of the aquifer. Lifting devices (bucket and rope) however do not break down, and those areas in which family wells are best established are often those where ground is consolidated but not very strongly cemented; so could be dug easily and yet did not collapse over many years. Water level fluctuations are minimal, or the water level could be followed down as droughts progressed; so that after a few years the depth of the well is sufficient to provide supplies even in the driest years. In Aleta Wendo for instance half the wells that have been deepened no longer go dry (despite average seasonal water level fluctuations of almost five metres), but the other half still need further deepening to become reliable. Half of all the wells surveyed in SNNPR have never needed deepening after initial excavation.

Overall in the six *woredas* surveyed, there is a range of source reliability (see Table 2.6). The average for all is 79% which provided water throughout the last five years (in SNNPR), or since construction (in Oromia). The second sampling in Haramaya and Kombolcha, is slightly biased for those wells with mechanised pumps (half the wells surveyed) by the fact that well owners are unlikely to put additional funds for a pump into a well which anyway goes dry. Some 96% of the 100 traditional wells in Oromia surveyed during the second sampling had not dried during the previous five years. Overall an average of four out of five wells of the 902 wells surveyed, are said never to have dried in the previous five years; or in the case of the first Oromia survey, since construction (which was, on average, nine years ago).

Table 2.6 **Ranked reliability of traditional wells surveyed in Oromia and SNNPR**

HIGHEST RANKING	1. ADA-A*	2. KOMBOLCHA	2. HARAMAYA 2	3. MESKAN	4. HARAMAYA 1*
Never dried in past five years	97%	96%	96%	92%	87%
Number of wells surveyed	113	119	50	119	127
LOWER RANKING	**4. BOLOSO SORE**	**5. ALETA WENDO**	**6. ELU***		**TOTAL AVERAGE**
Never dried in past five years	75%	67%	42%		79%
Number of wells surveyed	106	111	157		902

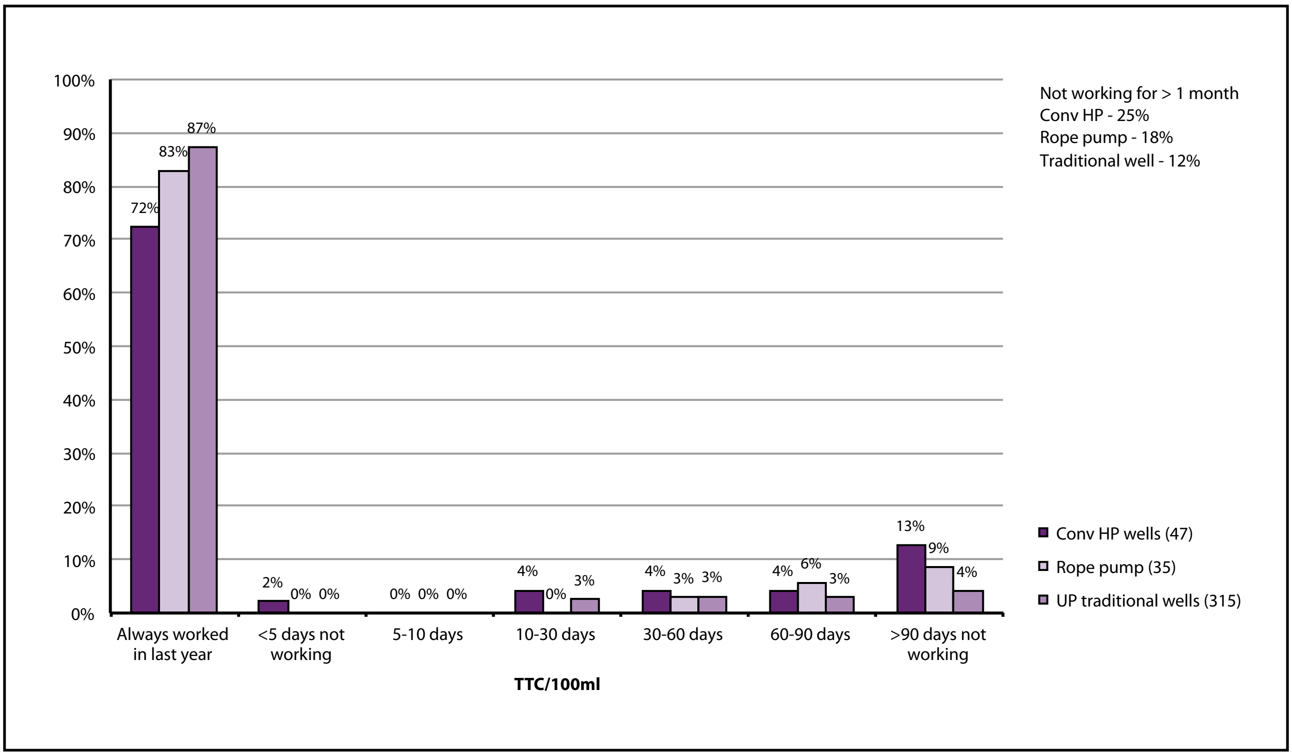
** = Oromia first survey Wells never dried since construction*

Findings in Oromia suggest that many wells in Elu were among the shallowest in terms of depth of water. Elu and Aleta Wendo wells dry up the most, and this is likely to be because of the instability of ground at the top of the well and/ or below the water level in Elu, and the high seasonal variation in water levels in Aleta Wendo (an average variation of 4.6m during the year of survey). The lack of a tradition and skills in lining below the water level has major implications on well reliability. In these *woredas* especially, there is a tradition of cleaning out wells annually to remove the accumulated debris which reduces well depth and increases the chances of drying up. Lower cost lining could also be introduced, since smaller diameter concrete rings (0.8-0.9m) could be made with lower cement content and no re-enforcing down to depths of 20 metres. A rental system for de-watering pumps might also improve performance of wells which dry up; if deeper excavation can be done safely. However with a high density of family wells, those families with wells that do not dry up often share their supply with less fortunate neighbours during periods of lowest water level, or when water in some wells becomes highly turbid in the rains. Some 30% of family well owners in Aleta Wendo have more users in the dry season, and almost half in Boloso Sore, where turbidity was also a problem. This reflects a combination of local wells and surface water drying up, and the common practice of sharing (see Section 3). More semi-protected wells in Boloso Sore dry up than the average for family wells in that area (32% rather than 11%), which may seem surprising when more effort and investment has been put into their improvement. Since these are mainly wells which were improved under the Productive Safety Net Programme, it is possible that the sense of ownership was lost when they became more communally managed; and so normal maintenance has been delayed or not organised at all.

2.3.3 Performance in the last 12 months

Reliability refers not only to sources which have provided water all the time, but also to the speed with which those which fail can be brought back into action (length of down-time). In SNNPR, information was collected from all source types on the number of days a functioning supply was out of action in the previous 12 months. Figure 2.10 shows that of the handpumps which were working (around 80% of the total, if the BoWR figures for 2008/9 are still approximately representative), 72% have provided an un-interrupted service over the previous 12 months. Thus overall some 59% of all installed handpumps have provided a reliable service over the past year. Whilst these served some 14,000 people in the *kebele*s surveyed, a further 10,000 people for whom handpumps were installed, suffered from intermittent or non-existent supplies. A quarter of pumps had worked for less than 11 out of the previous 12 months.

Figure 2.10 Waterpoint functioning in the last 12 months



This compares with 83% of rope pumps visited, providing an uninterrupted service in the year of the study (but only functioning pumps were visited). Since 41% of all installed pumps were not functioning, overall this means that only some 50% of all rope pumps installed provided an uninterrupted service, and some 80% of all traditional wells with a rope and bucket.

Rope pumps also often took longer to repair. As Table 2.7 shows, of all rope pumps installed in the *woredas*, a half to a third may have been out of action for longer periods. Maintenance systems seem to perform less than perfectly in many *woredas*, but ones such as Meskan (262 out of 268 handpumps functioning) show that higher efficiency is possible.

Overall it is apparent that in terms of service delivery traditional wells are, at present, more likely to deliver a year-round supply of water than conventionally constructed wells with handpumps; even in Meskan where functioning levels of handpumps are at their highest. Because people can and do maintain the facilities themselves, traditional family wells are the most likely to provide a year-round supply. The traditional wells surveyed served just under 30,000 people, and over 25,000 of those served had access to a reliable supply during the previous year.

2.4 Supply adequacy

In SNNPR there was little difference in the responses of those using protected or unprotected sources[5]. Between 70-75% of users indicated that the supply is adequate all year, and very few (less than 5%) felt it is never enough at any time.

There are, however, big differences in the purposes for which supplies are used. Relatively few users (less than one in five) of communal supplies take more than drinking and cooking water from them[6]; so adequacy does not refer to all uses as it does for most family wells. Communal well users tend to regard handpumps as only providing a part of their needs, other sources often being used to help satisfy their total domestic demand. Queuing and distance deter people from using handpumps for all purposes, and traditional wells provide an integral part of overall service delivery.

In Oromia, a slightly higher level of adequacy is found among family-owned wells, whether mechanised for irrigation uses, and/ or providing for animals and domestic purposes. Dry season surveys in Kombolcha and Haramaya found wells to provide an adequate year-round supply for all uses; 90% and 82% respectively. Unless water is very difficult to find, if a supply is insufficient, others will try and develop additional sources to keep adequate water available.

In some areas of Oromia (e.g., Walisso) people dig wells to have their own supply even when they know that the supply may only be sufficient for a few months each year. If those months are the ones which are critical for having as much time as possible in the fields, the well is still worth having even if it does not provide water all year. Here, the idea of conjunctive use of several sources for different purposes and different times of year is again the norm, when looking at family practice in water collection and use. Future measures of coverage and service delivery may need to consider these patterns, and how different supplies may contribute to an adequate overall domestic supply.

2.5 User satisfaction

The sustainability of a service depends to a large extent on the degree to which users are sufficiently satisfied with it to be willing to cover the costs of keeping it going[7]. Over 90% of communal well management committee members and those living near the pump are happy with their supply. Of communal well sharers mostly living further from the well, 59% are satisfied with the supply, but only 9% are actively dis-satisfied with it; the rest being fairly neutral. All rope pump owners appear happy with their supply, but these were the owners of pumps which are operating, not the ones which have been waiting for several weeks or more for repairs. Traditional well users are less happy with their supply overall (82% satisfied), but those who are not satisfied lived in the Meskan *woreda*, and in particular *kebele*s where depth to water is greatest, but also where people feel most concern that open wells without covers provided contaminated water. Elsewhere 90% of users are satisfied with their supply, the other 10% being neutral.

There is therefore a high level of satisfaction with the performance of supplies that are available to the people questioned. This does not mean they are not looking to improve the service (see Section 3), but at least their approval of what they use suggests that they will be more prepared to strive to keep it functioning, than if they were mostly dis-satisfied with it.

5 See Sutton, Mamo, Butterworth &Dimtse (2011) (Table 2.6)

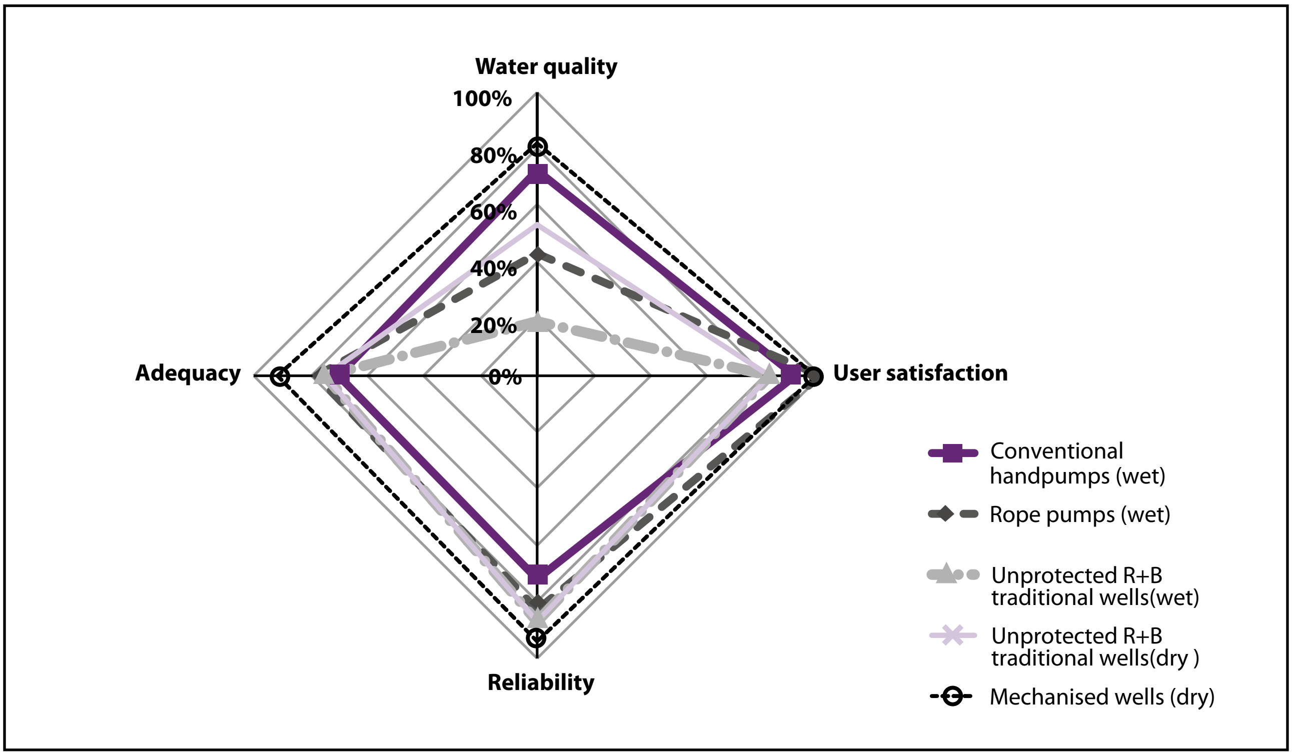
6 See Sutton, Mamo, Butterworth &Dimtse (2011) (Section 4.3).

7 Sutton, Mamo, Butterworth &Dimtse (2011).(Section 4.7).

2.6 Rating of supply performance

To compare the performance of the different supply types, the four main elements for sustainable performance are combined into scores, with a maximum of 400, and a graphic output to reflect user perspectives more fully (see Figure 2.11). They show that handpumps do provide better service than other options, but that rope pumps and even traditional family wells can offer a service that is not generally so inferior that they should easily be dismissed; especially at household level. Taking comparable data from the survey, it is apparent that since the rope pump performs better in terms of reliability, adequacy and user satisfaction than the handpump, this compensates to some degree for its lower water quality (see Table 2.5), but highlights the priority which needs to be given to improving protective measures and installation standards. Rope pump performance was only one point below that for handpumps, because of the latter's poorer reliability and user satisfaction. To depict reliability, the proportion of all installed facilities which were found functioning and providing water throughout the past five years is used (instead of the history of the last 12 months). Given this, the rope pump and conventional handpump would then fall down on this aspect (to 59% and 56% respectively), indicating the need for greater attention to better maintenance systems for both rope and conventional handpumps.

Figure 2.11 Performance rating for different supply types



Equally it is apparent that taking dry season performance of family wells with rope and bucket, the total score approaches that for handpumps and rope pumps. This suggests that more robust protection of family wells from returning surface water in the wet season, and contamination of rope and bucket may make them a suitable entry level of service for household supply.

Table 2.7 Rating scores for different source types

SUPPLY TYPE	WATER QUALITY	USER SATISFACTION	RELIABILITY	ADEQUACY	TOTAL SCORE (MAX 400)
Conventional handpumps	72%	91%	72%	70%	305
Rope pumps	43%	100%	83%	78%	304
Semi-protected traditional wells	34%	80%	68%	76%	258
Unprotected traditional wells (wet season)	19%	82%	87%	75%	263
Unprotected traditional wells (dry season)	53%	82%	87%	75%	297
Mechanised wells (Oromia)	82%	98%	94%	92%	369

DEFINITIONS

Water quality	= % age samples with low risk (deemed capable of simple improvement to zero TTC/100ml)
User satisfaction	= % age users satisfied with supply
Reliability	= % age of supplies which did not break down in the last 12 months
Adequacy	= % age of supplies providing adequate water for needs from that source
Total score is the integer sum of percentages	

The system of scoring can be refined but does begin to indicate areas that need attention and also further explanation. It also gives a more holistic view of service delivery from the user's point of view. Done on a *woreda* basis it shows where user satisfaction is compromised by lack of promotion of better lifting devices and protection for family wells, as in Meskan, and that pump maintenance systems bring down scores in Aleto Wendo, which are compensated for by better water quality. However the scoring helps to emphasise that a pump capable of producing good quality water is of little value if the supply itself is interrupted for significant lengths of time. The comparatively high score for privately-owned mechanised pumps shows the strength of private ownership combined with productive use.

