



**Assessment and Identification of the Most
Appropriate Commonwealth African Country in which
to Pilot Icen Mobile's Rural Connectivity Solution**

Final Report

**Submitted to
Icen Mobile**

**Submitted by:
Kojo Boakye
Programme Manager
Commonwealth Telecommunications Organisation
66 Glenthorne Road
Hammersmith
London
W6 7LO
Tel: +44 208 600 3815
Mobile: +44 7961 354 705
Email: k.boakye@cto.int**

Acronyms

3G	Third Generation
ALTON	Association of Licensed Telecommunications Operators of Nigeria
CAPEX	Capital Expenditure
CAZ	Communications Authority of Zambia
CCK	Communications Commission of Kenya
CEO	Chief Executive Officer
CTO	Commonwealth Telecommunications Organisation
GIFTEL	Ghana Investment Fund for Telecommunications
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
ICT	Information Communication Technologies
ICT4DM	Information Communications Technologies for Development
IT	Information Technology
ITU	International Telecommunications Union
Kbps	Kilobytes per second
NCA	National Communications Authority (Ghana)
NCC	National Communications Commission (Nigeria)
NGN	Next Generation Networking
NGO	Non-governmental Organization
OPEX	Operational Expenditure
PC	Personal Computer
PPP	Public Private Partnership
QoS	Quality of Service
SMS	Short Message Service
USF	Universal Service Fund
USPF	Universal Service Provision Fund (Nigeria)
WiMax	World Wide Interoperability for Microwave Access

Executive Summary

In late 2008 and early 2009, the Commonwealth Telecommunications Organisation (CTO) undertook a research project on behalf of Icen Mobile, the developers of an innovative low cost, ultra-low energy GSM network solution. The project sought to identify the most appropriate African Commonwealth country in which to pilot the solution.

During the first phase of the project, the CTO team analysed existing data from all 18 African countries and formed a preliminary shortlist of six suitable countries. The shortlist was whittled down to three countries (Ghana, Nigeria and Tanzania) after numerous interviews with government and private sector stakeholders. The three were then the subject of more focused research, including the administration of in-depth user surveys. As such, the conclusions and key recommendations in this report are largely based on the views and opinions of key stakeholders and more than two hundred telephone users from Ghana, Nigeria and Tanzania.

This report's final recommendation is that Ghana is the most appropriate Commonwealth African country in which to pilot the Icen Mobile network solution.

Ghana's unique position as the only short-listed country to have five licensed GSM mobile operators indicates that its ICT sector has the levels of competition required to compel its operators to explore the use of innovative infrastructure like the Icen Mobile solution. It also provides the Icen Mobile team with the largest potential market for the solution, which is aimed at GSM operators who are looking for cost effective solutions to connect hard to reach rural areas.

Ghana has a highly developed policy and regulatory environment for increasing access in rural areas. Amongst other things, this is evidenced by its well established Universal service Fund, the Ghana Investment for Fund for Telecommunications, which is only one of five operational USF's in Commonwealth Africa. The buy-in of GIFTEL officials, who have agreed to discuss the development of the pilot with the Icen Mobile team, is a key reason why Ghana was selected.

The high levels of buy-in received from the Ghanaian public and private sector is at the crux of CTO's decisions to recommend Ghana as the most appropriate country for the pilot. Like GIFTEL, Ghana's largest mobile operator, MTN and its competitors, Tigo and Glo Mobile have confirmed they would like to hold discussions with the Icen Mobile team about piloting the technology. This interest from Ghanaian mobile operators and GIFTEL is matched by Ghana's ICT ministry and ICT regulator. Indeed, Ghana is the only country of all those short-listed to have generated significant interest and support from all stakeholders.

Like many Commonwealth African countries, Ghana has a number of socioeconomic characteristics that make it appropriate for the Icen Mobile pilot. For example, it is ranked third behind Nigeria and Tanzania in terms of the estimated absolute number of people (millions) living on less than US\$1 per day. This shows the scope for Icen

Mobile to have a positive impact upon the country's socioeconomic development, if it is successfully rolled out on a commercial scale. In addition, although it is ranked relatively low alongside other African countries, Ghana has an adult literacy and school enrolment rate of more than 50%, an important consideration for the Icen Mobile team which wishes to provide a number of data services.

In addition to recommending the most appropriate country in which to pilot the technology this report uses existing data and the findings from the user surveys to make a number of recommendations and observations that should feed into the development of the Icen Mobile business model and service offering. Amongst other things, they call on the Icen Mobile team to:

- continue developing a public access ICT terminal that can be used on its network;
- attempt to negotiate lower tariffs with operators for calls that originate on its network, especially for those that both originate and terminate on its network;
- factor the low use of voicemail into its business model and consider ways to spark demand;
- develop a caller ringback service;
- develop a range of financial services, including money transfer, insurance, microfinance and savings;
- highlight that a growing proportion of calls will be made within the solutions' 10km radius; and,
- market the solution's ultra-low power consumption as a key benefit.

Table of Contents

1. Introduction	11
2. Purpose and Objectives	12
3. Background Context.....	13
4. Methodology.....	13
5. Development of Preliminary Country Shortlist	14
5.1. Human Capital Considerations.....	16
5.2. Policy Focus on Rural Connectivity	17
5.3. Technology and Service Neutrality.....	19
5.4. The Market Players and existence of competition.....	21
6. Stakeholder views on policy and regulation	23
6.1. From the government perspective.....	23
6.2. From the operators' perspective.....	25
7. The Icen Mobile Value Proposition: Stakeholders' Views on Key Issues..	27
7.1. The basics	28
7.2. Quality of Service	29
7.3. Value Added Services: SMS	29
7.4. Value added services: Voicemail	31
7.5. Value-added services: Locally relevant content	31
7.6. The cost and utility of handsets.....	31
7.7. How the price of oil will affect rural connectivity	32
8. Development of Final Shortlist	33
8.1. Ghana.....	33
8.2. Nigeria	33
8.3. Tanzania.....	34
9. Key Stakeholder Buy-in.....	34
9.1. Private Sector Buy-in.....	34
9.2. Government Buy-in	35
10. General Assessment of User Demand	38
10.1. Survey Methodology.....	38
10.2. The sample.....	40
10.2.1. Survey locations	40
Ghana.....	40
Nigeria.....	41
Tanzania.....	41
10.2.2. Household descriptors.....	41
10.2.3. Personal descriptors.....	43
10.2.4. Comparison with National Statistics	46
Age.....	46
Level of education	48
Literacy.....	49
Occupations	50
Appliances.....	51
10.3. Livelihoods Needs	52
10.4. Communications – Patterns of Behaviour	56
10.4.1. Mobile phones	57
10.5. SMS.....	64
10.5.1. Voicemail.....	66
10.5.2. Expenditure	66
10.6. Attitudes.....	67
10.6.1. General issues.....	67
10.6.2. Phone issues	68
10.6.3. SMS issues.....	69
10.6.4. Voicemail issues.....	70

10.7.	Intentions	71
10.7.1.	Mobile phones and voice / SMS use	71
10.7.2.	Price elasticity – SMS	74
10.7.3.	Ringback facility.....	75
10.8.	Survey Findings and Conclusions	76
10.8.1.	Access and use of communications	76
10.8.2.	Content priorities	78
10.8.3.	Where to start.....	79
10.8.4.	Conclusions	80
10.9.	Supporting tables.....	81
11.	Conclusions and Recommendations for the Pilot of Icen Mobile	84
11.1.	The Most Appropriate African Country	84
11.2.	Recommendations and Observation for the Icen Business Model and Service Offering	85
11.2.1.	Phone Ownership and Usage.....	85
11.2.2.	Price Differentiation based on location	85
11.2.3.	Promotional Voicemail to catalyse a culture of usage	86
11.2.4.	Icen Call queuing/Caller Ring Back Service	86
11.2.5.	Financial Services	86
11.2.6.	Volume of calls within the 10km footprint of the Icen Mobile Network	86
11.2.7.	Impact of fluctuating oil prices	87

Table of Tables

Table 1.	Population and Poverty Demographics for Selected Countries	14
Table 2.	Mobile Subscribers and Internet Users in Target Countries.....	15
Table 3.	Human Capital Indicators in the Target Countries	16
Table 4.	Universal Service Funds in Commonwealth Africa.....	18
Table 5.	Summary of policy and regulatory environment in the 6 selected countries from the perspective of policymakers and regulatory officials	24
Table 6.	Summary of policy and regulatory environment in the 6 selected countries from the perspective of operators	26
Table 7.	Aggregate responses to “What change to the existing mobile service business model would contribute most to increase rural use and subscribership?” by country	27
Table 8.	Private sector representatives keen to meet with Icen Mobile	35
Table 9.	Government representatives keen to meet with Icen Mobile	36
Table 10.	Regulator representatives keen to meet with Icen Mobile	37
Table 11.	USF representatives keen to meet with Icen Mobile	37
Table 12.	Currency conversion factors.....	39
Table 13.	Remoteness of communities	42
Table 14.	Household assets.....	42
Table 15.	Household expenditure	43
Table 16.	Gender balance.....	43
Table 17.	Highest level of education achieved.....	44
Table 18.	Literacy by highest level of education achieved.....	44
Table 19.	First languages	45
Table 20.	Main occupation	45
Table 21.	Estimated income groupings.....	46
Table 22.	Literacy rates (can read all or most of card)	49
Table 23.	Correlation coefficients across countries and indicators.....	55