2.7 General findings

1. Semi-protected family wells (ones with an apron, drainage and impermeable parapet) provide better quality water, but appear to be less reliable than unprotected wells and are about equal to handpumps. This may relate to the very specific area in which they were found (Boloso Sore), or also to the way in which they were selected, and/or in any changes implemented in the management system, which accompanied their protection.
2. Open unprotected family wells show very marked improvement in water quality during the dry season, and in several *woredas* show a high level of reliability and adequacy, combined with the possibility to use them for many different purposes. These attributes suggest that there are specific areas in which family wells could first be promoted and envisaged as a level of service, and simple improvements (semi-protection) could bring their performance rating up close to those for other supply types.
3. Most households do not rely on only one water source, so service delivery depends on the combined performance of more than one supply. The sector could take an approach that better fits this reality, focusing on the complementary nature of different service delivery models including communal sources and Self Supply.

4. Handpumps do provide a supply which is generally strong in all the aspects of performance and delivery, but reliability is jeopardised in some *woredas* by poor maintenance systems, and use is generally confined to only a part of the domestic demand for water. User satisfaction however is high because people generally have relatively easy access to other water sources to complete the 15 lpcd estimated total requirement.
5. Where people are being called upon to spend their own limited resources on water supply improvement, cost-effectiveness is important and should be viewed from the household point of view if changes are to be promoted.

2.8 Conclusions on benchmarking

1. The performance of traditional wells mounted with mechanised pumps for irrigation exceeds that for communal handpumps and protected springs, suggesting that those taking water from mechanised pumps even on traditional wells should also be counted in coverage figures for assessing progress towards universal access. Such wells should have an impermeable parapet, sealed top slab and an apron if water accumulates around the well.
2. Rope pump water quality and reliability are both weak at present, but have the potential for improvement. User satisfaction is very high among those who have the necessary links to keep their pumps working. Properly installed rope pumps should count towards **coverage**. In SNNPR (except Aleta Wendo), installation is at present generally sub-standard. Guidelines and re-training are needed.
3. At household level, traditional wells with adequate impermeable apron and parapet (semi-protected) should count towards coverage. New simple standards using minimum cement need to be developed as prototypes for training and promotion purposes. It may be possible to aim at achieving a household level for a water quality profile of <10 TTC/100ml initially in 50% of cases, but aiming for 90% to meet that low risk standard within five years.
4. In terms of effect on coverage statistics, the inclusion of mechanised pumps on traditional wells as an acceptable level of service is proposed above. This would significantly increase coverage in some areas. As an example, in Haramaya and Kombolcha, just including the 50 surveyed wells with mechanised pumps would increase coverage by 11-12% in the eight selected *kebele*s. Actual increases would be higher, since not all pumps were included. Assuming the surveyed *kebele*s have average coverage for the *woreda*, then actual coverage would rise from 59-71% in the surveyed *kebele*s of Haramaya, and 35-47% in Kombolcha.

Including diesel pumps in coverage (as available volumes of water and quality suggest is justified) can significantly raise coverage figures in areas where high value cash crops are being grown and irrigation is promoted. Such examples may encourage the sector to promote similar household investment and include supplies in inventories. It is also apparent that linking more to agricultural initiatives for raising productivity and access to water could make a major difference to progress in coverage, especially if better headworks' protection could be simultaneously promoted.

2.9 Key discussion points and suggested recommendations

2.9.1 Should household water quality standards be more flexible than community ones?

If food production is taken as an example of private versus public standards, it is normal that the rules in the family kitchen are set by the household head and/ or the senior woman in the family. Government provides guidelines and advice on food safety and dietary principles, but it is up to the family whether they chose to adopt these. However once one moves to providing food for profit or at least for payment, then government takes on a regulatory role including inspection, certification, etc., just as would be appropriate for utility and community water supplies. As in general government does not have the capacity even to monitor these public supplies regularly, it is not realistic or politic to suggest that household supplies should, at present, be covered by anything more than advisory guidelines promoted through the different members of the WASH Memorandum of Understanding (WASH MoU). These guidelines should seek to bring household water supplies to progressively higher levels of performance.

Recommendations:

1. Practical improvements to existing and new family wells should be encouraged to bring the majority to a state in which water contains <10TTC/100ml, which is considered as a low risk by WHO. Further improvement would depend on the prevalence of household water treatment.
2. Guidelines on improvements to wells, site hygiene and water collection and storage practices should be developed and provided, with training, to relevant BoWE and health *woreda*, as well as *kebele* offices.
3. Guidelines on household water treatment and improved availability of filters or chlorine products are necessary for all households who do not have a tap in the house.

2.9.2 Should rope pumps be considered an acceptable level of service?

At present most rope pumps (if not all) have been installed without due consideration of protective measures to ensure good water quality and reliability (see Sections 2.2.2 and 2.3.2). *Could they do better and if so, how?*

Recommendations:

1. Minimum low-cost installation guidelines should be developed and shared with the IDE and the Ministry of Agriculture to reach a common norm for any wells which will be used for domestic, multiple uses. Such guidelines should include installation of top slab above ground level, on a relatively impermeable mound, or at least one concrete ring with an apron and drainage.
2. Registration, training and certification should be mandatory for all pump manufacturers and installers, and their performance be monitored.

2.9.3 Should wells with a rope and bucket be an acceptable level of household supply?

Results from the survey show that it is perfectly possible to obtain water with zero (and certainly less than 10 TTC/100ml) from wells using a rope and bucket. This is easier in the dry season, which suggests that moves to decrease risks of contamination from wet dirty well surroundings and water drawing equipment can lead to low-risk supplies, and ones which are adequate for household use.

Recommendations:

Clear guidelines widely promoted and incorporated into programmes such as model houses, should include: improved sealing of the well parapet to a low-cost apron with rim; improved water drawing practices such as keeping the rope in the well not falling onto the ground; and hanging the rope and bucket in the well (not lying on the ground) when not in use. With these guidelines even semi-protected wells can form an acceptable supply. However care must be taken that promoting such changes does not weaken the power of family management and ownership, which do so much to keep traditional wells functioning.

2.9.4 Should all water supply standards do more to combine the indicators of performance which provide a more complete picture of the quality of all aspects of service delivery?

A source which provides safe water but is not reliable is no more valuable than one which provides a low-risk supply 365 days a year. There is a need to provide a monitoring system, which balances the various aspects of a supply service, indicating the problematic elements, as well as the threats to sustainability. This may not be done for all supplies, but systematic studies of representative systems can help in the development of guidelines for all. The two studies carried out by UNICEF and RiPPLE are a first step in this process.

Recommendations:

1. More information should be collected, especially on the performance of the lower end of the technology ladder so that, over time simple measures could be introduced to monitoring in a standardised fashion, and to provide a more complete measure of service delivery.
2. National inventory, such as the Demographic Health Survey (DHS) and the Multiple Indicator Cluster Survey (MICS) should include any source used for drinking, and do so in such a way that progressive improvements can be identified.

3. UNDERSTANDING THE DEVELOPMENT AND USE OF FAMILY WELLS

3.1 The history of household initiatives in water supply in SNNPR and Oromia

3.1.1 'Home-grown' and externally driven initiatives

There have always been some households with particular enterprise, which have developed their own water supply, through their own initiative. In addition, on several occasions there has been an external drive by government to build on this process through campaigns to encourage more rapid progress. The first of these was the 2002 campaign to increase irrigation capacity through rainwater harvesting and construction of water storage ponds at household level. The second was the campaign for the construction of household wells, which was particularly and effectively carried out in Oromia in the period 2004-5. In the latter, the cascade training of well diggers and grouping of households to support them in their work, led to the completion of over 80,000 new traditional wells. The capacity built in well-digging has continued to be employed by new households over the ensuing years. In addition there has been a drive in agriculture to adopt the treadle pump, and in water the rope pump; both of which have not taken off in the two regions.

Whilst these campaigns were well planned, the results were not necessarily as predicted and the drive was short-lived. They therefore provide some useful lessons for any future campaign by government to encourage household initiatives. These include:

- The need to establish standards of acceptable sources to count towards coverage, and be included in monitoring (such as the national WASH inventory) before starting a campaign.
- The early building up of support services, product quality control and robust supply chains which allow sustainable progress up the technology ladder.
- A small scale start-up, in order to identify un-foreseen outcomes and obstacles, improve promotion strategies, and to give a more accurate idea of the resources needed for effectively going to scale.
- Monitoring of progress to ensure results are in line with (or exceed) predictions, identify new bottlenecks, and develop associated solutions for more effective delivery.

Resulting distribution of household water supplies

The lack of data on household level water supply makes it impossible to give an accurate picture of the extent to which household level sources and water treatment have been developed so far. The new inventory carried out in 2011 will improve the situation since it includes a question for those using their own or shared traditional wells, or rainwater harvesting for drinking water. It will however not reflect those who use their wells just to augment drinking water from other sources, and to provide bulk water requirements for washing, bathing and animal watering (an important and apparently widespread practice), as well as small scale productive uses.

What is apparent is that there are many *woredas* where Self Supply has developed to only a very limited extent or not at all, but others where it is very well developed and could already provide a level of service (e.g., semi-protected wells, rope pumps, or mechanised pumps) to include in coverage calculations. In the case of areas where it has not developed, it may be that groundwater is difficult to access, but in many cases it may be that there is just no tradition of well-digging and people are not aware or not willing to invest the effort in establishing their own supply. There are methods for assessing the physical potential for Self Supply as described by Macdonald (2012), but the main factor appears to be that demand for convenient water which is difficult to quantify. The localised distribution of similar well protection solutions (and of wells themselves) suggest the high influence of 'seeing is believing' and that copying what a neighbour has achieved is valued and plays a major part in spreading the idea.

Woredas where Self Supply is already better developed could therefore also be used as a demonstration to others of what can be achieved. By definition, the *woredas* chosen for the present study are ones where there has been significant development of family wells, and where they are used for drinking water, among many other purposes. They show what can be achieved and the possibility to move to even higher levels of service with private investment, to supplement public supplies. There are areas in Haramaya and Meskan for instance where so many houses have their own well, and some even have two; that there is no need to share. Conversely there are also areas in Kombolcha and Aleta Wendo where households which have their own wells for bulk purposes choose to go for drinking water to others nearby (protected or unprotected, but with 'better taste') which they regard as having better water for drinking.

The spread of technologies

Whilst people make their own decisions over what they can achieve in relation to water supply improvement, there is a powerful incentive to copy what others have done, especially the easily observable actions of neighbours. In this way specific characteristics have evolved for family water supplies in different areas. Some of these are regional, some *woreda* level and some are confined even to specific *kebeles* or parts of them[8]. Thus pulleys are common in Oromia, but rarely found in the *woredas* studied in SNNPR. Wells with concrete parapets, aprons and metal covers are common in Haramaya, whilst the same are mostly constructed in wood in Aleta Wendo. Most of the spreading of new ideas seems to be from house to house, so triggering this initial response is key to scaling up. Piloting of new solutions, however, needs to be accompanied by effective and sustainable responses to such ignition of interest from early on, not simply to plan later for the necessary supply chain.

3.2 Well ownership and investment

Well owners' wealth and education

It may be assumed that only the richest people can and do invest in a well, and so Self Supply does not reach the poorest or most disadvantaged. The surveys included *woreda*-specific wealth indicators which were applied to owner households and sharers. Observation was also made of house roof type. In most cases, households have also improved the roof of their house to corrugated metal, which is an indicator of wealth but also of an active desire to improve quality of life.

There is no wealth indicator for comparison between *woredas*, so ranking relates to variation within the *woreda*. However a significantly lower proportion of well owners in Kombolcha and Haramaya fall in the lowest quintile. In SNNPR over a third (37%) of well owners fall in the poorest quintile (owning none of the indicator assets), compared with 18% in Oromia. Some 26% of SNNPR well owners are in the top two wealth quintiles, and 10% in Oromia. The majority of owner households have no or only one of the wealth indicators (58% in SNNPR, 61% in Oromia). Overall these findings suggest that initiative rather than wealth might be the main enabler in constructing a well. It is also apparent that it is not so much the best educated but the most motivated who have invested in wells. Just under half of wells (42% in SNNPR, and 47% in Oromia) were owned by households whose heads are illiterate, and two-thirds have not completed primary education (87% and 58% respectively).

Overall it appears that ownership of a well is not at all confined to the richest, but that further investment in the well is linked to greater wealth, without being able to say which leads to the other. Generally greater access to water allows more income generation, and so more potential to invest in further improvements to supply and to other aspects of the household.

In terms of cultural background, the *woredas* studied which have the most cash crop production and family wells tend to be ones with high Moslem populations. It may be that to encourage progression up the technology ladder, or

8 See Sutton, Mamo, Butterworth &Dimtse (2011) (Section 3.2) and Arma Enginerring & Sutton (2010) (Table 4.7).

even onto the technology ladder, will require slightly different approaches in different cultural settings, but also some exchange visits for people to see what can be achieved with their own resources.

Capital investment in household water supply

Owning a well requires both capital expenditure in the infrastructure (initial and upgrading) and recurrent and capital maintenance expenditure to keep the well producing water. The level of owner investment depends on several factors:

- The ease of well excavation (hardness of rock, risk of caving in) and depth to reliable water;
- The amount of help or of contributions from neighbours who may also use the well;
- The amount of work the owner does him/ herself rather than contracting it out to others;
- How long ago the work was done, and what types and amounts of material and equipment were used;
- The level of technology and its maintenance needs; and
- The availability of cash within specific rural economies.

Costs incurred by well owners therefore vary enormously. They are linked not only to physical conditions but also to the 'modus operandi' that has grown up in different areas, with high value cash crops offering a particular incentive to develop higher levels of service delivery. As a result, the costs per traditional well in Meskan are almost three times those in Aleta Wendo, but ten times less than in Oromia (or perhaps half, if inflation were included) . This may be partly because a higher proportion of SNNPR wells were constructed many years ago when costs were lower, but also because wells in Kombolcha and Haramaya more often have pulleys, masonry linings and aprons. Once mechanised pumps and water storage for irrigation are included, and rates of investment reach twenty times as high (see Table 3.1).

Table 3.1 **Capital costs and labour inputs**

Average cost per woreda	Costs in ETB					
	SNNPR	TRADITIONAL ROPE AND BUCKET (R+B) WELLS			OROMIA (KOMBOLCHA AND HARAMAYA)	
Traditional wells	**Aleta Wendo**	**Boloso Sore**	**Meskan**	**Average**	**Traditional R+B wells**	**Mechanised wells**
Lifting device cost	28	49	50	42	280	3911
Materials	80	264	166	165	4484	6970
Labour	125	183	453	253	2056	2379
Total	**233**	**496**	**669**	**460**	**6820**	**13260**

Well excavation With labour input from…….	Aleta Wendo	Boloso Sore	Meskan	Average	Oromia TW	Oromia MW
Owner	3%	18%	98%	40%	70%	64%
Owner's family	0%	7%	97%	35%	34%	34%
Artisans	0%	4%	0%	1%	44%	46%
Unskilled labour	97%	77%	82%	85%	36%	28%
Other users	0%	3%	4%	2%	6%	4%

N.B. Costs have not been adjusted to current values and bearing in mind the devaluation of the Birr over time, a traditional well costing around 500ETB in 1990 would be estimated to cost five times as much (2500 ETB) in 2010.

In richer farming areas, the investment in a traditional well may exceed US$ 1000 (assuming a nominal exchange rate of 17ETB to US$ 1), but averages about 7000ETB (about US$ 400) for the well and its protection, rising to 13000ETB (about US$ 750) if a mechanised pump is installed. In poorer areas, simple well completion with minimum protection may cost only some US$ 10-40, with most work done by unskilled labour.

Most well owners in SNNPR employ unskilled labour, and in Oromia, skilled labour. Only in Meskan in SNNPR, but more widely in Oromia, do the owner and family carry out much of the work themselves, and so reduce costs. Few owners look beyond the family for unpaid inputs, as this may reduce their ownership of the supply.

Loans for well excavation and development are rare at present since micro-credit institutions and traditional savings schemes do not yet recognise water supply as a viable investment. Even where large investments are required (e.g., mechanised pumps) families tend to raise money from their savings and from selling agricultural produce. Most well owners (80%) expected to have recovered the cost of investing in a mechanised pump within one year in Oromia, and of a rope pump in SNNPR in six months. Capital expenditure (CapEx) impact can be maximised by:

a) making available micro-credit that allows bridging between one harvest and the next;
b) building more on savings schemes, both traditional and modern; and
c) establishing smaller incremental steps, which allow income generation with less initial cost, from which bigger investments are then made possible.

The rope pump may be best promoted in the beginning as an affordable interim step between rope and bucket and mechanised pumps, but one which enables small scale irrigation and so increases income for further investment.

Levels of recurrent investment in household water supply (Capital maintenance expenditure, CapManEx)
The advantage of family wells is that maintenance is simple, usually involving cleaning out the well so debris does not accumulate and dry out the well, and/ replacing/ up-grading lifting devices. Since owners themselves have sourced materials and well-diggers, masons and where relevant, mechanics, they have all the necessary contacts and knowledge of costs to carry out necessary maintenance. As a result, in SNNPR almost 75% of privately-owned wells receive regular maintenance, and almost two-thirds of Oromia wells with mechanised pumps or simple traditional wells. Cleaning out is carried out regularly (usually on an annual basis) by almost all well owners surveyed in SNNPR and by over half of those in Oromia.

On-going costs relate not only to regular maintenance but to up-grading. A quarter of SNNPR and Oromia well owners have further improved well head protection in years after well excavation, especially top lining to stabilise the well mouth, and the addition of pulleys or pumps.

Such levels of commitment both indicate continued interest to invest in the water supply, and greater probability of sustainability, which is also demonstrated in Section 2.3.

3.3 Well sharing

3.3.1 Numbers using a well

Well ownership is a very complex business, in the balance between owners and others who use the well. Most owners regard water as a privilege and a public good and so freely share their asset with neighbours.
The number of users depends on several factors including:

- Density of housing
- Availability of water in the well
- Availability of alternative supplies
- Relationship to the well owner

Almost all wells are shared (90%) in the study *woredas*, except for Elu where very many houses have their own well in the *kebele*s chosen and so some wells are used by only one household. Average user numbers are also low in Aleta Wendo where surface water is often easily available. In Meskan coverage is high but nevertheless a large number of people elect to use the family wells, probably because of their greater convenience.

Table 3.2 **Numbers of households using each well**

SHARERS	AVERAGE NUMBERS OF HOUSEHOLDS PER TRADITIONAL WELL						AVERAGE OF ALL
Aleta Wendo	**Boloso Sore**	**Meskan**	**Haramaya**	**Ada-a**	**Elu**	**Kombolcha**	
5.9	21.8	15.3	14	6.1	4.1	15	11.7
	AVERAGE NUMBER OF HOUSEHOLDS PER WELL TYPE						
Well types	**Traditional well**	**Rope pump**	**Handpump**	**Mechanised well**			
	4-20	6.3	56	21			

As a result most household wells act as a mini-communal supply with private management but communal usage. Improvements made to such wells can therefore benefit not only the investing family but also many neighbours.

3.3.2 Seasonal variations

People who may have less reliable sources of their own may gravitate to perennial sources in the dry season, increasing the numbers using them. Conversely, in the wet season, those with the most turbid water (as in parts of Boloso Sore, Meskan and Elu) may opt to move to a clearer source (especially if wishing to chlorinate water). There is therefore a dynamic to sharing which varies throughout the year.

3.3.3 Limitations to access[9]

Most well owners felt that anyone can always use the well (70% SNNPR, 78% Oromia). Constraints mentioned by the others related mainly to times of water shortage when numbers might be restricted to conserve the supply. Some well users mentioned the necessary behavioural practices in water collection, which meant that people might be excluded if they are not prepared to conform. In general there does not appear to be a barrier to water use, as it is regarded a public good. However it is generally only the well owner who will use the supply also for non-domestic, productive uses such as animal watering and crop irrigation.

3.3.4 Relationship between owner and sharer

In most *woredas*, well owners share equally with relatives and with others beyond the family. In Meskan, however, because of larger family sizes it is more common to confine use to those within the extended family, perhaps because of the high number of users and the availability of alternative sources. In SNNPR, only one owner requires regular payment from those sharing the supply. This is a rope pump owner who has many sharers (over 150 households) and so, higher maintenance costs are incurred and there is a desire also to limit the number of users. In Haramaya, charging for water from a traditional well is mainly restricted to areas where the nearest alternative is a piped supply with water charges, and among mechanised pump owners where 40% have instituted regular payment to cover fuel costs. Water from family wells is therefore generally free of charge to neighbouring households, unless there are high recurrent costs or a tradition is already established for payment for water. Otherwise it is difficult for a well owner to ask family members and other neighbours for payment. This may change as regular payment for community supplies and water from mechanised

9 See Sutton, Mamo, Butterworth &Dimtse (2011) (Sections 4.2.3 and 4.6) and Mekonta (2011) (Section 3.2)

pumps becomes better established. Lower levels of family well construction do not, therefore, usually provide a direct return to owners for their investment from those who use it.

Whilst there may be no regular payment by the sharer to the owner, the former is usually willing to contribute in some way towards maintenance, if requested. This may be in labour, materials or providing food to those doing the work. This is mostly an 'ad hoc' arrangement called upon only if the owner feels a need for help. Generally he or she will solve problems on their own, and so there is rarely even a requirement for 'one off' payments. About one third of owners ask for help in kind for maintenance, but there is seldom any cash requirement from users. The down-side of this is that investment beyond well excavation, into improved lifting devices (pulleys and pumps) involves owners in higher capital and recurrent costs from which there is only a return if they are used for irrigation. More households come to use a well with a pump (rope, hand or mechanised pump) because it is seen as providing cleaner water, so wear and tear may increase, but usually without any financial benefit to the owner.

3.4 Water consumption and water use

3.4.1 Water consumed in the house

The National Standard for water consumption is 15 litres per head per day. This allows for drinking, cooking, bathing and washing. The measure of consumption is taken as the water carried into the house for these purposes. Table 3.3 shows that it is rare for this amount to be exceeded, except among mechanised pump users where water is plentiful and easily available. These may also be households which are better off and so can afford more storage containers in the house.

However Table 3.3 tells only half the tale. For many purposes people with water 'on the doorstep' may use water directly from a traditional source. For instance, bathing children and often also washing clothes is usually done at the source, rather than bringing water into the house. Thus low recorded consumption rates do not necessarily mean either inadequate water is used or is available. However communal supplies do not offer the same facility, being further from the house and often having rules against washing clothes or children nearby.

Table 3.3 Household water consumption of well owners and sharers

L/c/d	SNNPR			OROMIA	
	Traditional well	Rope pump	Conventional HP	Traditional well	Mechanised well
<5	28%	57%	24%	10%	11%
'6-10	49%	29%	59%	46%	28%
11-15	17%	14%	6%	28%	21%
16-20	3%	0%	12%	12%	26%
>20	4%	0%	0%	4%	15%
<10	77%	86%	82%	56%	38%
>15	7%	0%	12%	16%	40%

Additionally, a large proportion of households use more than one source, and where surface water is available women may prefer to take their washing to the water especially among handpump users. Almost half of traditional source users in SNNPR also used surface water since this avoids lifting water and also offers a social occasion on which people can meet up and chat. Rope pump owners tended to use their own water unless the pump breaks down or the well goes dry. Water usage is not fixed. Some days women will collect drinking water from their own well as they are in a rush, but other times they may go to the handpump or mechanised well which is further away, because guests are coming or for a large variety of other reasons. People with their own supply tend to use it in preference to other sources because of its convenience, but a traditional well owner with a nearby mechanised pump may choose to take drinking water from that source, as it is (justifiably) regarded as safer.

3.4.2 Multiple purposes of water use

The purpose for which different source types are used depends on the ease of abstracting water, the pressure of demand on the water point, the perceived water quality, and the convenience of the supply and the rules governing its use. Sources were as far as possible selected as being used for drinking water, but a few were only used for other domestic purposes (see Table 3.4). Many other household wells exist but were not included in the study because they are not used for drinking, and so water quality would not be an issue.

Table 3.4 Uses of different source types – proportion of those surveyed

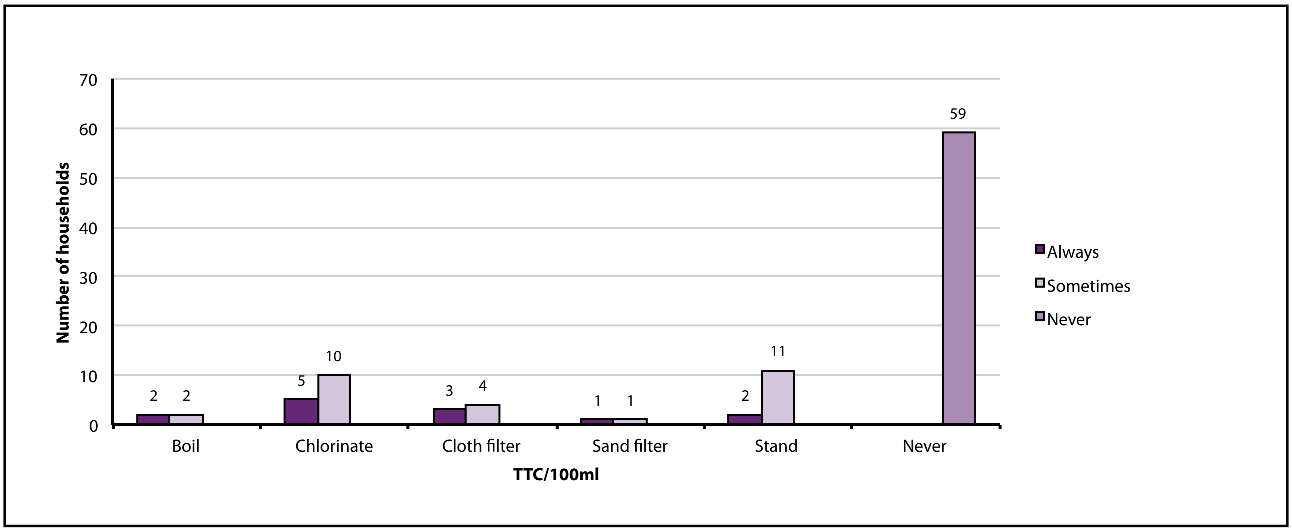
	SNNPR			OROMIA		
	Traditional well (338)	**Rope Pump (37)**	**Community HP (47)**	**Traditional well (Haramaya 2) 3 woredas (369)**	**Traditional well 2 woredas 2011 (50)**	**Mechanised well 2 woredas (50)**
Drinking	99%	92%	100%	100%	94%	100%
Cooking	99%	97%	89%	89%	95%	100%
Washing clothes	90%	70%	15%	15%	88%	96%
Bathing	86%	49%	17%	17%	100%	100%
Watering animals	85%	54%	15%	15%	35%	88%
Irrigation	30%	43%	0%	0%	20%	16%

Almost all surveyed wells are used for drinking and cooking purposes (see Table 3.4), and only the communal handpumps are not used very much for other domestic purposes. This is thought to be because of distance and the pressure of demand on the supply, leading to long collecting times, and also the rules of usage which limit the amount of water people will take home from such sources. Private household wells are more easily used for washing and bathing, as water can be used at the site or carried home. In Aleta Wendo, with the most easily available surface water, slightly fewer households use their own groundwater for this, but take their clothes to the stream or pond.

Productive use of water is almost non-existent from communal supplies (limited to some animal watering only) whereas family wells are widely used for animal watering, especially in SNNPR, and also for irrigation. In Oromia, those who had invested in diesel or electric pumps almost all use them for animal watering, and two-thirds also use them for irrigation. This pattern of investment and water use underlines two main points. Firstly, communal handpumps do not generally contribute to productive uses of water. Secondly well ownership allows the owner to water animals more easily and so keeping larger numbers – the higher the level of investment in a lifting device, the more likelihood of the well generating income from irrigated crops. However even basic unprotected sources are often used for growing vegetables for sale or own consumption. Thus a family well can contribute to poverty reduction directly through productive water use, as well as indirectly through aspects such as time saved and improved health.

3.4.3 Source and household water treatment

Figure 3.1 **Household water treatment methods and frequency, Oromia 2 woredas (100)**



The Ministry of Health carries out chlorination of household wells during periods of water-related disease outbreak. The survey on source water quality suggests that any effect this may have had is short-lived, as untreated and treated wells had similar water quality distribution[10] Dependence should therefore be put more on treatment at household level.

Several campaigns by the Ministry of Health have led to wide awareness of household water chlorination, but very few people treat their water on a regular basis. In Oromia, 47% were found never to have treated their water and 42% in SNNPR.

Those boiling, chlorinating or filtering their water through sand or clay filters are a very small minority. Chlorine use increases if there is an outbreak of dysentery or acute water diarrhoea (AWD), but declines afterwards. It appears that so far any campaign on household water treatment (usually using Wahuagar or boiling) has not had much impact in SNNPR, and only marginally more in Oromia. Only 8% of households in SNNPR and 7% in Oromia regularly chlorinate or boil their water (see Figure 3.1). In Oromia 65% of those using chlorine products at some time had bought some themselves, but in SNNPR, only one out of 16 had done so. This is partly because free hand-outs of chlorine products

in emergencies tend to disrupt the development of more sustainable supply chains.
There are regional patterns to this which relate to where campaigns have been held to combat AWD, but also as with well structure and copying of neighbours' habits, means that in some *woredas* local practices have developed. For instance in Meskan there is a strong tradition of filtering water through cloth, which is shown to have some effect in reducing bacterial loads. This filtering reduced highly contaminated water (>100 TTC/100ml) from 23% of samples at the source to 14% in the house, and increased water with zero TTC from 9% at the source to 20% in the house. It is often a seasonal practice linked to times of highest turbidity. Greater emphasis on cloth type and washing after use might improve the efficiency of a well-established practice, whose effectiveness needs further study.

There is scope for encouraging greater use of household water treatment and it is as necessary for almost all types of water supply, both because of the high proportion of sources with some level of contamination (even of protected

10 See Sutton, Mamo, Butterworth &Dimtse (2011) (Section 5.4).

supplies) and because of contamination during transport and storage. Increasing awareness of the burdens of diarrhoea and long-term consequences are needed if household water treatment is to become more widely adopted.

3.5 Drivers and benefits of own supply

Aspects of Self Supply can be incorporated into promotion and marketing to accelerate investment and increase impact. Much can be learnt from the motivating factors which have driven existing well owners, the benefits they perceive from their efforts, and the desires, expectations and constraints faced by them and those who have yet to construct their own well.

3.5.1 Reasons for constructing a new well

The overwhelming stimulus to well construction is access to more water, particularly for the household (see Table 3.5) rather than for productive use. This stems from a wish to care for the family better and to make water more convenient. However economic aspects such as the ease of watering animals are secondary considerations, followed by irrigation needs, especially in SNNPR. Privacy is a less valued advantage.

Table 3.5 **Reasons given for investing in a well**

REASON	OROMIA	SNNPR
Convenience	29%	26%
Care of the family	38%	43%
Privacy	17%	23%
More water total	90%	93%
More domestic	54%	75%
More irrigation	27%	49%
More animal	31%	69%

Additional reasons given included distance, not having to queue, and more water and privacy for personal hygiene.

Impacts of owning a well, and of the level of technology adopted

Once the well is constructed, owners can begin to quantify the advantages and see ones they had not predicted. Initial construction of the well appears to shift most families from sub-subsistence to having year-round food security, and the addition of mechanised pumping shifts them further up the scale into selling produce and having cash to invest further, rather than just covering their costs (see Table 3.6)

Table 3.6 **Food security with well ownership and investment**

Food and income	SNNPR		OROMIA*		OROMIA
	Before well	After well	Before well	After well	After mechanised pump
Food insufficient all year	82%	1%	51%	6%	0%
Enough all year	4%	76%	49%	79%	88%
Produce for sale	3%	5%	3%	37%	61%
Save expenditure with own produce	0%	3%	13%	46%	51%
Invest earned money in other activities	1%	1%	1%	7%	49%
Aspects not possible before	0%	9%	1%	10%	0%
Sample total	**76**	**76**	**71**	**71**	**41**

* *Mechanised pumps often installed soon after well constructed*

Family wells are therefore very effective steps in development for rural households, especially where there are livestock and where there is a market for high value cash crops. Investing in water moves people up the economic ladder into higher wealth groups.

In terms of specific advantages to family members, time saving (less queuing and shorter distances) and workload reduction are important. Time saved is converted directly into more time for other works, so is not 'spare' in the sense of un-used, but allows additional activities such as better childcare and getting them to school on time. Health benefits are also widely felt, partly converted also into reduced costs of medication. Income is an obvious additional benefit, but those who do not sell their water remark instead on the improvement in social standing and respect they receive from their neighbours.

Changes wanted by owners and sharers, and user satisfaction

Generally levels of satisfaction are high with all supply types surveyed. Higher supply levels tend to bring greater satisfaction, but except where supplies are unreliable or perceived to be of very poor quality, around 90% of users are happy with the service they get. In Oromia, 98% of mechanised well owners and 88% of traditional well owners are satisfied. In SNNPR, the pattern is similar. However most people are thinking what changes they would like to make especially where wells are unprotected. It seems that there is not so much a lack of awareness of risks, but more a feeling of helplessness as to how such problems can be overcome, or at least be minimised in ways which are affordable.

In Oromia those who had reached the level of having a mechanised pump have the least felt need for further changes (20% feel no changes are wanted). Their needs are mainly relating to fencing to keep animals out, increased water storage and stabilisation of the well head, and a house connection (and so elevated storage) was mentioned by one. Those without a pump generally put an improved lifting device at the top of their list in both regions, either to have a pump or even just a pulley. In SNNPR, the lack of tradition of using pulleys or windlasses severely limits people's ability to use their wells for irrigation, as does the lack of an effective supply chain for rope pumps. In Oromia, in the surveyed *woredas*, the lack of any demonstration of rope pumps but the wide use of pulleys suggests that there may be a good demand for other water lifting devices.