Table 24. Mobile phone users – zero expenditure	58
Table 25. Frequency of travel specifically to make a call (phone users only)	59
Table 26. Relationship between cost and frequency of travel specifically to make a call (phone users only)	60
Table 27. Need to spend money making journey to make a call by Country	60
Table 28. Weekly spend on mobile phones (phone owners)	62
Table 29. Estimated duration of calls (phone users)	63
Table 30. Estimated duration of calls (phone users) – disaggregated by types of calls	63
Table 31. Number of SMS messages sent & received (phone users)	64
Table 32. Expenditure on SMS (SMS senders)	65
Table 33. Use of SMS text services (among phone users)	65
Table 34. Estimated income and telecommunications expenditure (all respondents)	66
Table 35. Preferred means of getting in touch when person not available	67
Table 36. Preferred means of getting in touch when person not available – disaggregated by cost of journey	67
Table 37. If a line is engaged when you make a call, how useful would it be to get a ringback when it is free?	68
Table 38. Overall attitude towards SMS	69
Table 39. Overall attitude towards Voicemail	70
Table 40. Intentions – mean scores	71
Table 41. Intention to get a new mobile within the next year	72
Table 42. Intention to change use of voice calls within the next year	72
Table 43. Intention to change SMS use within the next year	72
Table 44. Correlation of attitudes with intentions	73
Table 45. Change in SMS use given roughly 50% reduction in cost	74
Table 46. Groups of SMS use (by number of SMS messages sent)	74
Table 47. Perceived value of ringback facility	75
Table 48. Correlation of attitudes with value of ringback	76
Table 49. Factors influencing demand for services	79
Table 50. Correlation coefficients – indicators relating to status	81
Table 51. Means and Non-parametric differences – Livelihood needs	82

Table of Figures

Figure 1. Extent of dependency of households on family members living elsewhere	43
Figure 2. Comparison of sample with national statistics (Rural adult) – age (Ghana)	47
Figure 3. Comparison of sample with national statistics (Rural adult) – age (Nigeria)	47
Figure 4. Comparison of sample with national statistics (Rural adult) – age (Tanzania)	48
Figure 5. Comparison of sample with national statistics (Adult) – Education (Ghana)	48
Figure 6. Comparison of sample with national statistics (Adult) – Education (Nigeria)	49
Figure 7. Comparison of sample with national statistics (Adult) – Education (Tanzania)	49
Figure 8. Comparison of sample with national statistics (Rural adult) – Occupation (Ghana)	50
Figure 9. Comparison of sample with national statistics (Rural adult) – Occupation (Nigeria)	50
Figure 10. Comparison of sample with national statistics (Rural adult) – Occupation (Tanzania)	51
Figure 11. Comparison of sample with national statistics (Rural) – Electricity & goods (Ghana)	51

Figure 12. Comparison of sample with national statistics (Rural) – Electricity & goods (Nigeria).....	52
Figure 13. Comparison of sample with national statistics (Rural) – Electricity & goods (Tanzania).....	52
Figure 14. Importance of livelihood issues (ranked by mean importance)	53
Figure 15. Intensity of use of communication media.....	57
Figure 16. Mobile phone ownership.....	58
Figure 17. Means of accessing phones	59
Figure 18. Most common types of calls (mutually exclusive) – made and received (phone users only)	61
Figure 19. Location of termination – calls made (phone users only)	61
Figure 20. Location of initiation – calls received (phone users only)	61
Figure 21. Most common types of calls made (mutually exclusive) (phone users only)	62
Figure 22. Most common types of calls received (mutually exclusive) (phone users only)	62
Figure 23. Attitude scores – general issues	68
Figure 24. Attitude scores – phone issues.....	69
Figure 25. Attitude scores – SMS issues (ranked by means).....	70
Figure 26. Attitude scores – Voicemail issues (ranked by means)	71
Figure 27. Price elasticity curves for intensity of SMS groups.....	75
Figure 28 Price elasticity curves for country samples.....	75

1. Introduction

This report presents the findings of a research project undertaken by the Commonwealth Telecommunications Organisation (CTO) on behalf of Icen Mobile, the developers of an innovative low cost, ultra-low energy GSM network solution. The project sought to identify the most appropriate African Commonwealth country in which to pilot the solution. Icen Mobile intends to use the findings of the research to inform a final decision – and prove that its technology may enable Africa to provide hitherto unconnected rural communities with voice and data ICT services.

During the first phase of the project, the CTO team analysed existing data from all 18 African countries and formed a preliminary shortlist of six suitable countries. The shortlist was whittled down to three countries (Ghana, Nigeria and Tanzania) after numerous interviews with government and private sector stakeholders. The three were then the subject of more focused research, including the administration of in-depth user surveys. As such, the conclusions and key recommendations in this report are largely based on the views and opinions of key stakeholders and more than two hundred telephone users from Ghana, Nigeria and Tanzania. The report is structured as follows.

Section 1 outlines the purpose and objectives of the research.

Section 2 describes some of the challenges to connecting rural communities and provides a brief overview of how Icen Mobile's low cost, ultra-low power network solution may meet those challenges.

Section 3 describes the methodology used to meet the objectives of the research.

Section 4 details how the preliminary shortlist of six African Commonwealth countries was developed and explains why Ghana, Kenya, Nigeria, Tanzania, Uganda and Zambia were selected.

Section 5 summarises how key stakeholders from the public and private sector view the policy and regulatory environments in their respective countries.

Section 6 provides an overview of stakeholder opinions on key issues that may have a bearing on the development of the Icen Mobile business model and the development of its service offerings.

Section 7 explains why Ghana, Nigeria and Tanzania were selected for the final shortlist of three countries

Section 8 provides the names and contact details of public and private sector officials from Ghana, Nigeria and Tanzania that have agreed to hold discussions with the Icen Mobile Team about implementing the pilot project. It also draws brief

conclusions on which of the three countries we found to be most appropriate to pilot the Icen Mobile solution, based on these discussions.

Section 9 contains the findings from the three user surveys undertaken in Ghana, Nigeria and Tanzania and draws conclusions on which country is most appropriate for the pilot, based on the survey findings.

Section 10 is the conclusion of this report and details CTO's recommendation on which country is most appropriate to pilot the Icen Mobile solution.

2. Purpose and Objectives

The primary purpose of the research project was to:

- Identify the most appropriate African Commonwealth country in which to pilot Icen Mobile's innovative low cost, low power GSM network solution.

In order to accomplish the primary purpose of the research project, the team fulfilled five main research objectives which were to:

- use secondary data concerning socioeconomic development and ICT policy and regulation to develop a preliminary shortlist of six African Commonwealth countries – from a possible eighteen – that could be deemed the most appropriate for the Icen Mobile Pilot.
- interview Key Stakeholders (policy makers, ICT regulators and mobile operators) in each of the six countries on the preliminary shortlist in order to ascertain their views on issues including the policy and regulatory environment, the use of services and other issue that may influence the development of the Icen Mobile business model, value proposition and service offerings.
- Develop a final short list of three countries, following analysis of the data collected during interviews conducted with Key Stakeholders from all six countries that made up the preliminary shortlist
- Determine the level of interest in the Icen mobile solution from government and regulatory officials from the three countries on the final shortlist
- Request expressions of interest from GSM mobile operators that chose to participate in the research project in order identify those that would be interested in holding discussions with Icen Mobile representatives
- Undertake a general assessment of rural users ownership and use of phones, as well as their potential demand for services that may be supplied through the Icen Mobile solution

3. Background Context

The recent explosion in mobile telephony across the continent is evidence of the potential for innovative mobile technology to connect the millions of unconnected Africans. The first mobile phone network was launched in Africa just over 15 years ago, yet mobile phones already outnumber fixed lines by nine to one in sub-Saharan Africa. More recently, mobile subscribership has grown an average of 52 percent per year from 2000 to 2006. However, much of this growth has been driven by mobile operators' business models which have concentrated on acquiring relatively prosperous, urban subscribers.

In recent years, urban markets have begun to saturate and become far less profitable. The rapid growth in penetration, increased price competition and the falling price of handsets have made it far more difficult to gain new subscribers and increase profits. Telecommunications operators are turning to rural communities to attract new subscribers and maintain their impressive growth rates. That being said, the challenges that had previously deterred mobile operators from extending services to rural communities are still there – but are no longer perceived as insurmountable.

The fundamental decision to roll out infrastructure for low cost connectivity to rural areas is based on a number of factors, including the size of the population in the targeted area, the potential users' levels of affordability, and the business models that will underpin the provision of services. Perceptions about the low levels of affordability in these communities have prohibited the rollout of infrastructure and services thus far, but Icen Mobile's solution can provide these poor communities with connectivity in a profitable way by reducing the cost of network expansion and usage.

Icen Mobile's low cost network extension is aimed at communities with very low average revenue per user (ARPU). Such users are often resident in highly remote communities, based on subsistence agriculture and dependent on family remittances for survival. Moreover, while individuals in such communities may not have the levels of disposable income to afford personal mobile phones and PCs, the community access point has proven itself a sustainable solution in low-income communities by enabling providers to aggregate demand for services. The Icen Access Community Terminal and Rural Access Point will allow rural users to share the cost of connectivity.

4. Methodology

The purpose and objectives for the project were achieved using a mix of quantitative and qualitative methods, including:

- analysis of existing data on ICT policy and regulation and socioeconomic development

- telephone and face-to-face interviews with key stakeholders, including ICT Ministers and ministry representatives, ICT regulators, officials from African Universal Services Funds (USFs) and representatives of mobile operators
- the administration of in-depth questionnaires with users of telephone services in unconnected or underserved rural areas of Ghana, Nigeria and Tanzania.

5. Development of Preliminary Country Shortlist

The first phase of the project involved desk-based analysis of existing data on rural connectivity in the 18 African Commonwealth countries. The analysis focused on the socioeconomic context, market need and regulatory regime of each of the 18 countries in order to identify the 6 most likely to provide a favourable environment in which to pilot Icen Mobile's network technology and services. These six, **Ghana, Kenya, Nigeria, Tanzania, Uganda** and **Zambia**, were subject to more in-depth research, detailed in later chapters of the report. This section summarises the findings of the preliminary research and how these six countries were selected.

Icen Mobile's target market is the socially and economically deprived people living at "the bottom of pyramid", without any access to communications. While the six selected countries are not the most "poor" in terms of the percent of total population living on less than a dollar per day, they account for the majority of rural poor in Commonwealth Africa in absolute terms. This can be seen in the population and poverty demographics provided in Table 1 below.