Over a third of well owners identify the need to protect and stabilise the well head as a necessary step, whether as an end in itself or as an essential move before any pump can be installed.

Levels of demand and constraints

The surveys do not bring out all the aspects of potential for Self Supply acceleration. The existing willingness to invest further is not easy to measure. However asking people the proportion of costs they are willing to cover does bring out some fundamental differences. Table 3.7 ranks the *woredas* studied according to the willingness of well owners to further fund 'all' or 'most' of the changes they would like to make.

Table 3.7 **Proportion of costs of well-upgrading that owners are prepared to cover**

REGION	WOREDA	WILLINGNESS TO COVER ALL OR MOST OF COST
SNNPR	Meskan	68%
Oromia	Kombolcha	52%
Oromia	Haramaya	38%
SNNPR	Aleta Wendo	24%
SNNPR	Bolos Sore	12%

This is not to say that the long term potential is not high in the lower ranked *woredas*, but simply that there will need to be a lot more preparatory work in instilling a 'can-do' attitude and highlighting the benefits of self help even before marketing the technologies themselves. Early testing of the concept and development of promotion strategies would need to select *woredas* with high and low levels of existing initiative, but would need to accept that the time to build up a significant level of response will be longer in the latter situation.

Additionally, the changes in which owners already show interest seem to be limited by the awareness of options and their costs, and are much influenced by what they have seen others do. Lack of information and demonstrations are limiting people's ideas of how they can further develop their supplies. Information needed includes the impact that supply improvements have had on investors' lives, and may require some exchange visits to show reality on the ground.

3.6 Summary of main findings

1. Campaigns can be effective, but need careful design, testing and follow-up activities for sustainable short and long term outcomes.
2. Self Supply is not concentrated among only the richest and best educated, many poorer and illiterate families are also investing in wells.
3. Capital investment in wells ranges from as little as US$ 10-40 for the most basic traditional wells up to over US$ 750 for wells with mechanised pumps linked in part to the strength of the rural economy in the area, to which it also contributes increased revenue. However the lack of tradition in charging for water means that few, except mechanised pump owners, generate income directly from the sale of water at present.
4. Self Supply traditional wells are typically shared by groups of around 70 people, with mechanised pump users averaging 125. Community handpumps, on average, serve around 300 people. Thus a Self Supply well acts as a small community supply, managed and owned by an individual.
5. Most wells are shared freely with anyone who wants to use them, except in times of major water shortage, otherwise exclusion is rare.

6. Measured water consumption in households may be lower than national standards for household wells, but this is often because it is normal practice for well-owning families to use water for washing and bathing at or near the source, rather than carrying it back to store in the house (where measurement is taken).
7. Household wells surveyed are used for all purposes (although there are many others just used to satisfy bulk water demand – irrigation, washing, etc.)
8. Community handpumps tend not to be used to satisfy more than drinking and cooking needs, and are rarely used for productive purposes or washing/ bathing. This is because of longer queuing time, greater distance for water collection, and also cost where charges by volume have been introduced.
9. Household water treatment is rarely practised, and if it is, it is almost always on a seasonal basis.
10. Improved access to water (reduction in distance, easier water lifting with pumps) has a big effect on the rural economy, family income, food security and child welfare. However the primary driver for traditional well construction is easier availability of more water for domestic purposes.

3.7 Key discussion points and suggested recommendations

3.7.1 What can we learn from previous campaigns to be more effective?

Previous campaigns were not sustainable and their full impact is not documented. Other ministries are now undertaking campaigns relevant to Self Supply (agriculture on rope pumps and small scale irrigation, health on Household water treatment and storage [HWTS]).

Recommendations:

1. The experiences from other promotional drives of the past ten years should be analysed, and potential pitfalls for any new campaign should be highlighted and documented.
2. Links should also be made to relevant drives in other ministries to re-enforce messages, provide consistent advice, and get standards introduced which minimise contamination risks (Community-led total sanitation [CLTS], preventive health care, rural development, etc).

3.7.2 How can we better collect and present evidence of the impacts of investing in a well?

The existing studies show that a significant effect is achieved on household economy and well-being by constructing a well. This fact needs to be highlighted to policy makers and householders alike, and additional evidence needs to be collected.

Recommendation:

Institute exchange visits and further monitoring to raise awareness of the benefits, and to quantify them better
Potential and promotion of Self Supply

3.7.3 Are there differences in promotion strategies needed for encouraging Self Supply in different areas/ socio-economic situations?

If there is a continuum between people who are unaware that they can make any changes to their lives for themselves, to those who are aware but unmotivated, and on to those who are both aware and motivated – the process of triggering actions and building up Self Supply investment may be different for each. The contrast between Boloso Sore where most people expected everything to be done for them, and Kombolcha where most people were already prepared to solve their own problems, illustrates this point.

Recommendations:

1. Promotion strategies should be designed with specific socio-economic situations in mind.
2. Planning should allow for differences in time before results are expected on the ground, depending on existing motivation of family decision makers, and the variable needed to develop a 'can do' mentality.

3.7.4 Should well owners be encouraged to charge for water?

Charging for water may or may not be desirable. If it is appropriate, how could councils/ WASH committees best support owners in this move away from tradition, without upsetting good relations in the community?
Charging for water is slowly becoming established for community supplies but in general the economic value of water is not recognised. Should those who have invested be able to make a small return on the investment, and can this be done without alienating neighbours and family, or should this wait until charging for community supplies is well-established and water is more widely recognised to always cost something?

Recommendations:

1. Attitudes to payment and effectiveness of charging systems in community supplies need to be better understood, as does the degree to which the poorest becomes excluded when payment is instituted.
2. Charging should not be obligatory since many well owners regard their supply as a service to their community. However ways could be developed to make the opportunity easier to exploit, if owners will want a return from their investment.
3. If charging for water, well owners should then be subject to a regulatory system with sufficient capacity (capacity is currently inadequate even to cope with existing community supplies and these should come first).

3.7.5 What is the view of government staff at different levels about Self Supply and how will this affect acceleration?

Whilst there is very good understanding of Self Supply by those at national and regional level who have most been involved in the discussions and studies, most politicians, sector professionals, and those in allied sectors (health, agriculture, MoFED etc.) are not aware of the degree to which people have already helped themselves through Self Supply, nor are they aware of the potential to expand on this. Among all there is a deep concern about water quality which over-rides user-perceived advantages in accessibility, reliability or conjunctive use. There is also a strong belief that water supply is the responsibility of government, and a need to provide it universally and equitably. There is therefore a need to collect and discuss evidence of the benefits and equity issues of Self Supply, from existing systems and action research on improving protection.

Recommendations:

1. Additional evidence should be collected whenever possible – on water quality, reliability, adequacy, user satisfaction, drivers and impact of change – and to learn as much as possible from whatever of relevance already exists in Ethiopia and beyond.
2. There is need to explore attitudes and develop advocacy materials and a communication strategy to increase awareness of Self Supply, its benefits, potential and limitations in a way which highlights the advantages of the approach in solving some of the problems the public sector, politicians, private sector, non-governmental organisations (NGOs) and end-users face.

4. ACCELERATING SELF SUPPLY

4.1 Creating an enabling environment

4.1.1 Key elements

The previous sections of this report indicate widely varying levels reached in water supply technology by those who have already invested through Self Supply, but also a level of apathy among many and a feeling that there is nothing they can do to change their situation. To accelerate progress, there is therefore both a need to make it easier for people to reach further up the technology ladder but also a need for demand creation to trigger action among those who at present see no reason or no way to get started.

The way in which people copy each other but tend to reach a ceiling related to the initiative of any trend-setters suggests that information is a major constraint. People are simply unaware of the options that could be available and relevant to them. This limiting factor is linked to the fact that there is generally also a lack of private sector history in providing any but the most basic level of service in water supply. Beyond digging a well, there are few masons trained in low-cost well head protection, and few mechanics trained in pump production, installation and maintenance. In addition, whilst there are quite widely available financing mechanisms for those wishing to invest in hammer mills, irrigation systems or food processing equipment, there is usually no access to micro-credit for those who want to invest in water supply improvement.

Figure 4.1 Support needs to facilitate Self Supply

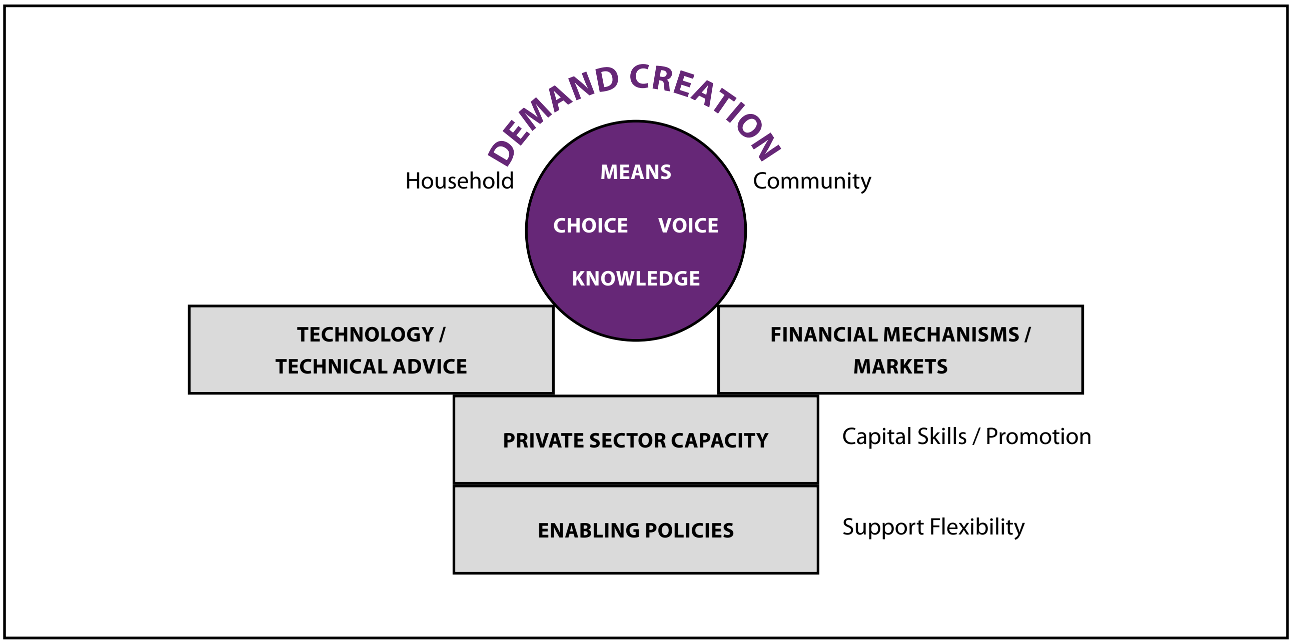


Figure 4.1 shows that alongside demand creation there are four types of support which are needed, and which the surveys show well owners and well-sharers request. It might be expected that people feel they are too poor to solve any of their problems in water supply. But the fact that there are areas where people have lifted themselves out of poverty partly through investing in improved water supply, and that many people already feel they can cover most of the cost themselves, shows that other aspects are equally important in mobilising families to improve their supplies. The farmers of Haramaya and Meskan are not so different in what they can produce. But in Meskan, mechanised pumps are only just beginning to be used, and pulleys are unheard of; yet the former are common and the latter

almost universal in Haramaya and Kombolcha. The four *woredas* surveyed in the main Oromia studies have no rope pumps, and there are very few in SNNPR; whilst in neighbouring Ziway (also Oromia) there are hundreds. Knowledge, advice which facilitates informed choice, a system which listens to and responds to people's demands, and the resources to be able to act on demand, are all essentials in helping people to feel capable to make changes in their lives. Providing these essentials requires the six elements of:

- good advisory services and wide technology options;
- a skilled, motivated and well-informed private sector;
- accessible financing mechanisms which regard water supply as a safe investment (which may also be linked to community managed funds); and
- government policies which encourage personal initiative in water supply improvement
- creating demand through promotion
- monitoring progress and learning from research

The scatter of motivated households and the level they have reached is in a small part, a result of promotion by government and NGOs, but the dominant factor is the initiative of individuals. What takes root and grows and what withers and why, need to be analysed carefully if acceleration of Self Supply is to be more successful and sustainable than previous campaigns. Creating demand is one difficult step, sustaining demand is another. This requires investment in monitoring and research, and to learn from evidence so that strategies and implementation modalities are updated and improved.

4.1.2 Strategy to introduce elements of a new approach

These six areas of support, which are all needed, do not have to be developed in isolation. The present scaling up of Community Managed Projects (CMP) and implementation of Community Led Total Sanitation (CLTS) both require similar changes to Self Supply acceleration in the way of thinking and also the development of several of the same services (including promotion, motivated private sector, skilled masons and access to revolving funds or savings schemes). Efforts to scale up household water treatment work at a similar scale could be highly complementary. Moves by the Ministry of Agriculture to scale up rope pump adoption for income generation can also provide production and maintenance capacity, as well as micro-finance which could be accessible for households investing in domestic supply improvement. They will also be developing paths for demand creation, which could be tapped into. Moves to start Self Supply acceleration in different regions and different *woredas* would need to explore the potential for such linkages and regional sector preferences, which may mean that the same template for acceleration is not adopted in all regions or *woredas*, but that flexibility is built in from the start. After a year or so, the best strategy for introduction could be scaled up.

4.2 Demand Creation

4.2.1 End-user demand

Triggering demand is a process more familiar to marketing professionals than water engineers, but it has recently become more accepted and understood through the growth of CLTS in the sanitation field. Here the driver is usually found in the shame of being seen as doing something unacceptable (open defecation). For water supply investment, it is apparent from the surveys that more positive aspects such as improved family income and well-being, convenience, status (increased respect from ones' neighbours) and being seen to value and care for the family (especially children) are all motivating factors. These added values can be used to trigger demand from households through giving examples of the changes, but perhaps most effectively in the early stages – getting those who have succeeded to meet and explain to those who are apathetic or interested, but who feel that the obstacles are too great. The pattern of copying from one's neighbour and the local spread of technologies shows that if a critical mass of change is established, the spread to others becomes self-sustaining. Thus while initial publicly-funded capital expenditure (CapEX) on demand creation and supply chain development may be significant in the early stages, in the long term, they can be reduced as the initial investments benefit a potentially rapidly increasing number of people.

End-user demand will be generated also by negative influences, such as among those who live in thinly scattered households with community supplies that may be unsustainable and at very high cost, meaning a long walk and wait to access a public supply. Equally those for whom communal supplies are inadequate in terms of reliability or limited by the pressure of too many users, difficulties encountered in taking water for productive purposes or involving long distances over which water must be carried may also motivate investments in supplies; making their lives easier and providing opportunities to generate income.

Attitude of sector professionals

Introducing a new approach which requires government leadership and backing, especially in the early stages, will not be successful if government personnel are not themselves convinced that the approach can work and can lighten their workload, without putting them out of a job. The introduction of the rope pump within MoWE has largely stood still in SNNPR and most of Oromia because sector professionals are not convinced of its value. The result is that budgets have not included adequate support to supply chain development and promotion. If these same professionals do not see the added value of encouraging Self Supply, and do not receive clear guidance on how to do it, accelerating Self Supply will also fail. They will need to be convinced of its added value to the sector before any attempt to go to scale begins.

Private sector

The private sector in Ethiopia is generally not aware that demand creation is a necessary part of establishing a new way of thinking and a new market. They think more in terms of responding to a demand, partly because they neither have the resources nor the skills to do otherwise. Those who have been forward thinking – such as the trained rope pump producers – have not been supported in developing the market, and are now mostly de-motivated by the lack of demand for their products (Sutton & Hailu 2011, Arma Engineering & Sutton 2010).

The private sector is the key to sustainable Self Supply and so needs to be fully convinced of the potential market and equipped both to expand that market and satisfy its needs. Especially with regard to rural services, where customers may be at long distances apart, most small and medium enterprises (SME) cannot cover the costs of promotion and yet keep products/services affordable (see Rope Pump studies Sutton & Hailu 2011, Arma Engineering & Sutton 2010). It is not sufficient just to build capacity in well-digging or pump production, if there is no outside commitment to support the supply chain and promotion during a period of at least three years.

4.2.2 Exchange visits

There are examples of excellence and of outstanding initiative at household and SME level which could inspire others to copy their example. Showing this to people from other areas – and to *woreda* and *kebele* officials – demonstrates the pride in and power of ownership and what this can achieve; is often the most effective starting point for awareness raising.

4.3 Capacity building

Capacity building is linked to demand creation, as it is first necessary to generate interest and demand for more knowledge and understanding. It is also necessary to identify training needs. This can partly be done during regional and national workshops on Self Supply. Capacity building without demand creation and marketing will be wasted, since the capacity formed will not be used.