Table 1. Population and Poverty Demographics for Selected Countries

Country	Population, total (millions) 2006 ¹	% of total population living on < 1 USD per day 1990-2005 ²	Estimated absolute number (millions) living on < 1USD per day ³
Botswana	1.88	28	.5

¹ International Telecommunications Union 2007, available at: http://www.itu.int/ITU-D/icteye/Reporting/ShowReportFrame.aspx?ReportName=WTL/BasicIndicatorsPublic&RP_intYear=2007&RP_intLanguageID=1

² Human Development Report 2007/2008, available at http://hdr.undp.org/en/media/HDR_20072008_EN_Complete.pdf

³ Note that this figure is projected from data in the first two columns, which are from two different sources and date ranges. It is therefore not an accurate statistic, but calculated for the purpose of illustration. However, the average of the percent of total population living on less than a dollar per day between 1990 and 2005 is a reasonable proxy for the same statistic in 2006.

Swaziland	1.14	47.7	.5
Namibia	2.07	34.9	.7
Lesotho	2.01	36.4	.7
Gambia	1.71	59.3	1.0
Cameroon	18.55	17.1	3.2
Sierra Leone	5.87	57	3.3
South Africa	48.6	57	3.3
Malawi	13.93	45	6.27
Zambia	11.92	63.8	7.6
Mozambique	21.4	36.2	7.7
Kenya	37.54	22.8	8.6
Uganda	30.9	31.1	9.6
Ghana	23.48	44.8	10.5
Tanzania	40.45	57.8	23.4
Nigeria	148.09	70.8	104.8

Table 2 below provides a glimpse of which African Commonwealth countries have only a small percentage of their populations subscribing to mobile services; and therefore greater potential for future growth. Ghana, Kenya, Nigeria, Tanzania, Uganda and Zambia are all countries in which at least two-thirds of the population do not yet own a personal mobile phone or SIM card. The combination of these countries' low subscriber rates and high populations of poor (seen in Table 1) suggests that there is a large untapped market of Icen Mobile's target population.

Clearly there is much room for growth in voice and data services if a cost-effective technology and innovative business model can be extended to unconnected rural areas. While the mobile subscribership of a few of the short-listed countries such as Kenya, Nigeria and Ghana may appear relatively good alongside other African countries, it is important to bear in mind that most of those who constitute users and subscribers in these three countries are urban dwellers. It must also be noted that mobile subscribership is different from mobile access, which is much more difficult to measure. It is common for families or communities to share a single mobile phone in order to share the cost of service. An individual living in a rural village with access to a "shared" phone will not be reflected in the subscriber numbers and may lead to an underestimation of true mobile access. On the other hand, individuals who own multiple SIM cards – perhaps to take advantage of special offers or promotions offered by competing operators – will be over-counted and may lead to an overestimation of true subscriber numbers.

Table 2. Mobile Subscribers and Internet Users in Target Countries

Country	Mobile Subscribers (%)	Internet users (% of pop)
---------	------------------------	---------------------------

	of pop) 2007 ITU	2007 ITU
Malawi	7.55	1
Sierra Leone	13.23	0.22
Uganda	13.58	6.48
Mozambique	15.42	0.93
Tanzania	20.4	0.99
Zambia	22.14	4.19
Lesotho	22.71	3.49
Cameroon	22.45	2.23
Nigeria	27.28	6.75
Kenya	30.48	7.99
Ghana	32.39	2.77
Swaziland	33.29	4.08
Namibia	38.58	4.87
Gambia	46.58	5.87
Mauritius	74.19	26.95
Botswana	75.84	4.25
South Africa	87.08	8.16
Seychelles	89.23	36.95

5.1. Human Capital Considerations

As seen in Table 2 above, the number of internet users is depressingly low for all the 18 African Commonwealth countries, with the unsurprising exceptions of Mauritius and the Seychelles. Both island countries have made progress in the sector thanks to targeted education initiatives and relatively high literacy rates. While the transmission of voice communications supersedes language and literacy, demand for Icen Mobile's data services would require a certain degree of literacy and the availability of e-content in the user's language. Table 3 ranks the African Commonwealth countries by a human capital index, merely the average of the adult literacy rate and the percentage of individuals of-age enrolled in primary, secondary and tertiary school. While Nigeria, Tanzania and Ghana rank relatively low on the list, it is encouraging that all six selected countries have achieved literacy rates and school enrolment rates above 50 percent.

Table 3. Human Capital Indicators in the Target Countries

Country	Adult literacy rate (% aged 15 and over) 1995-2005	1, 2, 3 school enrolment (% gross) 2005 HDR	Human Capital Index (Average of Adult literacy rate
---------	----------------------------------------------------------	---------------------------------------------------	-----------------------------------------------------------

	HDR		and school enrolment)
Seychelles	91.8 ⁴	82.2	82.2
Mauritius	84.3	75.3	79.8
South Africa	82.4	77	79.7
Botswana	81.2	69.5	75.35
Namibia	85	64.7	74.85
Lesotho	82.2	66	74.1
Swaziland	79.6	59.8	69.7
Kenya	73.6	60.6	67.1
Cameroon	67.9	62.3	65.1
Uganda	66.8	63	64.9
Zambia	68	60.5	64.25
Malawi	64.1	63.1	63.6
Nigeria	69.1	56.2	62.65
Tanzania	69.4	50.4	59.9
Ghana	57.9	50.7	54.3
Gambia	--	50.1	50.1
Mozambique	38.7	52.9	45.8
Sierra Leone	34.8	44.6	39.7

5.2. Policy Focus on Rural Connectivity

The governments of many countries have adopted national ICT policies, but some place more emphasis on the provision of ICTs to rural and underserved areas than others. Those countries with specific rural connectivity objectives may be more open to approving and supporting innovative technologies that help them reach their universal service and access targets. In addition, many governments have established universal service funds (USFs), often administered by an independent arm of the regulatory authority. The funds are usually financed by levies on operator revenue, direct government contributions, voluntary donations and funding from multilateral agencies such as the World Bank; and in turn subsidise the cost of connecting rural and underserved communities. Table 5 below lists the universal service funds in Commonwealth Africa that have been established or are in the process of being established.

⁴ This estimate is from the 2002 census (CIA World Factbook), since the HDR was missing data for the Seychelles.

The existence of a USF could be beneficial to Icen Mobile. Countries with USFs may wish to incorporate the pilot of Icen Mobile's technology into its existing programmes, which aim to provide access to unconnected or underserved rural communities, provide dedicated officers to help implement the network and support its rollout. As table 5 indicates, the six shortlisted countries are some of the few in Africa with a fund.

Table 4. Universal Service Funds in Commonwealth Africa

Country	Universal Service Fund/Agency
Ghana	Ghana Investment Fund for Telecommunications (GIFTEL)
Nigeria	Universal Service Provision Fund (USPF)
South Africa	Universal Service and Access Fund (USAF)
Tanzania	Universal Communications Access Fund (UCAF) <i>in implementation</i>
Uganda	Rural Communication Development Fund (RCDF)
Mauritius	Universal Service Fund <i>in implementation</i>
Kenya	Universal Service Fund <i>in implementation</i>
Zambia	No action taken
Botswana	Universal Service Fund <i>in implementation</i>

The National Communications Authority (NCA) established the Ghana Investment Fund for Telecommunications (GIFTEL) and defined universal service and access in its 2005 Telecommunications Policy. Universal access includes the provision of affordable and high-quality broadband information and communication services, including voice, data services, internet, local relevant content and government services, as well as mobile and broadcast signal coverage throughout remote regions.

The Universal Service Provision Fund (USPF), a semi-autonomous arm of the Nigerian National Communications Commission (NCC), released its 2007-2011 Strategic Plan. The plan promotes technological innovation in ICT service delivery in underserved areas and aims to ensure effective utilisation of USPF financing to leverage investments in rural communications. The USPF projects include Community Communications Centres (CCCs), which use wireless technology to extend voice, Internet, ICT training and other services to unserved communities, and a school access project. The USPF also provides smart subsidies to the lowest-bidding operators to provide mobile service in unserved areas.

Tanzania's 2003 National ICT Policy established the Rural Communications Access Fund, which is now in the final stage of planning. Policymakers intend to use the fund to incentivise investors to provide rural ICT services and support the construction of rural telecentres. Tanzania has also incorporated ICTs in complementary policies. The 2006 National Strategy for Growth and Reduction of Poverty, known as Mkukuta, aims to reach rural communities by opening up new communication channels to

youth information centres, teacher training centres, women's information centres and district libraries to increase capacity to provide and gather information on poverty reduction. In addition, the 2001 Rural Development Strategy promotes the creation of telecentres in rural areas to provide basic communication services, as well as public services, such as telemedicine, distance education and municipal governance services.

Uganda's 2006 Rural Communications Development Policy promotes the provision of communication services in rural areas as a profitable business and maintains the Rural Communications Development Fund (RCDF) as its principal tool to leverage investment in rural communication development. The RCDF distributes "smart" subsidies that act as incentives to commercial suppliers who will enter the market but not depend on unending subsidies for sustainability. The policy allows the provision of monopoly licenses to operators who roll out "state-of-the-art technology" to deliver services in rural areas with sparse populations. The New Proposed Telecommunications Policy (2006) is still under debate but would establish institutional data access points with a minimum speed of 256 kbps for all education institutions, government health units and population centres exceeding 1200 people.

The 2006 Zambian National ICT Policy paved the way for the establishment of the Rural ICT Development Fund⁵ administered by the Communications Authority of Zambia (CAZ). The same policy also provides for the transformation of all postal offices and public and community libraries as public access points for e-commerce, e-government and internet-based services, with the support of the private sector and civil society. It promotes cost-effective, last-mile technologies and private sector investment for providing access in rural and underserved areas.

Kenya's USF was legally established in the Kenya Communications Amendment Act, passed in August 2008. An institutional and regulatory licensing framework for universal access and its financing has been established within the Communications Commission for Kenya (CCK), and key members of the management team have been appointed. Moreover, it has already been confirmed that the Government will set up National ICT Centres of Excellence, and the centres will be partially financed through the USF. The act also established the converged licensing regime, now being phased in.

5.3. Technology and Service Neutrality

The Icen mobile solution is a GSM networks solution that has been designed to interconnect with existing GSM networks. In theory there should be no onerous regulatory approvals it must successfully obtain before it is rolled out. Nevertheless, piloting Icen mobile in a country which provides an enabling environment for the

⁵ CAZ has intimated to the CTO that they have levied millions from operators, but are having trouble dispersing its funds.

implementation of innovative network infrastructure like the Icen mobile solution holds obvious benefits.

A unified or converged licensing regime would ease Icen Mobile's entry into the market because all mobile operators are free to implement any technology and provide any service they like. This means that operators can choose to implement the technology they find most cost-effective to provide their services and can upgrade their equipment as technology progresses. For example, all licensed operators can provide VOIP services, operate a fixed-wireless network, or implement Icen Mobile's wireless technology solution, regardless of the technology they have traditionally employed. Without such a technology-neutral regulatory regime, operators licensed to provide fixed-line services would have to apply for a separate licence (which they may or may not be eligible for) to use Icen's wireless technology.

Only five Commonwealth African countries have adopted unified licensing regimes. Of the six selected countries, all but Ghana and Zambia operate unified licensing regimes. That being said, key stakeholders from Ghana and Zambia suggest that their respective countries are moving towards the implementation of a unified licensing regime. Moreover, they suggest the "spirit" of such a policy and regulatory regimes already exists and the implementation of innovative technologies is encouraged.

Kenya adopted a unified licensing framework in 2004 to replace its previous, cumbersome, service-specific licensing regime involving 46 different types of licences. The regime was gradually phased in during a transition period of three simplified licenses, before completely migrating to the single unified licence in 2008.

Nigeria now issues a unified service licence, which permits the provision of fixed telephony, whether wired or wireless, digital mobile services, international gateway services and regional and national long distances. Likewise, Tanzania offers just four licences under a unified licensing regime.

The telecommunications operators in Uganda have been aggregated into Public Service Providers (PSPs) and Public Infrastructure Providers (PIPs) under the unified licensing regime. PSPs are licensed to provide communications services of any kind using any technology. PIPs are permitted to build and operate communications infrastructure. A third category, the general licence, does not cost a licensing fee but requires payphone kiosks, fax bureaus and Internet/cyber cafes to register with the Uganda Communications Commission (UCC).

In February 2009, following several applications to provide 3G services, Zambia announced its plans to introduce a unified licensing regime.

Table 5: Commonwealth African Countries and Unified Licensing Regime

Country	Non-unified	Unified
Botswana		X
Cameroon	X	
The Gambia	X	
Ghana	X	
Kenya		X
Lesotho	X	
Malawi	X	
Mauritius	X	
Mozambique	X	

Country	Non-unified	Unified
Namibia	X	
Nigeria		X
Seychelles	X	
Sierra Leone	X	
South Africa	X	
Swaziland	X	
Tanzania		X
Uganda		X
Zambia	X	

Of the six countries in the preliminary shortlist, Ghana is the only country not to have legislated, or announced plans, for a unified licensing regime. However, the fact that Icen Mobile solution is a GSM technology designed to simply provide and extension to an existing GSM network and the fact that Ghana, according to stakeholders, encourages the use of innovative technologies means it was still considered for inclusion in the final short list.

5.4. The Market Players and existence of competition

The African telecommunications market is increasingly competitive, as regulators continue to license new market entrants nearly every year. This section briefly outlines the national operators that provide mobile services in each of the six selected countries. The success of Icen Mobile will depend on the buy-in of GSM operators, who will purchase or lease the Icen network extension in order to extend the reach of their services. Therefore, it is important that the selected country has a competitive mobile sector, with innovative and aggressive GSM operators looking to capture the untapped rural market.

The mobile telecommunications market in Ghana is home to five competing national operators. MTN Ghana leads the pack with 55.1% market share and 19% growth in the last half of 2008. TiGO is second (26.3% market share) and Vodafone Ghana (17.1% market share) follows. Zain Ghana (3.9% market share) just launched mobile services in December 2008 and has already outstripped CDMA operator Kasapa Telecoms (3.9% market share).⁶ Globacom was the awarded the country's sixth mobile licence but has yet to roll out services.

Kenya's mobile telecommunications market is increasingly competitive and there are now three mobile telecommunications service providers, namely Safaricom, Zain Kenya, and Telkom Kenya. Safaricom dominates the market with 71% market share,

⁶ NCA Statistics cited from Samuel Dowuona <http://allafrica.com/stories/200903180804.html>

while Telkom Kenya just began mobile operations in the last year after the adoption of the unified licensing regime.

There are five national mobile network operators competing in Nigeria's GSM mobile market; namely MTN Nigeria (40.8% market share), Glo Mobile (30.9% market share), Zain (27.7% market share), M-Tel (0.4% market share), and a new entrant Etisalat. In addition, the CDMA operators, which were previously licensed to provide fixed-wireless access, have now been re-licensed under the unified licensing regime and are permitted to extend their coverage across the nation. These operators are Multilinks, Starcomms, ZoomMobile and Intercellular Nigeria.

The communications market in Tanzania is technology-neutral with four operators providing GSM services; namely Vodacom, Zain, Mobitel/Tigo and Zantel. The mobile market is dominated by Vodacom and Zain who had captured 48 and 29 percent of market share by September 2007. Mobitel/Tigo controls 13 percent and Zantel 7 percent. However, according to the Tanzania Communications Regulatory Authority (TCRA), subscription growth faltered between 2005 and 2007 for all operators with the exception of CDMA operator TTCL (3% market share in 2007).⁷

There are three mobile operators in Uganda, namely MTN Uganda (52% market share), Zain (31% market share) and Uganda Telecom Telecel (17% market share).

There are now three fully licensed mobile operators providing voice, Internet and data services in Zambia. Zain dominates the mobile market with 71.4% market share, followed by MTN Zambia (15.9% market share) and Zamtel Cell Z (10% market share).

Questions may be raised about the existence of effective competition in some of the six countries, especially when one considers that in each country one operator controls more than 40% of the market – more than 70% in the case of Zambia and Kenya. However, evidence suggests that the significant market share held by leading operators has not stifled their desire to offer innovative services and promotions. The renowned M-PESA money-transfer service was introduced by the mobile operator Safaricom in Kenya and indicates that, despite its 70% market share, it is still driving innovation, new products and services. Similarly, Ghana's major operator, MTN, introduced a number of promotions despite controlling more than 50% of the market.⁸

For Icen Mobile to be commercially successful it must appeal to as many innovative GSM operators as possible. Ghana (5 operators), Nigeria (4) and Tanzania (4) are relatively more competitive with more GSM operators, presenting the most

⁷ TCRA Statistics <http://www.tcra.go.tz/publications/telecom.html>

⁸ Ofcom guidelines on assessing the existence of SMP notes that: "Where markets are emergent or growing more quickly, high market shares are less indicative of market power than in more mature or slow-growth markets. Fluctuations in market shares may also indicate a lack of market power" http://www.ofcom.org.uk/static/archive/Oftel/publications/about_oftel/2002/smpg0802.htm

opportunity for Icen mobile; while Uganda, Zambia and Kenya are home to just three GSM operators each.

6. Stakeholder views on policy and regulation

The previous section concluded that **Ghana, Kenya, Nigeria, Tanzania, Uganda** and **Zambia** may provide an enabling environment for the rollout of the Icen Mobile solution. All have policy and regulatory regimes that focus on extending access to yet unconnected areas and foster competitive markets that facilitate innovation. That being said, the findings of the desk-based research detailed in section five must be assessed alongside primary evidence collected from key stakeholders working in the six countries.

This section of the report analyses the data collected from interviews with policymakers, regulators and mobile operators from the six selected countries and highlights their views about the policy and regulatory environments in their respective countries. Tables 5 and 6 provide a summary of these views.

6.1. From the government perspective

Government officials from all six countries report conducive policy and regulatory environments for rural connectivity, citing either fierce competition, a technology-neutral regime or the establishment of a USF as evidence. They view the government as an enabler of ICT4D; respect the role of a competitive private sector in providing service; and recognise a place for government incentives where there are market failures.

For example, the minister of ICT in Uganda, HE Ham-Mukasa Mulira, said “The government’s job is simply to create policy for a stable, predictable, transparent, fair-to-all environment and the rest is in the hands of the private sector.” However, Uganda also passed e-health and e-education strategies, recognising that there are some critical areas where the government must step in.⁹

Likewise, the Nigerian Communications Commission (NCC) announced its plans to deploy broadband services in all 36 states this year, as part of its State Accelerated Broadband Initiative. They have reportedly selected three companies to execute the plan and the NCC will subsidise terminal equipment and bandwidth charges to enable more people to use the services.¹⁰

USFs are another example of how governments act as more than just enablers. They have traditionally offered direct incentives to operators to extend coverage to rural areas, but the interviews indicate that USF interests may be changing. For example,

⁹ Ham-Mukasa Mulira became presidential advisor on ICT in March 2009. He is not long the Minister for ICT

¹⁰ The first phase of the State-accelerated Broadband initiative will cover the 36 state capitals, and then extend to council headquarters.

Mr Phillip Prempeh, business development manager of Ghana’s GIFTEL said that he expects the focus to shift away from voice and towards data services. Recent legislation has enabled GIFTEL to use its fund for incentives to operators to establish rural telecentres and incubator centres at schools. Even the RCDF in Uganda, the statistically least connected of the selected countries, is funding 3G/Wi-Max projects.