4.3.1 Training and information packs

Oromia already has training materials and courses in well excavation, lining, and head works, but at present these do not include consideration of low-cost modifications or incremental steps since materials relate mainly to community supply wells constructed to national standards. These would need to be developed, as would materials to increase awareness and change ways of thinking among WASH Committees (WASHCOs), health extension workers, *kebele* and *woreda* administration. Teams who are used to planning and budgeting for specific solutions (lined wells with handpumps, hand-drilled shallow boreholes, etc.) find it hard to see how to proceed when their inputs are limited to aspects which are not easily counted, such as advising, training, marketing and monitoring. This requires a big shift in thinking but one which also presents a challenge in CLTS. Training and information packs may perhaps be combined for the two as one possible approach to introduction.

4.3.2 Private sector involvement

If the private sector is to play a major part in providing the services for implementation, there will be a need to involve interested parties in the initial awareness raising, and also to develop materials which government can use for training small scale entrepreneurs/ artisans. These would also include guidelines for best practice and certification for pump producers and quality control. *Woreda* and *kebele* offices would therefore need to assemble directories of artisans, pump producers, and advisers with mobile phone numbers, where relevant. They can then put potential investors in touch with service providers, and also circulate information on new products or methods.

4.4 Suggested roles and responsibilities

4.4.1 Stakeholders

There are four main groups of stakeholder in the introduction of a new approach such as Accelerated Self Supply. Firstly there is government who will be the main drivers of the approach, through the regional BWE, but with necessary links to other sectors such as health and agriculture. Health already promotes improved supply as a preventive health care measure, and is involved in CLTS promotion and scaling up HWTS. Agriculture through the PSNP is promoting small scale irrigation including source up-grading for easier water access and abstraction. The Bureau of Finance and Economic Development (BoFED) is implicated partly through its influence on budgets, and partly for its coordination and monitoring of NGOs. All these are further represented at *woreda* level, and in some cases down to the *kebele* level, with health being the best represented at local level.

External inputs may also be provided by NGOs and resource centres, which may assist government in the initial development of models of accelerated Self Supply and on research and learning. NGOs could also help with introduction, through their respective rural development and livelihoods programmes, especially if informed and encouraged by BoFED and partner ministries.

Private sector stakeholders include:

- traders who sell pumps, ropes, storage containers, well construction and water treatment consumables and equipment;
- small enterprises/ artisans in well, sanitary facility and ground storage construction, well head protection, drilling and masonry;
- mechanics who produce or maintain handpumps or mechanised pumps; and
- micro-credit banks and savings organisations.

Finally but most importantly there are the end-users (households) themselves who form the primary market and are the investors in and managers of supply improvement.

The division of responsibilities between these various stakeholders needs considerable discussion, and will vary over time as the balance between their inputs changes with the growth of private sector capacity and household demand.

4.4.2 Government and NGO roles

The various elements of introduction and scaling up, and the main divisions of responsibility are set out in Figure 4.2. Within this project cycle, federal and regional government would play a major role in Steps 1, 2 and 4, and local government and local private sector (initially assisted by NGOs) would focus particularly on Step 3 – the implementation strategy. End-users contracting artisans and other support service providers would cover the implementation in 3.5 and 3.6, followed by any type of demonstration needed as part of market development and innovation in the introductory phase.

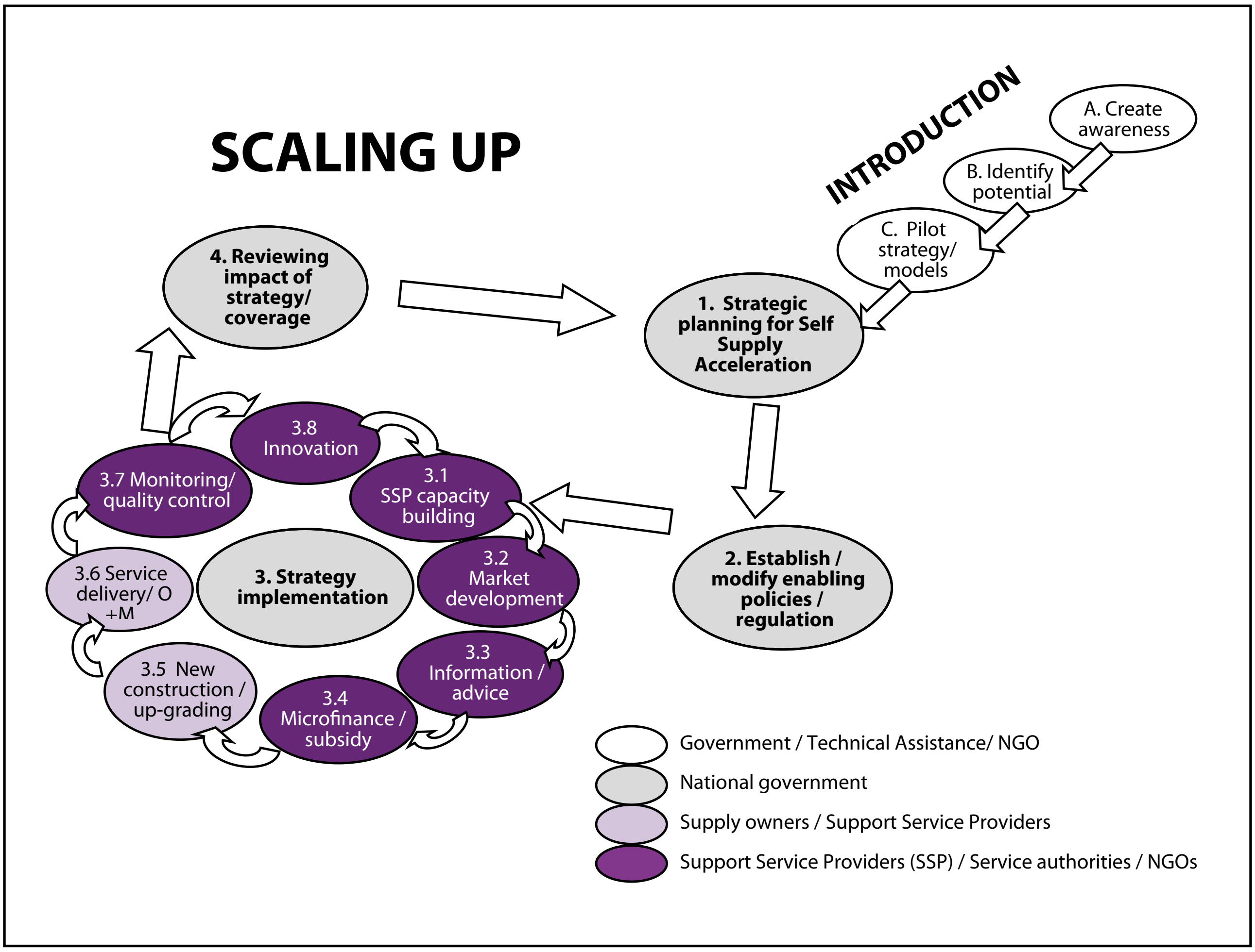
Government will initially decide on the technologies on which to focus and promote household investment, with most public funding going into capacity building and promotion. NGOs will probably also be involved in promotion, establishing training and supply chains. Ultimately, unless government is providing significant subsidies, which is not envisaged nor recommended, it must be end-users who become the main drivers of up-take, with the private sector marketing its skills and products to the end-user. Whilst there is significant initial cost for government in building up capacity and promoting household options, it is likely to be paid back many times over by the subsequent 'take-off', which makes household investment sustainable and self-perpetuating. In other countries (notably Zambia, Uganda and Zimbabwe) the investment in creating an enabling environment has in the long term required only 25-60% of the public funding needed to establish subsidised communal models to provide the hardware for small and scattered communities (Smits and Sutton, 2012; Carter, Mapalanyi and Kiwanuka, 2008).

Government role in community water supply development and maintenance is well-established, but Self Supply requires a different type of support. The new WASH implementation framework (MoWE, 2011) and the Self Supply policy guideline (Annex 1) both provide a good basis to start with. To promote and support small scale private investment in water, and to improve service, as well as increase coverage – all require different roles and strategies, at all levels of public service. Rather than mainly emphasising on planning, financing, contracting, procuring and regulating, the role of government may become more centred on promoting and marketing the concept of household supply improvements, providing information, training and micro-credit, certifying service producers and products, and ensuring healthy supply chains. These are all software aspects, which build up an enabling environment within which those who wish to can invest in better quality water supplies than they can at present achieve. The necessary public and private sector services can be partly linked to:

- the rural water supply maintenance services at *kebele* level, which government is already planning to strengthen;
- existing micro-finance institutions;
- rope pump production for productive purposes, which is planned to expand enormously; and
- health service initiatives centred on model houses and improved hygiene practices.

The details of 'who will do what' needs to be discussed within regions and within *woredas* in order to create linkages with other existing initiatives (e.g., community managed funds, CLTS, rope pump promotion, etc.).
Success of training and promotion can be measured in terms of improvements made to supplies, but cannot be planned as a specific output initially. When response has been measured in one area, the results may be used to predict outputs in terms of water supply improvements in others. Targets can then also be set with some confidence.

Figure 4.2 Summary of roles and responsibilities



Source: Smits & Sutton (2012).

At federal and regional levels the main government roles will be chiefly in the areas of:

- Promotion of water supply as an area for growth and investment, for example through:
  - Tax incentives on investment in water services
  - Information for Chambers of Commerce, recipients of remittances or of pensions, on market potential, training materials, etc.;
- Quality control standards for installations and guidelines for service;
- Research and development into reducing cost solutions and piloting of innovations;
- Setting advisory roles and developing training programmes for local government and private sector;
- Inclusion of Self Supply services into national monitoring systems and sector assessments;
- Setting policies on subsidies; and
- Regulation of the service itself, especially where Self Supply evolves into a for-profit private sector service delivery model.

The experience gained from the different approaches to rope pump introduction tends to suggest that government should encourage the growth of supply chains based on basic market principles. The inclusion of government procurement and of *woreda*, rather than local SME support to maintenance, appears to disrupt the normal relationship that grows between well-digger/ mason, pump producer/ installer and the customer which produces a sustainable network for up-grading, replacement and maintenance. This is the system built up by the IDE, which tends to encourage private initiative and a growth in the market with less (but not 'zero') need for outside intervention and funding.

Local government roles are mainly focused on:
- Coordinating the promotion of supply options and opportunities for supply development through all sectors;
- Providing technical advice and demonstration;
- Capacity building and quality control of support services – providing training in good practices and new technologies;
- Monitoring of Self Supply, but only if monitoring of community supplies is already fully implemented; and
- Contracting technical and vocational training courses for officers, artisans and traders.

These are also the roles, which may be taken by NGOs where local government does not have the human resources or capacity to undertake these functions at the necessary scale.

4.4.3 Support service providers (SSPs)

SSPs comprise the SMEs, artisans and traders who provide well-digging, well head protection, lifting devices like rope, buckets, pulleys, windlasses, pumps, water treatment equipment and consumables. Services provided will seldom make an adequate income out of water supply alone, but it can make a significant contribution towards SSP income in an environment where the rural economy offers limited opportunities.

Questions arise on how far the roles of SSPs and supply owners may overlap or replace some of those undertaken by regional and *woreda* offices of BoWE, which have developed with the present drive to introduce the rope pump. Here, the bureau is almost the sole procurer of rope pumps, passing these on or selling these to householders[11]. This division of responsibility has proven to be ineffective since the householder is not in touch with the pump producer so the householder cannot complain if a pump breaks down very quickly after installation. The householder also cannot buy spare parts and contract a local mechanic for repairs, nor encourage neighbours to buy directly without the delays that *woreda* budgeting and procurement procedures tend to cause. In general, pump producers have so far taken much of the onus of production costs on their own shoulders, without there being a consistent and effective drive by BWE offices to expand the market and build up the necessary supply chain to feed it. As a result, many pumps (more than 50%) remain in stores, at a time when demonstration units have created a demand, which is not being satisfied. Thus the relationship between stakeholders needs discussion – what each will do and how their roles fit together into facilitating an effective supply chain needs clear definition in each region – with *woreda* offices and with SSPs – so that together, some of the bottlenecks, which have arisen in the past are removed.

In general it is proposed that supply service providers will:
- Construct and protect supplies;
- Manufacture hardware and procure necessary materials/ consumables;
- Market their services and promote improvements to water supply;
- Stock items relating to water treatment, lifting and storage;
- Provide maintenance services; and
- Set prices which allow expansion of the market.

End-users/ householders

Householders and in some cases groups of households/ small communities acting together, will be the primary managers and owners of the improved supplies through their own investment in the works and equipment. These are the people who need to be convinced that improvements in their water supply will benefit their family to such an extent that it may take precedence over other calls upon their limited household budgets.

Their roles will be in:
- Asset investment, management and ownership;

11 This issue is more discussed in the rope pump reports. See Mammo (2010) and Sutton & Hailu (2011).

- Maintenance/ replacement/ up-grading;
- Promotion of benefits of their supply to others to encourage them to do likewise;
- Decisions on tariff (if any) to those who will share their supply; and
- Contracting out or undertaking works themselves.

4.5 Financing options

The studies undertaken in SNNPR and Oromia suggest both an ignorance of householders over available micro-credit organisations and within such organisations that water supply improvement – even if mainly for domestic purposes – can provide adequate economic return to cover investment. In isolated cases, use of traditional savings schemes were found to have been used to provide community contributions to water supply construction, but this aspect could also be further developed. The surveys showed that people had normally raised funds for supply improvements by selling assets, usually agricultural produce or more rarely animals, and using savings. Less than 10% had accessed a loan or obtained funding from NGOs, suggesting that to a large extent just changing people's minds over what they can achieve can unlock investment.

The experience of IDE is that people generally felt a need to borrow money for such a large investment as a rope pump, but that repayment was made in 80% of cases within six months, without additional subsidy (Sutton & Hailu 2011). NGOs subsidised selected aspects of the supply chain: centralised procurement of materials for pump production, but not procuring and marketing – but pumps were sold at the full cost of manufacture.

Availability of loans seems to act as an incentive for faster up-take, even where no substantial subsidy is involved. If the loans are to revolve, there is a need for the initial investment in seed money to start them off, but they can then be self-sustaining. At present most micro-credit organisations are not set up for administering revolving funds, but such arrangements do put more pressure on people to pay back in a timely fashion. It is aspects such as these that might be incorporated into the scaling up of Community Managed Projects (CMP), where the only subsidy to individual investment might be in covering some of the costs of managing the loan system. This needs to be discussed as part of the expansion of CMP, planned by MoWE and UNICEF. Some action research will need to be undertaken to see how accelerated Self Supply can best be incorporated.

4.6 Summary of main findings

4.6.1 Elements of acceleration

To accelerate investment in water supply, services need to be developed, which can be accessed both by those living in thinly scattered households, but also those who find the level of service offered by public systems inadequate. This requires the investment of public funds in the development of six elements - demand creation, technology options and advice, strengthened private sector, supportive financial systems and government policies all supported by monitoring, research and learning.

4.6.2 Creating demand

To create demand at household level and support within the private sector first requires understanding amongst decision makers in government, at all levels, of the added value of accelerating Self Supply. If they are not convinced, then their responsibility for initial support will be ineffective. Effective support could lead to a 'critical mass' where the market takes off as a result of peer example, rather than just being a result of promotion by government and private enterprise. At that point, further public investment becomes minimal and the initial costs will relate to a sufficient number of beneficiaries for the per capita costs to fall dramatically.

4.6.3 Building capacity

Capacity building includes both the changing of attitudes and developing new skills. The latter consists of aspects that develop markets for water supply improvement, as well as the technical ones: low-cost techniques of implementation for household level supplies, new technologies and maintenance routines. What people feel they do not know and need to know should be explored in introductory workshops, manuals and guidelines developed, where necessary.

4.6.4 Roles and responsibilities of government

The development of government roles will require an understanding of the difference between community water supply (government plans implementation, contracts and funds it, supervises and largely maintains it) and Self Supply (government only plans and funds implementation of promotion, training and monitoring, not supply construction itself). This, as in CLTS and CMP, requires changed attitudes to the devolution of more responsibilities to the end-user and the private sector, and well-developed skills in the less 'hands-on' approach of community water supply for which regional and *woreda* offices are already well-equipped.

4.7 Key discussion points and suggested recommendations

4.7.1 How best to target early adopters?

Those who first adopt a practice or develop a business are the key people to target in getting a new idea adopted. Creating the right messages to gain their interest, giving the opportunity to see results on the ground, and demonstrating new technologies are all needed to start the process.

Recommendation:

A strategy for introducing the approach should be developed for specific areas as a starting point, and to test out marketing and training materials.

4.7.2 How to develop the six key elements of accelerated Self Supply in a cost-effective fashion?

These elements require funded support in the early stages. It is important that demonstration does not lead to unrealistic expectations and a dependence on subsidy. Policies, financing mechanisms and supply chains need to be established in time to respond to growth in demand generated by demonstration and promotion by various stakeholders. There are several other government initiatives which share some of the aims of accelerating Self Supply.