During interviews key stakeholders were asked if there would be any changes to policy and regulation in the short to medium term that would have an impact on the implementation of the Icen mobile solutions. The responses were diverse across countries. The Nigerian regulators reported no change, despite expectations from operators (see subsection 6.2). Ugandan officials likewise expected no change, apart from a continued increase in incentives for rural connectivity. The establishment of USFs is the biggest evolution in the Tanzanian and Kenyan environments, and a shift towards more advanced communications services is expected in Ghana.

Although there are often gaps between theory and practice, table five indicates that all the changes identified by government representatives would have no negative impact upon Icen mobile. Most will lead to increased effort, focus and resources being put into achieving what the Icen Mobile solution is designed to do – connect rural communities

Table 5. Summary of policy and regulatory environment in the 6 selected countries from the perspective of policymakers and regulatory officials

Country	Current policy and regulatory environment	Expected changes to policy and regulatory environment
Uganda	Good. Perceives itself as an enabler. E-health and e-education strategies.	More incentives for increasing rural connectivity (non-specific)
Tanzania	Good	Operational USF
Ghana	Good. Cited fierce competition	USF moving beyond voice services and used to provide data services
Nigeria	Good. State-accelerated Broadband Initiative	None.
Kenya	Good.	Operational USF and completion of transition into tech-neutral regime.
Zambia	Good	Use levied funds to meet rural connectivity needs

6.2. From the operators' perspective

The mobile operators had more diverse opinions about the policy and regulatory environments in which they operated.

Operators in Nigeria and Uganda were the most satisfied with their respective policy and regulatory environments. The head of regulatory affairs at Starcomm Nigeria, Mr Kazeem Oladepo, said that regulatory intervention has been good and that the NCC understands how important fair interconnection is. He reports that **“the NCC is again focusing on its interconnection regulation, in an effort to further speed up the negotiation process, lower the interconnection rates and ensure that any reduction is reflected in the price of services.”**

Similarly, Mr Damien Udeh, the head of legal and regulatory affairs for Etisalat, Nigeria stressed that although there had been some problems, the Nigerian policy and regulatory environment was one of the most progressive in African and the regulator, the Nigerian Communications Commission (NCC), was focused on continued improvement of the environment. When discussing interconnection in Nigeria he said: **“In my career I have seen various cases in which major operators have stopped the smaller ones from interconnecting, and it can take some time to resolve the issue. The time taken to resolve disputes negatively impacts upon the smaller operators more than their larger counterparts. The NCC has really sped up the process for dealing with such disputes, and I believe they are aiming to speed it up even more.**

Operators in Tanzania, Kenya and Ghana said that the regulatory environments are good, but were critical of other government policies and lethargy. For example, Mr Vitalis Olunga, the head of international and wholesale business at Safaricom said: **“The government sees mobile telephony for development as important. However, many of the initiatives that are having a direct impact on development are initiated by operators. Government did support things like M-PESA and the projects which have seen schools and market centres connected to GPRS. Yet, while these may fulfil government's broad aims, they are not a direct result of government action.”** He added that the government is taking a step in the right direction with the pending waiver of import taxes on mobile handsets. The government also recently purchased the Huawei, ZTE and Sagem backbone, which will enable operators to extend access.

Operators looked more kindly on the regulator in Kenya, citing the expected USF, cost-based interconnection (that cut costs by 30%) and the successful transition into a technology-neutral regime. In addition, the CCK reduced the cost of spectrum by 10% and recently waived the licence requirements for handset resellers.

Similarly, the CEO of Zantel, Mr Noel Herrity, supported the regulatory regime in Tanzania but expressed indignation with policymakers' taxation policies. **“Telecoms is viewed as an enabler of economic development; however, governments find more and more ways to tax telecom operators because they are seen to be successful operations. The direct and indirect taxes are direct disincentives to**

investment and discourage more operators from getting involved in the country. They are a major irritation to those of us already in the market.” The source of the CEO’s angst was a new government excise duty and mandate that all operators obtain consultancy reports from the National Environmental Management Council to report on the business’s impact on the environment. While he recognised the importance of environmental responsibility, the consultancy reports had to be obtained from government consultants at the National Environmental Management Council for a non-competitive fee”.

The sense of frustration among operators is similar in Ghana. The international business manager at Ghana Telecom (now Vodafone Ghana), Mr Ernest Aikins, felt the regulator was doing a good job, but was less certain about the ministry’s commitment. He said, **“The previous government¹¹ did speak about the need for ICTs to be leveraged for socioeconomic development, but when you look at policies and initiatives I can only point to one; the government initiative to connect all districts and schools within those districts. I am not sure if all the work was done, i.e. all the schools were connected, but you can say they were focused on education.”**

The CEO of Kasapa Telecoms, Mr Bob Palitz, likewise felt that the regulatory environment was conducive to rural connectivity and was happy to be both a contributor and recipient of GIFTEL funding. His opinion of the policy environment, however, was that the official policy and what the government actually does conflict. The previous government **“was in favour of every buzz word and acronym there is that will help them collect money for the government. They say they want all these things but then they raise user taxes.”**

The Zambian government has hiked import taxes on mobiles for different reasons. The Zambian government has increased customs duty on all foreign manufactured phones to 5 percent from 15 percent to protect its infant mobile handset manufacturing industry. Mmobile Telecommunication Zambia successfully produced over 5,000 handsets, which are now on the market as of 11 March this year. The handsets are available in 21 countries throughout the entire Southern African Development Community (SADC) and Common Market for Eastern and Southern Africa markets and the plan has the capacity to produce between 50,000 and 70,000 handsets per month. Prior to the tax hike, a phone that sold for USD\$20 in most neighbouring countries, cost USD\$25 in Zambia. Now, the price of foreign-imported phones is likely to further increase; however, Mmobile does not plan to sell its domestic phones for less than USD\$40.

Table 6. Summary of policy and regulatory environment in the 6 selected countries from the perspective of operators

Country	Policy environment	Regulatory environment

¹¹ Change of government in January 2009

Uganda	Good – Shift from voice to data penetration	Good
Tanzania	Mixed views – indirect taxes	Good
Ghana	Mixed views – only one ICT4D policy with little results	Mixed views
Nigeria	Good	Good – USPF and licence conditions are a step in the right direction, decreased interconnection rates
Kenya	Mixed views – No specific government aim, purchase of backbone	Good – transition to tech-neutral regime, cost-based interconnection regime cut costs by 30%
Zambia	--	--

7. The Icen Mobile Value Proposition: Stakeholders' Views on Key Issues

The Icen Mobile team wished to find out key stakeholders' views on a number of issues that would have an influence on the value proposition they put to operators, the business model they develop and the services they offer. This section of the report summaries the main views expressed in respect of:

- access and affordability;
- quality of services;
- use of value-added services such and SMS and voicemail;
- the cost and utility of mobile handsets; and,
- how the price of oil might affect the roll out of mobile infrastructure in the future.

During the interviews, each stakeholder was asked, "What change to the existing mobile service business model would contribute most to increase rural use and subscribership?" Stakeholders were free to give as many answers as they liked. Table 7 aggregates all stakeholders' responses by country to give a snapshot of which aspects of the mobile operators' business model need innovative solutions. The following subsections explore the stakeholders' responses in greater detail.

Table 7. Aggregate responses to "What change to the existing mobile service business model would contribute most to increase rural use and subscribership?" by country

Country	Access	Affordability	QOS	VAS	Handsets	Other
Ghana	X	X	X	X	X	X
Kenya	X				X	
Nigeria	X	X		X	X	
Tanzania	X	X			X	
Uganda			X	X		
Zambia			X			

7.1. The basics

Access and affordability are the two most basic elements of the business model. Without these, any discussion on quality of service or the functionality of a low cost handset is irrelevant. Taking measures to improve the affordability of services was cited as important by all stakeholders apart from those in Uganda, who felt that competition had driven prices down to an affordable level and that the market was meeting 100% of rural demand for voice services.

All the interviews with stakeholders in **Tanzania** highlighted the need to increase access and affordability first and foremost. Stakeholders in Ghana collectively indicated that all elements of the business model should be focused on, including access and affordability. Mr Issah Yahaya in the Ministry of Communications suggested that incentives for infrastructure sharing should be explored to improve access in rural areas. Mr Philip Prempeh of GIFTEL said that tariffs are already low, but that tariff discrimination to make calls more affordable for rural people should be explored. Mr Ernest Aikins from **Ghana** Telecom agreed, “There is nothing to stop companies from making calls that originate in rural areas cheaper.”

Mr. Bashir Idris, the assistant director of economic analysis and corporate planning in the NCC, reported that operators are making good progress extending access in rural areas of **Nigeria** but that 65-70% of rural demand is still unmet. The USPF said that access and affordability were the primary focus. Mr Damien Udeh of Etisalat and Mr Gbenga Adebayo, CEO of Association of Licensed Telecommunications Operators of Nigeria (ALTON) both suggested the adoption of asymmetric interconnection models that favour smaller operators in rural areas and enable them to reduce prices for rural users. Oladepo of Starcomm suggested tariff regimes that reward users with more bonus airtime to make service more affordable.

Mr Vitalis Olunga, the head of international and wholesale business at Safaricom in Kenya and chairman of the GSM Association for all of Africa said: “**Coverage has improved in rural areas, but there is work to be done. Competition is driving operators to look for customers in rural areas so the market is definitely doing more than ever before to meet the needs of rural customers.**” He believes that the sale of low denomination vouchers has made great progress in making communications more affordable for rural Kenyans.

The chief economist at CAZ, Ms Susan Mulikita, said operators already have a presence in all 9 provinces and 72 districts in the country. She said that tariffs are affordable to rural users but that price differentiation based on location would be good if it were possible. **“Zambian operators are unable to do this. If the operators could actually tell us what proportion of their calls originates in rural areas, we would be able to take the tax away on the proportion of revenue derived from those calls. The benefits of the tax break could then be passed on to consumers, but they don’t have the platforms to do that.”**

Call differentiated pricing is something that Icen Mobile may wish to discuss with operators and incorporate in its business model, especially because users are likely to make calls to other users within the solution’s 10km footprint. Although little is known about the price elasticity of demand in the virgin areas that Icen mobile will pilot the solution, it is likely that discounted calls will create more demand amongst highly price-sensitive rural communities.

7.2. Quality of Service

Prempeh of GIFTTEL said it is not uncommon to see a group of people huddled together, lifting their mobiles up in the air, when travelling through rural areas. That is the one spot in the entire community where users can get a mobile signal. That said, the consensus in all six countries is that the quality of service in rural areas is good. Mr Ernest Aikins of Ghana Telecom explained this apparent contradiction: “Where there is service, it is good. Poor QOS areas should be viewed as gaps in the network. Rural base stations are well maintained, there just needs to be more of them.” In fact, over two thirds of respondents (from all categories of stakeholders) said that QOS in rural areas was as good as, if not better than, that in urban areas.¹²

The poor quality of roads make maintenance of rural base stations more difficult, but telecom operators in all six countries indicated that there is no point in investing in a base station and then not investing in its maintenance. In addition, many rural base stations are dependent on diesel fuel generators for power, as they are located far from the national power grid. While at first this seems like a disadvantage, in fact, Olunga from Safaricom said that it is the unreliable commercial power supply that often cuts out and interrupts communications service. Most rural base stations have backup diesel fuel generators for such an event, but it is difficult to monitor the backup fuel supplies. Rural base stations that are wholly powered by generators are easy to monitor and operators refuel the base stations on a regular schedule. Refueling of base stations that are predominantly powered by commercial power is less systematic.

7.3. Value Added Services: SMS

¹² For example, urban areas in Nigeria suffer from poor quality of service at peak traffic times because the networks do not have enough capacity to handle the congestion. This problem is exported to rural areas during holidays when urban users travel back to their rural homes, creating a surge of demand on the limited rural infrastructure.

Nearly all those interviewed indicated that voice and SMS were the main services required by rural people. However, many suggested that additional value-added services, such as money-transfer or m-banking services, agricultural, electoral and weather information, as well as mobile internet, would be beneficial. We have already seen in the previous chapter that there is a general shift away from voice and toward data services in the governments' policy and regulation. However, our research shows that operators have not yet mastered the business model for voice and SMS in rural areas; SMS usage in rural areas is limited. Illiteracy and the higher cost and inconvenience of SMS were cited as reasons why the selected countries are slow to adopt the service.

Mr Kazeem Oladepo, Head of Regulatory Affairs, Starcom Nigeria said: "Cultural and educational factors mean that rural users don't really need anything beyond voice and SMS. Most rural dwellers are farmers or artisans who don't really send SMS. However, Nigerians are really quick to pick up things, so it really depends on what services are offered in the future. I think internet would be useful for those in rural areas if they could be taught about the benefits and how to use it."

Because SMS has remained unpopular in rural areas of Nigeria, the government is intent on reducing the price of SMS. Some stakeholders believe that illiteracy is also an impediment to SMS use but Efosa Idehen, head of strategic planning for Nigeria's USPF said that "If you cannot read and write, you will not be able to send an SMS on your own, but that does not mean you cannot ask for someone's assistance. This is what most illiterate people do, so it does not really hamper SMS." The NCC estimates that between 30% and 40% of rural users use the service.

Stakeholders in Ghana indicated that SMS is not popular in rural areas. Illiteracy is one impediment, but the proliferation of voice promotions has also made SMS relatively more expensive.

The exception may be Tanzania, where literacy rates are relatively high due to good primary education enrolment, and all stakeholders reported a good culture of SMS in rural areas. Tanzanian operators have also played their part in embedding the SMS culture. To promote the use of SMS, Zain, Tanzania offered Free SMS for a limited period. Similarly; Zantel has offered a promotion dubbed as BabKubwa Mtelezo. Subscribers will earn free airtime worth TZS 1,000 along with 10 free SMS when they top up their mobile phones for TZS 2,000. The free airtime will be applicable only to Zantel-to-Zantel calls while SMS can be sent to any network.¹³ The Ugandan stakeholders also reported a good culture of SMS because the service is more affordable than voice calls and people are able to text in their own languages.

Kenya has a good literacy rate (about 70%), but SMS is more expensive. An SMS costs 5 Kenyan shillings, while a one minute call costs 3 shillings and is billed by the second. Mochache in the CCK recognises the country's high literacy rate and disproportionate low use of SMS and concludes that it is simply "more about the culture."

¹³ <http://wirelessfederation.com/news/category/tanzania/>

7.4. Value added services: Voicemail

Voicemail is not a popular service in the selected countries. All stakeholders across countries said that rural users do not leave voicemails when no one picks up the phone. They were confident that rural people could easily learn how to set up and check their voicemails (so the problem is not one of human capacity) but that people did not want to pay money to talk to a machine.

The view of Ernest Aikins of Ghana Telecom appears to be typical. He said: "I myself don't see the point in paying to leave a message. The mobile is a device that will show you who called, and if you want to call them back you can. Voicemail would not be popular in Ghana unless it was free to leave and collect messages."

However, as the Tanzanian evolution of SMS usage indicates a culture of using voicemail may be developed if operators continue price it appropriately and make it easy to use. Kasapa is the only telecom operator to offer voicemail to all its subscribers in Ghana, believing that the cultural resistance to voicemail will gradually change. Kasapa finds that when users receive a text message indicating that they have received a voice message, they retrieve the message approximately 90 percent of the time.¹⁴

7.5. Value-added services: Locally relevant content

Money transfer and m-banking services were the most popular and needed value added services (after SMS) among the stakeholders interviewed. The M-PESA money-transfer service has already been a renowned success in Kenya and the minister of ICT in Uganda expects all operators in his country to launch their own breeds of M-PESA money transfer service early this year. The CEO of Zantel argued that money transfer schemes and any kind of m-commerce activities would flourish in rural areas, more so than in developed markets where the population already has access to banking services.

Issah Yahaya from the Ministry of Communications in Ghana noted the demand for money transfer services in rural areas, and also argued for the provision of relevant value-added services such as agricultural information, election results and weather alerts. Mr John Paul Bagiire, general manager of strategic planning at MTN Uganda, was enthusiastic about value added services but admitted uncertainty as to which services would contribute most to the business model. "This is something that we at MTN are looking out now, and I can honestly say that we are not sure. We know that data services are required and we believe that market information on commodity prices, weather and health are needed."

7.6. The cost and utility of handsets

¹⁴ This estimate does not disaggregate rural users from non-rural users.

The utility of a low cost handset with reduced functionality is defended by stakeholders in all six countries. The cost of the mobile handset has plummeted and a low-end mobile can now be bought in nearly every country for around \$20. This cost is still unaffordable to the poorest of the poor who then share phones with families and communities. In addition, the majority of rural calls originate in urban areas, suggesting that there are urban relations who have the money and will to buy a mobile phone for rural family and friends.

Although there is still a market for the low cost handset with reduced functionality, some stakeholders stress the need to produce low cost handsets with more functionality – not necessarily expensive or fancy, but appropriate to the rural context. Mr Noel Herrity, CEO of Zantel in Tanzania, urges manufacturers to produce more low cost phones with radio receivers and functions that rural people need. The CEO of Kasapa said that rural users want low cost phones that work well; they are less concerned with style and flashy features such as downloads and ringtones and are more utilitarian. That beings said, he is aware that rural users will not want phones that look drastically different from higher end phones on the market. He argued that: **“Poor or rural users do not have a lower measure of pride than urban users and are not going to settle for an ugly phone with poor quality of service. Money is important to them and they are not willing to give up their money for something mediocre. In short, they want respect”**.

Mr Efosa Idehen acknowledged that rural people in Nigeria are not oblivious to trends in development and a limited function mobile will not appeal to the younger generations (a large percentage of mobile operators’ present and future market). The CEO of Zantel also questions whether rural users will be happy with low functionality mobiles and suggests that handsets offered to rural users should be multifunctional if they are to have a developmental impact. He says: **“Although rural often correlates with poor, handsets should not be less functional. They need radios built in and all the bells and whistles in order to overcome their poverty. Additional services, such as m-commerce, are particularly attractive in rural areas. The killer application of mobiles will always be voice communication, but we can enable sustainable development in rural areas by enriching the communication with other services”**.

In Zambia, where policymakers have increased taxes on imported handsets to protect its infant, domestic, mobile manufacturing industry, the chief economist at CAZ said that most people can afford even the relatively higher price of mobile handsets in Zambia. She emphasises that there are some wealthy rural dwellers that live better lives than urban dwellers.

7.7. How the price of oil will affect rural connectivity

Stakeholders were surprisingly optimistic about the impact of fluctuating oil prices on the ability of operators to extend rural networks. There were policymakers, regulators and telecom operators in all six countries that thought an increase in the price of oil would increase operational expenditure, but that operators’ inability to extend coverage would only be at the margins. Ms Susan Mochache predicted that a hike in

oil prices would not deter operators from rolling out network coverage; rather, it would narrow the margins for further tariff cuts, bonus airtime and special promotions.

The response among Nigerian stakeholders was particularly resilient. Mr Damien Udeh, head of legal and regulatory affairs at Etisalat, Nigeria was confident that operators with robust business plans would not be hindered, having included price volatility in their original expectations. Again, Mr Gbenga Adebayo, the Chairman on ALTON, conceded that rollout would continue regardless of the price of oil, but that high oil prices would prohibit the price of tariffs from falling any further. An increase in oil prices may even assist operators in oil exporting countries, such as Nigeria. An increase in the price of oil correlates with an appreciation of the Naira, making it cheaper for telecom operators to import equipment and infrastructure.

8. Development of Final Shortlist

The preliminary shortlist of six countries was narrowed to three countries following analysis of the existing data and the feedback from government and private sector stakeholders. The three countries were Ghana, Nigeria and Tanzania. The relatively large number of GSM mobile operators in the three countries was an extremely important consideration. However, each country also had a unique characteristic that 1) helped differentiate it from the others on the preliminary shortlist and 2) could potentially lend itself to the pilot and commercial roll-out of Icen Mobile solution.