Recommendations:

1. The six fundamental elements for government investment need to be developed in ways which make the best use of other initiatives, which in part have similar aims (e.g., CMP/ CDF, CLTS, model households, Productive Safety Net Programme, etc.).
2. The methodology and relative effectiveness of links to these different initiatives should be developed through action research before going to scale.

5. SUMMARY AND OUTLOOK

5.1 Summary of situation analysis and opportunities

At this stage, the country is apparently at a critical moment with respect to the role of Self Supply in WASH and economic development. On the one hand, there has been considerable progress in terms of policy development (notably the recognition of Self Supply in the new WASH Implementation Framework and the new Self Supply Policy Guideline), research findings are now available to help advance understanding of the performance of family wells developed and upgraded through a Self Supply approach, and some monitoring of family well use is now included in the National WASH inventory. However, the enabling environment for scaling up of the approach is yet to be developed, with significant gaps including a lack of understanding and mechanisms on the different role required by government, a weak private sector, and low demand from households that do not know what is possible or what can be done. Opportunities abound however: good linkages with efforts such as CMP scaling up in WASH, HWTS, CLTS and small-scale irrigation have the potential to help the water sector lead development of a highly effective and complementary mode of service delivery that enhances community water supply, and could provide an additional step towards universal access.

Looking forward, a key development needs to be found in the creation of appropriate incentives for Self Supply. Where Self Supply contributes to safe access to water – requiring decisions on benchmarking safe water access using the findings in this report – should it be included in coverage calculations, facilitated by the collection of information through the national WASH inventory. This would increase the interest of regional governments and *woredas* on the approach, and encourage them to invest, where it is appropriate. Acceptance of an appropriate benchmark is needed and could be based upon the findings on the performance of wells with mechanical pumps, wells with rope pumps and traditional wells with varying levels of protection, as discussed in this report.

To enable the scaling up of Self Supply, the WASH sector also needs to modify its planning and financing arrangements. On the one hand, Self Supply takes the burden of investment off the shoulders of government (and its development partners) because households pay for the wells, protection and pumps. On the other hand, the approach requires government to do different things, and in different ways. This includes creating the conditions for private sector to provide inputs and support services. Promotion, training, advisory and support, technology development, monitoring and research activities are all needed and will not come for free. A specific budget line must be established, so that regional governments and *woreda* offices can fund the enabling 'software' activities that they will need to undertake.

This is a 'leap of faith' for some and a challenge. All need to be convinced that overall they will receive more investment in productive infrastructure – that is used and maintained, through government spending and donor money – that creates the enabling environment rather than trying to build or fund all the water systems directly. Self Supply, and the activities required in order to go to scale will need to be shown to be cost-effective. The MoWE and water professionals at all levels also need to be convinced that Self Supply is not a threat to community water supply – but rather a complementary approach that will support their efforts – and can be delivered since it requires them to do different things that will need the development of new skills.

Attempts to scale up family wells in the past have not been entirely successful, and could not be sustained (water safety being one key issue), although huge steps in access were made in some regions such as Oromia. Showing that a Self Supply approach is possible with outcomes that are safe and complementary to community supply will require a mix of implementation at scale, monitoring, learning and adoption of approaches. Such action research should reveal the best ways to create the enabling environment, the types of partnerships needed, and how to best optimise interaction with relevant sanitation, health and agricultural initiatives to minimise additional costs for government.

5.2 Self Supply Working Group

MoWE has led the establishment of a Self Supply Working Group to spearhead efforts towards scaling up the Self Supply approach in ways that are cost effective, but also safe and sustainable. This group intends to take forward the issues raised in this report, developing a plan for required activities and leading the acquisition of resources towards its implementation. This will require an effort that engages several ministries as well as other key stakeholders at different levels from national to regional and *woreda* levels. It will also require the support of development partners providing resources, technical support and access to knowledge, such as through the Rural Water Supply Network and its own working group on Self Supply at international level.

5.3 Visions for Self Supply

One vision is that, by 2015, Self Supply:

- is making a widely acknowledged contribution to WASH sector coverage, with recognised wider economic benefits as an important engine for economic growth.
- is accelerated through a conscious strategy to improve WASH access for multiple uses by government at all levels, implementing appropriate catalysing and supporting activities under the new window for Self Supply projects.
- is a shining example of how households can lead their own development with the support of government and a growing private sector, and together with community level approaches to WASH.
- helps provide a robust safety net in the context of system breakdowns, climate change and periodic food insecurity.

At that time it is envisaged that:

- water quality will have been widely improved both through source and site hygiene improvements, as well as household water treatment, so that 70% of all rural drinking water contains zero faecal coliform and 95% less than 10.
- micro-finance will be readily available for those wishing to invest in water supply.
- more than 10% of rural and peri-urban coverage will be made through family investment.
- water supply-connected services will considered a healthy element of rural economy, with high quality products and well-developed skills.
- *Woreda* offices promote Self Supply alongside community supplies and fit necessary public investment into plans and budgets.

5.4 Next steps

The October 2011 National Workshop on Accelerating Self Supply and the Self Supply Policy Guideline have been the first of many steps needed to realise this vision. The MoWE has drafted a proposal for a Self Supply Acceleration Programme (SSAP) that further formalises the approach and defines necessary resources. The Self Supply Working Group intends to follow this up by defining more clearly what it wants to achieve, the partners and assistance needed and the steps envisaged from action research to implementation at scale. Some early steps are already being taken as part of the establishment of the SSAP. These include:

- endorsing and promoting agreed benchmarking of traditional wells;
- managing the development of technical guidelines based on benchmarking;
- engaging regions in planning for Self Supply; and
- linking various initiatives, developing household marketing approaches and promoting small scale groundwater development to build on each other's experience and adopt similar standards of supply construction for training, advisory services and implementation.

Developments over the past year and recent inclusion of a clear commitment to Self Supply within the commitments made during the Sanitation and Water for All High Level Meeting (Anon., 2012), suggest that Self Supply is now being given high priority by government, and that there is real interest to realise its hidden potential.

FURTHER READING

This report is a synthesis of the two reports:

1. Sutton, S., Mamo, E., Butterworth, J. and Dimtse, D., 2011. *Towards the Ethiopian goal of universal access to rural water: understanding the potential contribution of Self Supply.* (RiPPLE Working Paper 23) [online] Addis Ababa: RiPPLE. Available at: <http://www.rippleethiopia.org/documents/info/20110915-working-paper-23> [Accessed 5 July 2012].
2. Arma Engineering & Sutton S. 2010. (unpublished) *Benchmarking for Self Supply (Family wells)*. Addis Ababa: UNICEF.

Two related reports studying the aspects of rope pump introduction were also referred to:

1. Mammo, A., 2010. (unpublished) A*ssessment of local manufacturing capacity for rope pumps in Ethiopia*. Addis Ababa: UNICEF-United Nations Children's Fund.
2. Sutton, S. and Hailu, T., 2011. *Introduction of the rope pump in SNNPR, and its wider implications.* (RiPPLE Working Paper 22) [online] Addis Ababa: RiPPLE. Available at <http://www.rippleethiopia.org/documents/info/20110615-working-paper-22> [Accessed 5 July 2012].

A collection of reports, papers and links relating to Self Supply in Ethiopia and elsewhere is maintained by the Rural Water Supply Network. Visit: <http://tinyurl.com/selfsupply-ethiopia>

REFERENCES

Anon., 2012. *Ethiopia Country Statement for Sanitation and Water for All High Level Meeting, 20 April 2012 Washington, DC: Mobilizing Political Prioritization for WASH.* [online] Sanitation and Water for All. Available at: <www.sanitationandwaterforall.org/files/Ethiopia_-_Statement_to_2012_HLM_EN.pdf> [Accessed 12 June 2012].

Arma Engineering & Sutton, S. 2010. *Benchmarking for Self Supply (Family wells).* Unpublished report (December 2010). Addis Ababa: UNICEF.

Carter, R., Magala Mpalanyi, J. and Kiwanuka, J., 2008. The Uganda Self Supply Pilot Project 2006-2008. [online] St. Gallen: Rural Water Supply Network. Available at: <http://www.rwsn.ch/documentation/skatdocumentation.2010-12-07.8741319757/file> [Accessed 12 June 2012].

Economist, 2011. *The lion kings? Africa is now one of the world's fastest-growing regions* [online] Available at http://www.economist.com/node/17853324

Funk, C. et al., 2012. *A climate trend analysis of Ethiopia.* (Famine Early Warning Systems Network – Informing Climate Change Adaptation Series) [online] USAID and FEWSNET/USGS. Available at: <http://pubs.usgs.gov/fs/2012/3053/FS12-3053_ethiopia.pdf> [Accessed 18 June 2012].

Macdonald, D.M.J., 2012. *Towards a regional assessment of Self Supply potential in SNNPR.* (RiPPLE Working Paper). Addis Ababa: RiPPLE.

Mammo, A., 2010. (unpublished) *Assessment of local manufacturing capacity for rope pumps in Ethiopia.* Addis Ababa: UNICEF-United Nations Children's Fund.

Mekonta, L. 2011. Self Supply potential and upper ladder household investment: the case of Haramaya and Kombolcha *woredas*, Oromia. RiPPLE working paper. RiPPLE, Addis Ababa.

MoFED – Ministry of Finance and Economic Development, 2010. *Growth and Transformation Plan (GTP) 2010/11-2014/15.* Draft report September 2010. Addis Ababa: MoFED.

MoWE – Ministry of Water and Energy, 2011a. *Revision of UAP (water) draft report.* Ababa: MoWE.

MoWE – Ministry of Water and Energy, 2011b. (unpublished formats for data collection) *National Water Supply, Sanitation and Hygiene Inventory.* Addis Ababa: MoWE.

MoWE – Ministry of Water and Energy, 2011c. *National WASH implementation framework.* (Draft report April 2011) [online]. Addis Ababa: MoWE. Available at: <http://www.mowr.gov.et/index.php?pagenum=10> [Accessed 13 September 2011].

MoWR – Ministry of Water Resources, 2002. Ethiopian Specification for Drinking Water Quality. Ministry of Water Resources, Addis Ababa.

MOWR – Ministry of Water Resources, 2009. *Review of Rural Water Supply Universal Access Plan Implementation and Reformulation of Plans and Strategies For Accelerated Implementation.* Addis Ababa: MoWR.

Plan International, 2006. *Action Research for Scaling up Community-managed Water Supply and Sanitation Services in*

Shebedino Wereda, Sidama Zone of SNNPR: Assessment of drinking water quality in Shebedino wereda. Hawassa: Plan International.

Smits, S. and Sutton, S., 2012. *Self Supply: the case for leveraging greater household investment in water supply.* (Building blocks for sustainability series) The Hague: Triple- S and IRC International Water and Sanitation Centre.

Sutton, S. and Hailu, T., 2011. *Introduction of the rope pump in SNNPR, and its wider implications.* (RiPPLE Working Paper 22) [online] Addis Ababa: RiPPLE. Available at: <http://www.rippleethiopia.org/documents/info/20110615-working-paper-22> [Accessed 12 June 2012].

Sutton, S., Mamo, E., Butterworth, J. and Dimtse, D. 2011. *Towards the Ethiopian goal of universal access to rural water: understanding the potential contribution of Self Supply.* (RiPPLE Working Paper 23) [online] Addis Ababa: RiPPLE. Available at: <http://www.rippleethiopia.org/documents/info/20110915-working-paper-23> [Accessed 12 June 2012].

Westbury, JD. 2011. *Evaluation of Potential, Benefits and Risks of Self Supply Water.* M Phil Thesis, Engineering for Sustainable development , University of Cambridge

WHO – World Health Organization, 1997. *Guidelines for drinking-water quality, volume 3: surveillance and control of community water supplies, 2nd ed.* Geneva: WHO.

WHO – World Health Organization, 2005. *Water Safety Plans: Managing Drinking water quality from catchment to consumer.* Geneva: WHO.

WHO/ UNICEF – World Health Organization and United Nations Children's Fund, 2010. *Rapid Drinking Water Quality Assessment in the Federal Democratic Republic of Ethiopia: Country report.* [online] WHO/ UNICEF. Available at: <http://www.wssinfo.org/fileadmin/user_upload/resources/RADWQ_Ethiopia.pdf> [Accessed 12 June 2012].

Workneh, P., & Sutton, S. 2008. *National Consultative Workshop on Self Supply: Report on Presentations, Discussions and Follow up Actions.* [online] Addis Ababa: Ministry of Water Resources/ UNICEF/ Water and Sanitation Programme. Available at: <http://www.rwsn.ch/documentation/skatdocumentation.2011-02-18.9979938018/file> [Accessed 12 June 2012].

APPENDIX 1: Federal Democratic Republic of Ethiopia/ Ministry of Water & Energy national policy guidelines for Self-Supply in Ethiopia

Guidelines to support contribution of improved Self Supply to the WASH GTP/ UAP (dated 27th January 2012)

Background and objective of the Self Supply guideline

Self Supply happens across the country through private initiative and investment in well construction and up-grading, spring protection, rainwater harvesting, and household water treatment and storage (HWTS). Some Self Supply initiatives are undertaken by small groups, but private ownership and shared use of groundwater sources is by far the commonest model at present, with owners wanting to keep control over their investment. This also allows them to use water for productive purposes whilst sharers (usually 10-20 households) have access to water for domestic uses, and sometimes also animal watering.

Acceleration of Self Supply seeks to speed up the process of private investment in supplies through appropriate support services. This support can leverage more funds from within communities and families to augment limited sector donor and government funding, and it is for this reason that government funds are mainly needed. Acceleration seeks to remove the main barriers to private investment in water supply, notably lack of knowledge and limited availability of technical options, poorly developed support services including micro-finance and absence of clear strategies and plans. Building up demand through promotion and marketing takes time to establish sustainably, but if carefully designed can lead to exponential growth in water supplies, which continues even after the initial government investment ceases. The hand-dug well campaign in Oromia (2004-2006) showed what can be achieved but also the need to establish supply chains to encourage people further up the ladder before a campaign begins.

Government of Ethiopia, donors and implementing partners recognise the importance and the role that Self Supply can play in accelerating progress to achieve the Growth and Transformation Plan (GTP)/Universal Access Plan (UAP) goals. They built consensus that Self Supply is no longer to be considered as a stand-alone effort, but is to be embedded into government programmes and addressed in the revised sector plan and framework (the Universal Access Plan and the WASH Implementation Framework). This guideline sets out the main principles of how such embedding may be achieved by providing suggestions how to standardise the process, and set financing-, technical- and sustainability requirements of Self Supply in order to facilitate its scaled implementation in Ethiopia.

1. Definition and concept of Self Supply

The basic definition of Self Supply for Ethiopia is *'Improvement to water supplies developed largely or wholly through user investment by households or small groups of households'.* Self Supply (SS) involves households taking the lead in their own development and investing in the construction, upgrading and maintenance of their own water sources, lifting devices and storage facilities A key characteristic of Self Supply is the ladder of incremental improvements in steps that are easily replicable and affordable to users, linked when necessary to micro-finance and/or water from productive use. The water technology ladder increases in complexity and cost as one moves upwards, but also implies greater ease in accessing water and reductions in risks and levels of contamination reaching levels contributing to coverage. Steps of the ladder (from bottom to the top) are: unprotected traditional well, semi-protected traditional well, wells fitted with rope pump, wells fitted with hand pumps or those fitted with motorised or solar pumps, and many variations in between. In all, management and maintenance are based on local ownership (by individuals or groups of households).

In terms of implementing an accelerated Self Supply programme, reference is made to the endorsed future National WASH program, where Self Supply can be considered complementary to the Community Managed Project (CMP) financing modality – where actual project implementation and its financial management is carried out by the community. In case of Self Supply, community is replaced with household as the entry point, but the related Self Supply capacity building can be mainstreamed into CMP's - as well as with the CLTSH's (Community-led total sanitation and hygiene) capacity building and implementation approach. The main difference is in the modality of providing hardware subsidy, which is elaborated more in detail in section 4 'Approaches and financing strategy of accelerated Self Supply'.

Multiple Use Services (MUS) of water are facilitated by the advantage of family well proximity to the house (most are within 50 meters). Economic returns from small-scale irrigation, animal watering and crop processing may act as incentives for people to develop their own supplies, rapidly re-paying investment. Well water is also used for domestic purposes, e.g., drinking, washing, cooking and bathing. This requires support from the Health Extension Package (HEP), concentrating on preventative health actions and increased awareness of risks. Such actions include advice on diarrheal disease reduction through hygiene, sanitation and improvement to water supply, fitting in well with HWTS (boiling, disinfection with chlorine, filtering etc), safe water transport and storage, and practices associated with well siting and water drawing (e.g., washing hands before drawing water, activities around the well).

Self Supply investment is regarded as an effective strategy towards achieving 'equity' because of its low-cost technologies and approach to investment in affordable steps. Wealth and education are shown not to be a pre-requisite to investment; initiative appears to be more important. Such supplies provide small but equitable water sources and generally are shared voluntarily.