8.1. Ghana

Ghana accommodates the most licensed mobile operators of all the six countries in the preliminary shortlist; therefore, Ghana offers the Icen Mobile team the greatest number of possible partners with whom to pilot their technology. Moreover, Ghanaian ministry and regulatory officials showed a high level of interest in the project and were proactive in seeking further information about the solution and contributing to the project.

All the six countries have established a USF; however, Ghana's USF agency is fully operational and likely more capable of supporting Icen Mobile's pilot (in contrast to USFs in Kenya, Zambia and Tanzania). Although the private sector stakeholders in Ghana have mixed views of the policy and regulatory environment, the recent market entry of Vodafone and Glo Mobile suggest the policy and regulatory environment is one in which Icen Mobile can do business.

8.2. Nigeria

Nigeria has a relatively large number of mobile operators (four) and key stakeholders consistently view the policy and regulatory environment in a positive light. Nigeria has

a well established unified licensing regime and a specific focus on improving rural communications, evidenced by the active Universal Service and Provision Fund (USPF). Yet, perhaps most importantly, Nigeria offers by far the largest market for mobile telephony in Africa – with only 27.28 % of the 140 million-strong population subscribing to communications services.

8.3. Tanzania

Tanzania also has a relatively large number of mobile operators (four) and was one of the first to establish a unified licensing regime. There is consensus among key stakeholders, both from the public and private sector, that a good regulatory environment exists. Tanzania was also selected because it is the only country with a widespread culture of SMS usage, even in rural areas. It has the highest number of literate citizens and therefore the largest number of users that could quickly adopt Icen Mobile data services.

9. Key Stakeholder Buy-in

The successful pilot will depend on the level of buy-in from policymakers, regulators and mobile operators. During the project, key stakeholders were asked whether they are interested in meeting the Icen team to potentially partner for the Icen Mobile pilot project. This section of the report contains tables identifying which key stakeholders and organisations expressed keen interest.

9.1. Private Sector Buy-in

The table provides contact details for those mobile operators that are happy to discuss developing a pilot with Icen Mobile. It clearly indicates that Ghanaian mobile operators consulted have shown the most interest in holding discussions with Icen Mobile.

Table 8. Private sector representatives keen to meet with Icen Mobile

Name and Contact Details	Company	Country
Mr M. S. Krishnan Chief Technical Officer Globmobile Ghana Ltd 18 Third Close Airport Residential, Accra +233 241 871115 Email: Madabushi.krishnan@gloworld.com	Glo Mobile, Ghana	Ghana
Mr Eben Albertyn Chief Technical Officer Technical Division Scancom Ltd MTN Plot # 17 & 19 Ridge Towers 10 th – 12 th Floor, 6 th Avenue, Ridge P.O. Box 281. Trade Fair, LA Accra, Ghana Tel: +233 24 430000 Mobile: +233 24 4304 401 Email: ealbertyn@mtn.com.gh	MTN, Ghana	Ghana
Lucy Quist Business Development Manager, Africa MILLICOM International Cellular (Tigo) Millicom Place, Barnes Road PMB-TUC, Accra Tel: +233 (0)277 555 218 Fax: +233 27 7503999 Email: Lucy.Quist@tigo.com.gh	Tigo, Ghana	Ghana
Mr. Mr Philip Sowah Country Manager Zain Communications Ghana 8 th Floor Silver Star Tower Airport City Accra Private Mail Bag Accra-North, Ghana	Zain, Ghana	Ghana
Mr. Damian Udeh Head of Legal and Regulatory Affairs Tel: +233 234 809 944 3505/ +234803 304 3490/+234 805 567 3189: Email: damian.udeh@etisalat.com.ng	Etisalat, Nigeria	Nigeria
Lucy Quist Business Development Manager, Africa MILLICOM International Cellular (Tigo) Millicom Place, Barnes Road PMB-TUC, Accra Tel: +233 (0)277 555 218 Fax: +233 27 7503999 Email: Lucy.Quist@tigo.com.gh	Tigo, Tanzania	Tanzania

9.2. Government Buy-in

The governments and regulatory authorities from the three short-listed countries are focused on rural connectivity and representatives from each organisation have

bought into the concept behind the Icen Mobile solution. Tables 9, 10 and 11 provide contact details for the liaison in each ministry, regulatory authority and USF that is happy to discuss the pilot with the Icen Mobile team.

Table 9. Government representatives keen to meet with Icen Mobile

Name and Contact Details	Organisation	Country
<p>Mr. Issah Yahaya Ministry of Communication, Ghana PO Box M38 Accra, Ghana</p> <p>Mobile: +233 (202) 011 032 Tel: +233 21 685 656 Email: issah.yahaya@gmail.com</p>	<p>Ministry of Communication</p>	<p>Ghana</p>
<p>Mr. Henry Angulu Director of Public Communication, Federal Ministry of Information and Communication Radio House Abuja, Nigeria</p> <p>Tel: +234 803 314 2645. Email: hangulu@nigeria.gov.ng</p>	<p>Ministry of Information and Communication</p>	<p>Nigeria</p>

Table 10. Regulator representatives keen to meet with Icen Mobile

Name and contact details	Organisation	Country
Mr. Kwame Baah-Acheamfuor Technical Regulations Manager National Communications Authority 1 st Rangoon Close P.O. Box CT1568 Cantonments-Accra Tel: +233 2177 1701 Mobile: +233 246 375 700 Email: kwame.baah-acheamfuor@nca.org.gh	National Communication Authority	Ghana
Mr. Bashir Ayodeji Idris Economic Analysis and Corporate Planning Dept, Nigerian Communications Commission Tel: +234 9 461 7131 Mobile: +234 803 314 4879 Fax: +234 9 234 4589 Email: baidris@ncc.gov.ng	National Communications Commission	Nigeria
Prof. John Sydney Nkoma Director General Tanzania Communications Regulatory Authority Mawasiliano House PO Box 474 Dar es Salaam Mob: 255 741 22 2219 Tel: 255 22 211 8947 Fax: 255 22 211 6664	Tanzania Communications Regulatory Authority	Tanzania

USFs are mandated to extend rural access by catalysing the implementation of infrastructure like the Icen Mobile solution. The buy-in of the USF in each country is important, because each USF could provide Icen Mobile with dedicated support during the pilot project. The USF of Ghana and Nigeria are prepared to support the Icen Mobile pilot and the names of the points of contact are provided in table 11 below. Tanzania's USF is not yet operational, so we could not gain its buy-in.

Table 11. USF representatives keen to meet with Icen Mobile

Company Representative and Contact Details	Organisation	Country
Mr Kofi Asante Administrator/CEO Ghana Investment Telecommunications Fund M72 PMB GPO Accra, Ghana Tel: +233 21 665 618 Email: akofiasante2002@yahoo.com	Ghana Investment Telecommunications Fund	Ghana
Mr. Efosa Idehen Head of Policy and Strategy USPF - Universal Service Provision Fund Private Bag 13341 Abuja, Nigeria Mob: +234 8055084414 Email: efosa@ncc.gov.ng	Universal Service Provision Fund	Nigeria

10. General Assessment of User Demand

The Icen Mobile solution is targeted at remote rural communities that are currently beyond the reach of mobile networks. It is recognised that mobile phones are now so much a part of African culture that everybody is familiar with the concept of mobile communications, and indeed most people have some experience of using mobiles, even if they live beyond the reach of networks. The purpose of the survey was to gather data from individuals who lived in remote rural areas of three African countries – Ghana, Nigeria, and Tanzania. Survey respondents lived outside of the current coverage area, but has used a land or mobile phone at least once before. Two principal questions addressed were:

- **Mobile phone use and ownership** – understanding mobile phone ownership and access, and patterns of phone use (voice and SMS), including the types of calls made and the locus of calls.
- **Demand for services** – the survey cast light on potential demand for services included in the Icen offering: voice, SMS, data services (focus on financial and agricultural) and voicemail.

10.1. Survey Methodology

The questionnaire comprised the following sections:

- **Livelihoods needs** – ranking the importance of a range of financial and agricultural issues in general; this included some social and health issues in order to provide some context of wider livelihood issues.
- **Mobile phone ownership and use** – exploring phone ownership and access (especially travel to make a call), and patterns of use (intensity of use,

expenditure, types of calls etc.). This section covers voice calls, SMS, and voicemail.

- **Attitudes** – attitude statements were drawn up to address issues arising from key stakeholder interviews, and from previous research on the topic.
- **Descriptors** – personal characteristics of the respondent;
- **Income and expenditure details.**

The analysis comprises three approaches:

- **Understanding the sample** – because the sample provides a snapshot rather than any form of representation, it is important to understand the characteristics of the sample;
- **Presenting the data** – on information needs and patterns of use of telecommunications;
- **Barriers and drivers** – linking future behaviour regarding use of voice, SMS and voicemail to detailed attitudes to identify those that are influential.

Surveys were conducted in Ghana, Nigeria and Tanzania. Samples were drawn from two close by locations in Ghana, and Nigeria, and one in Tanzania. Locations were selected on the basis that they were reasonably accessible yet poorly served by mobile networks.

Despite sample sizes of only 60 per country, the survey administrators have sampled individuals across a reasonable range of occupations and ages. Nevertheless, the restricted sample sizes mean that the results cannot be considered as being in any way representative of each of the nations, or of rural areas in general; they do, however, provide a useful snapshot of behaviour, and some interesting insights into the priorities and concerns of rural residents, who may be regarded as typical of the potential users of the IcenI offering.

Currencies are different for each country data set, and the purchasing power of a dollar is different in each country. In order to create a single currency that reflects parity across all three countries, financial figures have been converted to USD PPP figures using current currency conversion rates, and purchasing power parity (PPP) factors from World Bank Key Development Data & Statistics¹⁵ (see table 12).