2. Recognition and counting Self Supply in terms of coverage

A lot of the contamination of family wells in Ethiopia is found to be related to poor well protection and behaviours that could be modified at relatively low cost. Few traditional wells or rope pumps were found to have properly protected headwork to avoid the return of dirty water to the well.

The inclusion of family wells which features basic protection (see below) may be justified in coverage calculations, assuming that due precautions are taken to reduce contamination[12].

Required protective measures against surface contaminants are provided in Table 1.

12 It has to be noted that many conventional supplies face the same challenges over water quality; some of the measures recommended for family wells are equally applicable to other (community) water sources.

Table 1: Protective measures against surface contamination

FORM OF CONTAMINANT TRANSPORT	PROTECTION MEASURES
Surface run-off	Well mouth kept above ground level by earth mound Drainage trench diverting run-off water away from well mouth Parapet/ well wall projecting at least 50 cm above ground level
Infiltration into upper parts of well shaft	Apron made of impermeable material and with a slope and a lip around the outer edge to guide water to drainage channel Seal between apron and parapet Lining from parapet to at least one meter below ground level Drainage from apron via single channel at least 3 m long to soak-away
Windblown or dropped debris and dirt	Lockable cover/ lid Top slab with seal to cover/ lid
Contamination from water lifting devices	Improve sealing of the well parapet to a low-cost apron Improve water drawing practices such as keeping the rope in the well from falling onto the ground Hanging the rope and bucket in the well (not lying on the ground) when not in use

Promotion of environmental sanitation, hygiene awareness, household water treatment and safe storage among community at large are an integral part of any drive for low-cost solutions for reduction in contamination.

Water quality

Thermo-tolerant coliforms are taken as the main indicators of water quality. WHO Drinking Water Quality Guidelines and the Ethiopian Water Quality Standard set zero TTC/100ml as the standard for community supplies. In order to contribute to the water supply access coverage, an improved Self Supply (family well) has to meet the Ethiopian Water Quality Standard promulgated for community water supplies, which is zero TTC/100 ml (Ethiopian Standard – ES 261:2001). Another considered indicator in terms of water quality is acceptable level of fluoride, having high prevalence and related health risks especially in the rift valley area, but a risk that is generally common to all groundwater sources and not just those that are privately financed.

Sanitary surveillance

Sanitary Surveillance provides a simple measure of the level of risk a well poses in terms of contamination. As Sanitary Surveillance is designed for conventional protected sources, it needs to be modified for non-standard installations such as family wells. A checklist is to be developed consisting of five aspects: i) well mouth protection; ii) well surround; iii) well lining; iv) lifting device; and v) environmental hygiene. Protection increases with higher scores. The well owner would provide a picture of the longer-term performance of the well, the adequacy of the supply and the level of satisfaction with it. This inventory system makes it possible to see how far a well owner has got in the ladder towards safer and more reliable water, and what steps could subsequently be promoted.

National WASH Inventory (NWI)

Efforts should be made to include Self Supply schemes into the National WASH Inventory (NWI), in the same way as traditional latrines are included, as part of the household level survey. The first roll-out of the NWI does count family wells used as main drinking source, yet they do not capture other traditional wells or the level of protection of a well. NWI incorporating Self Supply should measure performance in terms of water safety, yield and reliability in line with the JMP indicators. Additional surveys and qualitative research may focus on user satisfaction. Also, the DHS and the agricultural sector inventory can also be consulted for indications of the prevalence of (improved) family wells.

3. Acceleration of Self Supply

3.1 Potential and targets

Self Supply has significant potential in approximately half of the country where rainfall and shallow groundwater are most plentiful. Self Supply acceleration should initially be focused on the *woredas* and *kebele*s with the greatest potential based on rapid regional assessments and regional expertise. Planning should consider coverage rates in both: areas with low access to alternative communal supplies, and areas with high access but where the cost of covering the last 10% or 20% to achieve universal coverage through communal supplies is prohibitive. Self Supply can be expected to develop more rapidly where high value crops are being cultivated. To build confidence and capacity, regions are encouraged to start acceleration activities in *woredas* and *kebele*s where there is high potential and some existing knowledge about Self Supply practices exist. Self Supply options need to be embedded into sector training approaches[13].

Decisions on investment in Self Supply are principally taken at the household level so it is difficult to plan construction of water points in the same way as the development of community, *woreda* and NGO-managed projects[14]). Planned numbers of water sources per region, *woreda* or *kebele* are therefore not appropriate nor required since budgeting is based upon the cost of acceleration activities (i.e. promotion, training, technical support and partial hardware subsidy for group-led investment), and not the unit costs of water sources.

Support for accelerated Self Supply will follow the following modalities: i) where CMP is being implemented in which a segment of the community does not get sufficient/ no supply; ii) where there is high ground water potential adequate for both domestic and multiple use services are feasible but no community water services have been provided; and iii) in places where Self Supply wells are already widely in use.

Where possible, Self Supply programming will be linked to the Community Managed Projects (CMP) process or CMP-like modalities where communities are responsible for planning, funding, constructing and managing their water facility, and government's role changes from being implementer to coordinator, controller and facilitator. Depending on the availability of rainfall and shallow-ground water, where possible, Self Supply schemes shall be constructed or upgraded in those areas where CMPs are implemented, acknowledging the similar approach and requirement of capacity building of micro-finance credit institutions, establishment of revolving fund, promotion and skill-upgrading of artisans, which will support the uptake, or construction and up-grading of Self Supply facilities. It is therefore recommended that the promotion, awareness creation, as well as capacity building actions on Self Supply facilities are closely coordinated and linked with CMP awareness creation and capacity building in order to avoid overlapping and duplication. This will also help avoiding confusion if both approaches (CMP and SS) are promoted together. The same artisans or at least some of the same well-developed skills may be used for Self Supply facilities and community supplies. The artisan training of community supplies shall therefore include a section on construction and maintenance of Self Supply facilities. Finally, according to same principle the CMP management trainings at *woreda*, *kebele* and WASHCO level should include a chapter for Self Supply principles.

Additionally, there is a strong link between the envisaged acceleration of Self Supply, agriculture and CLTSH, especially in: promotion of Self Supply; encouragement of individual investment which Self Supply needs to be successful; household level promotion through market dynamics; small-scale business development and upgrading of artisan skills at low costs; direct contracting by households of small-scale entrepreneurs and private sector developers being willing to work against the 'lower' rates that individual households are able to afford in constructing their Self Supply facility; and finally sanitation training.

13 Guided Learning on Water and Sanitation (GLoWS) could be used as one of the means to facilitate the Self Supply planning at community level.

14 The four funding modalities in the WIF are: i) Community Managed Project (CMP) funding modality; ii) Woreda Managed Project (WMP) funding modality; iii) NGO-managed Projects funding modality; and finally iv) Self Supply Projects funding Modality.

Monitoring will cover 1) acceleration activities (i.e. promotional and awareness raising activities, training activities etc), 2) outcomes (i.e. supply chains and capacity developed) and 3) impacts (i.e. the numbers of upgraded or new water sources, their performance and use).

Nevertheless it is possible to set out some national targets for upgraded and new water sources and improved access through a Self Supply approach. Over the four-year period from September 2012-2015 it is anticipated that a potential planned target is 100,000 upgraded or new water sources serving approximately 5 million users. Investing in acceleration activities to build capacity and demand will mean a relatively slow start in terms of numbers of water sources leading to more rapid take up, i.e. acceleration. Initial activities will also focus on upgrading existing wells rather than constructing new wells, but rates of construction also tend to increase once people see what can be achieved.

3.2 Acceleration activities and financing

Self Supply acceleration activities aim to: 1) provide technology options and advice; 2) create demand; 3) develop capacity in the public and private sectors; and 4) facilitate access to credit.
Budgeting for Self Supply acceleration activities is undertaken at regional levels based upon the activities that are planned at regional, *woreda* and *kebele* levels, so requiring well-informed personnel at all levels to include Self Supply in plans. To promote, upgrade and accelerate Self Supply both on demand and supply sides, resource mobilisation is essential to sustain the significant software package of advocacy and promotion, development of a menu of technological options, capacity building and training, private sector development, establishment of supply chains, mobilisation of micro-credit and saving schemes, quality control and water quality surveillance.

Under the heading of Self Supply acceleration programme, the following major activities are intended:

1) **Technical options:** national (technical) guidelines will be made available during early 2012. These will consolidate best practices relating to water source construction, protection, lifting devices, treatment, storage and handling, etc. with special attention to incremental up-grading and reduced cost options for household level facilities. This will hopefully instill pride in ownership and a desire to copy or improve on what others can be seen to have done. At regional level, some adaptation of the national guidelines is anticipated. Research to fill knowledge gaps is encouraged.
2) **Creating demand:** demand needs to be created based on real commitment, since families will need to take from their household budgets to achieve change. Effective support should aim to reach a 'critical mass', where the market takes off as a result of peer example. Awareness raising and marketing activities aim to make information available (down to household level and within the private sector) about the options and support available for Self Supply. An important element is capacity building of public servants and the private sector, but additional documentation, carefully designed information campaigns and use of the media to disseminate relevant messages is essential and need to be budgeted for by *kebele*s and *woredas* (as for CLTSH).
3) **Capacity building** on Self Supply requires:
    - New roles and capacities in government to accelerate uptake given the significant differences between household-led investment in Self Supply and government-led investment in communal WASH. The approaches are complementary but new competencies need to be developed within staff at regional, zonal, *woreda*, and *kebele* levels, including Health Extension Workers (HEWs) and agricultural development agents, especially in promotion and advisory services.
    - *Woreda* Self Supply potential mapping by the *woreda* team could enable benchmarking and demand creation. The participatory-guided learning on water and sanitation – if it is rolled out everywhere – can provide the knowledge base for *woreda* WASH teams.
    - Private sector development – including Micro-Finance Institutions (MFIs) – and supply chain establishment: Activities to promote the development of private sector service suppliers such as well-digging, lining and headworks construction by artisans and masons; manufacturers and suppliers of rope pumps and other lifting devices; and suppliers of HWTS products etc. This could include support on encouraging entry of

entrepreneurs to develop the market; develop technical, marketing and small business management skills; facilitate access to credit; ensure clear standards and rules while avoiding unnecessary regulation etc., through training, workshops and visits, for example.

- Coordination between government institutions at different levels, especially water, agriculture, health, finance, etc.
- Monitoring and regulation: regions will monitor Self Supply acceleration activities, outcomes and impacts using the monitoring framework provided, and as far as possible existing data collection channels. Different approaches to regulation will be developed for household and group-led water sources. Regular impact monitoring will focus on whether upgrading is happening and new sources are being developed as per the support provided. Occasional water safety surveys will assess the risks and reliability of sources developed through a Self Supply approach.

Each Regional Water Bureau will identify a Self Supply focal person (based in the Regional WASH Management Unit), and will develop a capacity building and training plan, together with the Regional Capacity Building Unit; the latter being established in accordance with the WASH Implementation Framework (WIF) and initiated by the CMP, for government officers and private sector development. A working group or learning alliance amongst government and private sector will be developed with regular meetings, trainings and other events. It is proposed that the Regional WASH Technical Team will support and be accountable to organise learning occasions in Self Supply.

4) **Mobilisation of savings schemes and credit:** Traditional saving schemes, self help groups built around encouraging savings, revolving funds and MFIs all have a role to play in facilitating investments in upgrading and new water sources. Action is needed to make MFIs aware of the opportunities for local economic development provided by Self Supply, so that they will lend for family well development since loans required are of about the right size and the asset created is of a productive nature[15]. It is suggested to link MFIs with regional Self Supply Working Groups and/ or the Regional WASH Technical Teams.

4. Approach and financing strategy of accelerated Self Supply

The overall approach is that acceleration activities should lead to increased willingness and ability of individuals and/ or group of households to upgrade existing and develop new water sources through their Self Supply investments, and partial subsidy for group led investments. It involves encouraging and incentivising households, requiring pro-active marketing techniques, rather than simply creating awareness and providing information.

Existing experiences include both household-led investment (a widespread practice) and a joint investment by groups such as was encouraged during the hand-dug well campaign. It is recommended that both options are considered but with differing levels of support (technical and/or technical and financial as applicable), and with communities and households deciding their preferences.

In Ethiopia, two approaches in the acceleration of Self Supply are considered: i) no subsidy for individual household levels investments approach; and ii) 50 % subsidy for a group-led approach (10 and above households) to be tested in accelerating the Self Supply programme. The best practices will be expanded to many more areas based on positive outcomes.

Approach 1: No subsidy for individual households

Most Self Supply facilities are owned by individual household, i.e., private family wells. Households make their own

15 Working through and with MFIs is a main link with CMP. CMP should perhaps be able to establish revolving funds within an MFI or even at WASHCO level which would be form of initial subsidy/ seed money, albeit over a time a very small one.

technology choices and other decisions. There should be no subsidy for hardware, but technical support. Technical advice will be provided to ensure achievement of the *minimum* standard of the Self Supply facility, relating to the installation of a pump, protection of the well, sanitary lining, as well as to encourage, advice and educate on protection measures including HWTS to improve water quality. Household-led investment is supported through acceleration activities including promotion and marketing, technical support, facilitating access to credit, and private sector development. Upgrading is promoted on a continual basis by e.g., trained artisans, CLTSH and CMP experts, water technicians as well as Self Supply experts, WASHCOs, *Woreda* WASH teams and *kebele* WASH teams. Sharing of such sources is voluntary and at the owners' discretion[16], but research has indicated that it is the culture to share access to such sources without payment (typically between 12 and 20 households, the latter being mechanised wells), and this is encouraged. The evidence showed that water from traditional wells is almost always provided without charge, whereas about 40% of owners of mechanised pumps sold water to neighbours to cover the costs of fuel or power.

4.2 Partial (50%) subsidy for small group–led investments

To support acceleration of Self Supply at group level of households, it is proposed to partially subsidise group-led investment where groups jointly decide to upgrade or invest in the development of new water sources, and these sources are then owned and used by the group as 'semi-communal' schemes. A subsidy of 50% would be provided by government and partners when criteria to achieve required minimum standards are met by representatives (WASHCOs) of the requesting group of households. Details of the types of subsidy will be worked out subsequently, but subsidy may cover hardware. It is to be emphasised that subsidy is only to ensure a minimum standard of the Self Supply facility, such as the purchase and installment of a pump, proper protection of the well and lining. Additional support such as technical advice will be provided to ensure minimum standards and sustainability of the Self Supply facility. Group-led investments must include adequate protection of the water source to standards. The level reached will depend on the investors' financial capacity with or without matching funds.

Groups must be composed of a minimum of 10 households and make a written commitment towards ownership, and with rules and regulations how to share, operate and manage (including operations and maintenance, O&M costs similar as to WASHCO principles) the source at household level so as to promote upgrading of water sources and management arrangements. Group-led investment is to be implemented through and explicitly linked to the CMP process or CMP-like principles and mechanisms where money is transferred for agreed activities to the group, on the basis of a maximum of 50% grant to achieve minimum accepted standards, and required top-up group contributions.

The groups are required to submit a construction/ upgrading plan for quality check and sign off by a WASHCO / *Kebele* WASH Team as the expected number of Self Supply facilities to be upgraded or constructed is too large for *woreda* water bureaus to manage. It is suggested that *kebele* WASH Teams/ WASCHOs manage the process of group-led investment by performing technical advice, assistance, quality check and sign-off. *Kebele* WASH Teams/ WASHCOs are to ensure that subsidies are only asked for achieving 'countable' levels.

However, as acceleration of Self Supply through group-led investment follows the CMP or CMP-like process in terms of subsidy/ credit application, appraisal and approval process, *woreda* WASH teams are involved specifically through checking and regulating the process of group-led investment and subsidy ensuring that level of subsidies is only asked for achieving 'countable' levels. Here as well, it is recommended that the financing channels and procedures are tested before acceleration of Self Supply, bearing in mind that envisaged Self Supply project is part and parcel of the CMP module where households themselves will manage construction and financial management. Families always remain the owner and manager of the scheme.

16 In case of sharing the source, there should be clear models for the agreement, which is to be signed between the households. Informing about the benefits of these agreements is part of the promotion package. This will help the later conflicts of change in ownership.

The subsidy will be carefully designed to ensure that it does not interfere negatively with supply chain development. For example, bulk purchase of rope pumps for free distribution tends to break the supply chain between pump manufacturer and user, which leads to sustainability problems. The same level of subsidy could be provided using vouchers without the negative impact on the supply chain. The subsidy will be scalable and sustainable, i.e., there is regional budgetary commitment to extend the subsidy to all eligible applicants, based upon an estimate of demand over a period of at least five years.

All proposed subsidies and adherence with these requirements will be specified in the regional plan for implementation.

4.3 Summary process of promotion, investment and subsidy in Self Supply schemes

Under the "no-subsidy approach", the process of promotion and investment of accelerated Self Supply programme is the following:

i. WASHCOs, *kebele* WASH Teams, *woreda* WASH Teams, CMP/ CLTSH experts and other Self Supply experts communicate and provide information, promotion and marketing on Self Supply and options for improvement and investment for all who want to improve or construct Self Supply facilities *(Information, Education and Communication)*
ii. Households receive training from artisans (linked to CLTSH or CMP programme), and other relevant experts on Self Supply implementation, management and maintenance *(Information and Orientation)*
iii. Households build or contract out the construction of basic Self Supply facilities or upgrading of existing schemes based on the technical advice received *(Construction & Upgrading)*
iv. Supervision and certification of the upgraded/ newly constructed scheme by *woreda* WASH Teams to ensure that minimum standards are met
v. Self Supply facility or interim stage completed; inclusion of Self Supply water point in *kebele* inventory and then registration for coverage when minimum standard is reached *(Inventory)*

Under the "partial subsidy approach" (for group-led investments):

i. WASHCOs, *woreda* WASH Teams, CMP/ CLTSH experts and other Self Supply experts communicate and provide information, promotion and marketing on Self Supply and requirements for improvement and investment for all who want to improve or construct Self Supply facilities, as well as familiarise the group led household investors with the subsidy approach[17] *(Information, Education and Communication)*
ii. *Woreda* WASH Teams (WWTs) include a planned subsidy amount into their annual WASH budget for Self Supply investment as well as for operational costs related to technical assistance, capacity building, training of artisans, *Kebele* WASH Teams and WASHCOs on construction management, technical quality, sanitation, gender and operation and maintenance management, including water safety *(Planning)*
iii. Groups of households (minimum 10 households) submit their applications in similar manner as in CMP process and establish themselves by a written statement of commitment and management of the (shared) Self Supply facility, and by committing for formal registration of the WASHCO (formal registration) group of households receive training from artisans, and other relevant experts on Self Supply implementation, management and maintenance *(Information and Orientation)*
iv. WASHCO approves community group's mini-proposal for family ownership and implementation of Self Supply facility and subsidy request for upgrading/ construction *(Approval)*
v. Groups of households receive subsidy grant through a Financial Intermediary *(Credit)*
vi. Groups of households build/ upgrade the basic Self Supply facility to the required minimum standards with the received matching subsidy fund and settle their accounts with the relevant *woreda* CMP/ Self Supply officers as per the rules and regulations of the CMP/ Self Supply guideline *(Construction/ Upgrading)*

17 The self-supply concept is to be included in the CMP promotion, application preparation, desk- and field appraisal, project approval and agreement preparation training package.

vii. *Kebele* WASH Teams/ WWTs check the standard of the basic Self Supply facility built /upgraded by the household group[18] *(Quality Inspection)*

viii. Self Supply facility with minimum standard completed; registration of Self Supply water point (Inventory)

5. Institutional arrangements and strategy of SSAP: roles, synergies and collaboration

Compared to more conventional water supply solutions, Self Supply is different – with households taking over as funders, implementers, managers and maintainers; the private sector supplying related products, services and marketing; and government facilitating (also in terms of subsidy), monitoring and promoting the scheme. To accelerate Self Supply, a shift from business as usual is needed among all stakeholders.

5.1 Roles

There are four main groups of stakeholders in the introduction of this new approach (accelerated Self Supply): i) government; ii) NGOs; iii) private sector; and iv) end-users/ households.

Government: Government will be the main drivers of the approach through the regional WASH management unit and with necessary links to sectors such as finance, health and agriculture. Rather than emphasis being on planning, financing, contracting, procuring and regulating, as in conventional community supplies, the role of government may become more in researching, demonstrating, promoting and marketing household supply improvements, providing information, training and facilitating financing through micro-credits, and certifying service producers and products. This, as in CLTSH and CMP, requires devolution of responsibilities to end-user and private sector, and skills in a less 'hands-on' approach than that of community supply for which *woreda* managed projects are equipped.

At federal, regional, and zonal levels, roles will be: i) promotion for growth and investment, for example, through tax incentives on investment in water services or provide information for Chambers of Commerce, recipients of remittances or of pensions, on market potential, training materials; ii) quality control standards for installations, and guidelines for service; iii) research and development into reduced cost solutions and piloting innovations; iv) setting advisory roles and developing training for local government and private sector; v) inclusion of Self Supply services into national monitoring systems; vi) setting policies on subsidies; vii) regulation of the service itself, but only if Self Supply evolves into a for-profit private sector service delivery model; and viii) organising learning alliance and experience sharing, as well as providing awards for best performances.

Woreda WASH Teams (local government) roles are mainly: i) coordinated promotion of supply options and opportunities for supply development; ii) technical advice and demonstration; iii) capacity building and quality control of support services – training in good practices and new technologies; iv) monitoring of Self Supply, but only if monitoring of community supplies is already fully implemented; v) contracting of technical and vocational training courses for officers, artisans, traders; vii) receiving applications, appraisals and approvals of projects for financing, especially in group-led investment programmes, eligible to 30-50% government subsidy; vii) control over the issuance and usage of financial subsidies; and viii) assessing the markets, and providing updated market price information to the Self Supply clients.

NGOs: Working in partnership with Government, NGOs may help with the introduction and up-scaling of Self Supply through their rural development programmes. The roles attributed to Local Government are also the roles, which may be taken by NGOs where local government does not have the manpower or capacity to undertake these functions at

18 Kebele WASH Teams assist the Self Supply WASHCOs in application preparation, field appraisal and construction management and monitoring of all water supply schemes quality and functionality in the Kebele.

scale. NGOs could also provide collateral for financing the Self Supply scheme through Micro-Credit and may assist government in the initial development of models of accelerated Self Supply.

Private sector/ service providers/ development agents: Private sector stakeholders providing support are: 1) traders who sell pumps, ropes, storage containers, well construction and water treatment consumables and equipment; 2) small enterprises/ artisans in well, sanitary facility and ground storage construction, well head protection, drilling, masonry; 3) mechanics who produce or maintain hand pumps or mechanised pumps; 4) micro-credit banks and savings organisations; and 5) Private consultants or *woreda* Support Groups and Community Facilitation Teams (CFTs) supporting in the selection of the appropriate technology at site and quality control.

In general it is proposed that supply service providers will: i) construct and protect supplies; ii) manufacture hardware and procure necessary materials / consumables; iii) market their services and promote improvements to water supply; iv) stock items relating to water treatment, lifting and storage; v) provide maintenance services; and vi) set prices which allow expansion of the market.

End-users/ households: Finally, but most importantly, there are the end-users (households) themselves, who form the primary market and are the investors in and managers of supply improvement. Households/ small communities acting together will be the primary managers and owners of the improved supplies through their own investment in the works and equipment. They are the people who need to be convinced that improvements in their water supply will benefit their family to such an extent that it may take precedent over other calls upon their limited household budgets. Their roles will be: i) asset investment, management and ownership; ii) maintenance/ replacement/ up-grading; iii) promotion of benefits of their supply to others to encourage them to do likewise; iv) decisions on tariff (if any) to those who share their supply and selecting family members in management body which will create the rules and regulations of the owner how the water source will be operated, managed and maintained; and v) contracting out or undertaking works themselves.

5.2 Synergies and collaboration

Essentially, there are six pillars of an accelerated Self Supply programme:

1) Good advisory services and wide technology options
2) Skilled, motivated and a well-informed private sector
3) Accessible financing mechanisms, which regard water supply as a safe investment
4) Government strategies and plans, which encourage personal initiative in water supply improvement
5) Effective monitoring, evaluation and reporting
6) Research and sharing of research results

These six areas of support do not need to be developed in isolation. The present moves towards Community Managed Projects (based on Community Development Funds) and Community Led Total Sanitation and Hygiene, both require similar changes in way of thinking, and also the development of several of the same services (including promotion, motivated private sector, skilled masons and access to revolving funds or savings schemes). Efforts to scale up household water treatment and improvements in family wells can fit well into the Health Sector's promotion of improved supply as a preventive health care measure, linking with CLTSH promotion and scaling up HWTS, all with similar approaches of creating demand and changing behaviours.

There are also good synergies with approaches like MUS requiring a well-coordinated and linked accelerated programme. Agriculture, through the Productive Safety Net Programme, is promoting small-scale irrigation and so source up-grading for easier water access and abstraction. Moves by the Ministry of Agriculture to up-scale rope pump adoption for income generation provide production and maintenance capacity, and micro-finance accessible to households investing in domestic supply improvement.

BoFED's role is important partly through its influence on e.g., budgets, fund transfers, financial reporting, auditing, and partly for its coordination and monitoring of NGOs.

Synergies between the public and private domain are recommended when it comes to building up software aspects on behalf of an enabling environment. Public and private services can be linked at: i) the rural water supply maintenance services at *Kebele* level; ii) existing micro-finance institutions; iii) rope pump production for productive purposes, which is planned to expand enormously; and iv) health service initiatives centered on model houses and improved hygiene practices.

The details of who will do what needs to be discussed within regions and within *woredas* to link to other existing initiatives (e.g., community managed funds, CLTSH, rope pump promotion etc). Moves to start Self Supply acceleration in different regions and different *woredas* would need to explore the potential for such linkages and regional sector preferences, which may mean that the same template for acceleration is not adopted in all, but that flexibility is built in from the start. After a year the best strategy for introduction can be scaled up.

APPENDIX 2: Modified sanitary inspection system

Modified sanitary inspection scoring for traditional wells.
Mark with 'x' in box below nearest relevant description and/or put relevant score in last column.

Increasing protection
Decreasing risks

OBSERVATION	SCORE					
Well characteristic	**0**	**1**	**2**	**3**	**4**	**Score**
1. Well mouth						
1.1 Well mouth covering	None	Loose sheet/ plank, wood, plastic, metal	Closely fitted lid (eg. Saucepan) or wood cover	Lockable cover in impermable top slab	Sealed unit (pump)	
Mark relevant box with 'X'						
1.2 Well mouth protective wall	None	Permeable (wood/ rotten drum)	Concrete top slab, no wall	Impermable <30cm high	Impermable >30cm	
Mark relevant box with 'X'						
1.3 Level of well mouth/ wall base	Below ground level		Level with surrounding ground		Raised above ground (mound)	
Mark relevant box with 'X'						
2. Well surround						
2.1 Apron	None	Compacted soil	Wood/ cracked concrete	Impermeable <0.5m	Impermeable >0.5m	
Mark relevant box with 'X'						
2.2 Drainage channel	None	Apron/top slab with no lip to divert water	Earth channel diverts waste water away	Apron with concrete lip	Apron,lip + impermable channel >3m	
Mark relevant box with 'X'						
2.3 Soakaway	None	Waste water to plants within 3m	Wastewater to plants > 3m	Blocked soakaway	Operating soakaway	
Mark relevant box with 'X'						
3. Lining						
3.1 Length	None	Top < 1 metre BGL	Top > 1 metre BGL		Full lining impermeable	
Mark relevant box with 'X'						
3.2 Material	None	Wood / clay/ dung	Wood (close) or dry stone	Masonry with mortar	Concrete rings	
Mark relevant box with 'X'						
3.3 Seal lining and parapet	None, water can flow in		Water cannot flow in, but infiltrate below ground level		No surface water infiltration possible	
Mark relevant box with 'X'						

4. Lifting device						
4.1 Device type	Rope and bucket	R+B + pulley	Windlass.	Rope (low cost) pump	Hand/Mechanised pump	
Mark relevant box with 'X'						
4.2 Functioning	Not functioning		Functioning badly		Functioning well	
Mark relevant box with 'X'						
4.3 Hygiene (observation)	Rope and bucket on ground between drawing	Rope kept off the ground in use	Rope/ bucket hanging on post between drawing	Rope stored in well/in house between drawing	No rope and bucket needed	
Mark relevant box with 'X'						
5. Environmental sanitation						
5.1 Latrine proximity	Within 10m, uphill of well	Within 10m	Latrine within 30m		None within 30m	
Mark relevant box with 'X'						
5.2 Solid/ faecal waste	Within 5 metres of well	Within 10m, uphill of well	Within 10-30m		None within 30m	
Mark relevant box with 'X'						
5.3 Standing water	Muddy/ waterlogged within 3m	Standing water within 10m	Muddy/ waterlogged within 30m		None within 30m	
Mark relevant box with 'X'						
Maximum						0
Well characteristic	**User information** (where possible to collect)					
Tendency for collapse	Collapses frequently below water	Collapse common near surface		Needs annual cleaning below water	Never collapsed	
Mark relevant box with 'X'						
Well reliability (last 12 months)	Not functioning for >90 days	Not functioning for 30-90 days	Not functioning for 10-30 days	Not functioning for <10 days	Functioned all year	
Mark relevant box with 'X'						
Adequacy	Not enough for everyone's domestic uses		Not enough for irrigation + domestic		Enough for everyone	
Mark relevant box with 'X'						
User satisfaction	Strongly not satisfied	Not satisfied	Neutral	Satisfied	Very satisfied	
Mark relevant box with 'X'						
Water uses	Irrigation only	Bathing/washing /domestic non-potable	Drinking and other domestic purposes	drinking, domestic, animal watering	For all purposes inc animals +irrigation	
Mark relevant box with 'X'						
Maximum						0

WELL PROTECTION	KEY
0-29	Unprotected
30-58	Semi-protected
58-60	Protected
(actual cut-off needs calibration)	

This can be filled in on a sheet as shown in these examples, once enumerators are trained. This system predicted water quality slightly better than the ten-point system, but needs many more examples in order that the various factors can be weighted for better prediction. It also allows recommendations for the next stage of improvements, to be discussed with well owners.

Sample output from Haramaya

WELL CHARACTERISTIC	OBSERVATION					TOTAL SCORE	RECOMMENDATIONS
	0	**1**	**2**	**3**	**4**	Max 15 per characteristic	
1. Well mouth							
1.1 Well mouth covering				x		10	No improvement unless installing hand pump
1.2 Relationship to ground level					x		
1.3 Well mouth protective wall					x		
2. Well surround							
2.1 Apron				x		3	Apron needs extending to avoid infiltration back to well
2.2 Drainage channel	x						Apron needs a retaining lip to divert water to single outlet area
2.3 Soakaway	x						Apron needs attached drainage channel to tak water to soakaway
3. Lining							
3.1 Length				x		7	Lining length adequate to avoid infiltration of spilt water
3.2 Material					x		
3.3 Seal and wellhead				x			
4. Lifting device							
4.1 Divice type		x				6	Encourage move to rope pump or higher option
4.2 Functioning					x		
4.3 Hygiene		x					Encourage storing of rope in well, and keeping it off the ground during use
5. Environmental sanitation							
5.1 Latrine proximity					x	4	
5.2 Solid / faecal waste	x						Encourage cleaning up well site, keeping animals away (fence)
5.3 Standing water	x						Improve drainage as in 2.2 / 2.3
Total score						**30**	**Semi-protected**

Sample output from Elu

WELL CHARACTERISTIC	OBSERVATION					TOTAL SCORE	RECOMMENDATIONS
	0	**1**	**2**	**3**	**4**	Max 15 per characteristic	
1. Well mouth							
1.1 Well mouth covering		x				4	Needs well -fitting lid/cover
1.2 Relationship to ground level			x				Surround needs to be built up to avoid survace inflow
1.3 Well mouth protective wall		x					Ideally needs concrete ring or at least sound oil drum
2. Well surround							
2.1 Apron	x					0	Needs impermeable apron, or minimum of domed surround in compacted clay
2.2 Drainage channel	x						Surround should be sloped to take water to drainage channel
2.3 Soakaway	x						
3. Lining							
3.1 Length		x				2	Needs minimum of two low cost concrete rings to line > 1m below ground level
3.2 Material		x					These, or oil drum should be sealed with apron
3.3 Seal and wellhead	x						
4. Lifting device							
4.1 Divice type	x					4	Encourage move to pulley, windlass or rope pump
4.2 Functioning					x		
4.3 Hygiene	x						Encourage storing of rope in well, or on pole
5. Environmental sanitation							
5.1 Latrine proximity					x	8	If score = 1, well should not be used for drinking
5.2 Solid / faecal waste	x						Encourage cleaning up well site, keeping animals away (fence)
5.3 Standing water					x		
Total score						**18**	**Unprotected**

Self Supply involves households taking the lead in their own development, making investments in the construction, upgrading and maintenance of their own water sources, lifting devices and storage facilities. In Ethiopia, traditional or family wells are common, providing access by the owners and their neighbours to a vital resource. Yet Self Supply's contribution to providing water services is hidden. It has not been officially recognised until recently, and programmes to make it safer and more widespread are only on the drawing board. This report brings together the findings of two complementary research studies on the role of Self Supply in rural water services provision in two different regions of Ethiopia, Oromia and the Southern Nations, Nationalities, and People's Region. It aims to help fill some of the gaps in our knowledge about the existing performance of traditional wells, especially water quality, and the reasons that motivate families to build, improve and maintain their own water sources.

unicef

IRC International Water and Sanitation Centre

RiPPLE