Table 12. Currency conversion factors

	Conversion ¹⁶ (currency / USD)	GNI per capita (USD) 2007	GNI per capita PPP (international dollars)	PPP factor (calculated)
Ghana	1.4	590	1,330	2.25
Nigeria	150	930	1,770	1.90
Tanzania	1323	400	1,200	3.00

International dollars (USD PPP) = $\frac{\text{amount} * \text{PPP factor}}{\text{conversion}}$

¹⁵<http://siteresources.worldbank.org/DATASTATISTICS/Resources/GNIPC.pdf>

¹⁶ 11th March 2009

This gives the following conversion factors, which have been applied to all currency data:

Ghana	=	1.607
Nigeria	=	0.01267
Tanzania	=	0.002268

The analysis uses non parametric statistical tests to look for the influence of key groupings on behaviour. Tables in this paper present the probability (p value) that relationships between the groupings have occurred by chance. When considering correlations between two variables, only where the p value associated with a Spearman Rank Order Correlation Coefficient is less than 0.05, and the correlation coefficient itself is greater than 0.2, has it been assumed that a valid relationship exists.

10.2. The sample

10.2.1. Survey locations

Ghana

The location is a farming community and since plantain, cassava and maize are the crops of choice here and are seasonal, most pointed out that their earnings are from what they make at harvest time and not every month or weekly. Most times, in-between harvest periods, they do not have any money to spend; which is why a few of the women are traders.

Regarding infrastructure, the community is close to the Akosombo Dam so every hut has power. However, there is no water, forcing the women to go out early in the mornings to fetch water from rivers and streams for household chores.

Most people have used a mobile phone before, especially the men and married women who shared ownership with their husbands.

Phone network connectivity is received on the outskirts of the village especially on the school park which is 1 km away from the southern end of the village. People living closest to the park and the 'highway' to the village are able to get connection with little difficulty, but those living within the village always have to walk to the park to be able to make calls. Others go over to neighbouring villages with connection.

Along the highways of Ghana, connection is very much in place, but as soon as you turn off from these highways to untarred roads, then you begin to have connection problems

Nigeria

Both communities have both primary and secondary schools and their normal population is about 10,000 each. Jibbo itself is a very big village market center where people go every week. Both are accessible 16 km from Badeggi, along an untarred road. Badeggi itself is located 19 km along the Bida – Suleja Express road. Most houses are the typical old-time mud houses – only few are modern, built with blocks. People are generally poor, living in the subsistence economy – farming, agricultural products sales, domestic home care, unskilled labour, few teachers and clerks.

Mobile coverage in both communities is poor. In one community there is a very faint availability of ZAIN and MTN signals, no GLO signal. The village is surrounded by hills, which block the MTN signals. Ekugi does not have any of the signals of the three GSM Networks (ZAIN, MTN, GLO) but they always go to Jibbo where they have faint signals of ZAIN and MTN in few spots, especially around a hill there.

There are no government public payphones but individuals provide commercial phone services in places where there is fair availability of signal strength, thus making it relatively cheaper for people to make calls as against using their phones.

Regarding infrastructure, there is no public water supply but most people have wells in their compounds; there is primary health care facility in each community; few have television and fridges powered by generators. An electricity supply to these communities have been under construction for a long time but has yet to be finished.

Tanzania

The Survey was administered in Lunga Village, which is 125 km North East of Dar es Salaam. It is in Lugoba ward in Bagamoyo District within The Coast Region of Tanzania. It is located along the main highway running from Dar es Salaam to the northern regions of Tanga, Kilimajaro and Arusha. According to 2002 National population census the village had 4,432 people.

The village has basic social services including a dispensary, primary and high school, clean water supply, electricity along the main road and feeder roads enable easy means of transportation. Major ICT services available at Lunga village include access to the national radio (TBC) and Radio Free Africa. The area is poorly served by mobile phone networks i.e. there are access issues, problems with quality of service etc.

The major economic activities of Lunga villagers includes small scale farming and small business fuelled by the transportation trucks which stops in the village while approaching one of the major weight bridges at Chalinze area.

10.2.2. Household descriptors

A total of 205 interviews were conducted in three countries:

Ghana	75
Nigeria	70
Tanzania	60

The following tables show that the communities surveyed are substantially different. Communities in Nigeria and Tanzania, although rural, are not far from community services, notably main markets; the Nigerian sample is marginally more remote. On the other hand, it appears that the sample from Ghana is much more remote (see table 13Table 13).

When it comes to status, the Ghanaian sample appears to be the highest status group, with higher rates of electrification, and higher ownership of household appliances (table 14). However, the field report notes that the all dwellings are electrified because the community is close to the Akosombo Hydroelectric Dam. This probably accounts for the higher ownership of electrical goods – ownership is usually constrained by lack of rural electrification.

The questionnaire asked for an indication of the amount spent on principal household expenditure items (see table 15). The sum of these expenses also indicates that the Ghana sample is highest status, although similar to the sample from Tanzania. The Nigerian sample stands out as significantly poorer.

For the sample as a whole, the extent of household dependence on family members living elsewhere correlates with both estimated personal income ($r = -0.215$, $p = 0.003$) and registered household expenditure ($r = -0.212$, $p = 0.002$), which implies that it is the poor who are more dependent on remittances (N.B. the amounts of money involved may well be different to the degree of dependency). The highest status sample (Ghana) has a higher proportion of households that are more acutely dependent. On the other hand, the lowest status sample (Nigeria) has the highest rate of dependency (80% of respondents), but the extent of dependency is only slight, indicating that the people in their social networks also have limited resources.

Table 13. Remoteness of communities

	<i>Ghana</i>	<i>Nigeria</i>	<i>Tanzania</i>
Distance to main market (mean) km	36	2.2	0.8
Distance to primary school (mean) km	1.9	1.7	0.9

Table 14. Household assets

	<i>Ghana</i> (%)	<i>Nigeria</i> (%)	<i>Tanzania</i> (%)
Electricity supply	88.0	24.3	40.0
Phone - fixed line	1.3	0.0	5.0
TV	45.3	24.3	20.0
VCR / DVD	29.3	24.3	11.7

Fridge	29.3	24.3	21.7
radio	78.7	100	68.3
computer / laptop	5.3	0.0	6.7
internet connection	1.3	0.0	5.0
satellite / cable TV	1.3	0.0	8.3

Table 15. Household expenditure

<i>(USD PPP per week)</i>	<i>Ghana</i>		<i>Nigeria</i>		<i>Tanzania</i>	
	<i>mean</i>	<i>median</i>	<i>mean</i>	<i>median</i>	<i>mean</i>	<i>median</i>
Food	51.1	40.1	13.4	7.9	53.5	37.4
housing	17.9	0.0	1.8	0.0	10.0	2.3
water	8.4	0.0	0.2	0.0	4.4	2.3
energy	30.0	8.0	1.1	0.0	7.4	2.3
health	31.2	8.0	1.6	1.6	5.1	2.3
transportation	38.5	16.1	5.8	1.6	4.7	2.3
education	48.4	16.1	22.4	7.9	13.1	2.3
other	0.0	0.0	1.3	1.6	5.4	0.0
telecommunications	4.6	3.2	3.5	2.2	16.5	13.6
Total expenditure	230.1	138.1	51.3	29.5	120.1	110.8

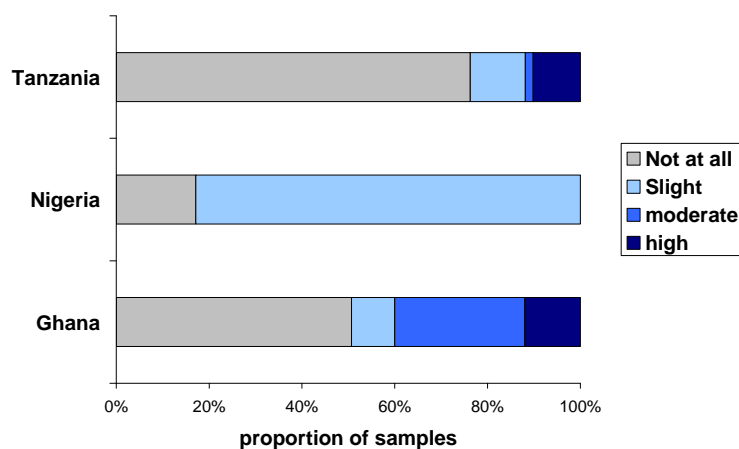


Figure 1. Extent of dependency of households on family members living elsewhere

10.2.3. Personal descriptors

All samples have a good gender balance (see table 16).

Table 16. Gender balance

	<i>Ghana</i>	<i>Nigeria</i>	<i>Tanzania</i>
male (%)	54.7	50.0	48.3
female (%)	45.3	50.0	51.7

The mean ages of the country samples are:

Ghana	31.8 years
Nigeria	27.7 years
Tanzania	34.4 years

A comparison of country samples (see table 17) shows that the sample from Ghana is the highest status – although the proportion of the sample with higher education is similar across all three samples, the proportion with full secondary education is much higher in Ghana. The sample Tanzanian sample has the lowest levels of secondary education – 75% have only primary education or less. While the Nigerian sample has only 51% in this category, this has by far the largest proportion of respondents with no formal schooling, which probably ranks it as the lowest status sample.

Table 17. Highest level of education achieved

	Ghana (%)	Nigeria (%)	Tanzania (%)
Valid No formal schooling	5.3	24.3	6.7
Incomplete primary school	4.0		6.7
Complete primary school	38.7	27.1	61.7
Incomplete secondary school / complete junior secondary	17.3	27.1	10.0
Complete secondary school / complete senior secondary	20.0	8.6	1.7
Post secondary / higher e.g diploma, degree	14.7	12.9	13.3
Total	100.0	100.0	100.0

Literacy rates in Ghana and Nigeria are 72% and 76% respectively. In Tanzania, literacy data was only gathered from those with no formal education, and all are illiterate. However, data from Ghana and Nigeria indicates that substantial number of respondents with education are also not able to read, and this is likely to be the case in Tanzania as well.

Table 18. Literacy by highest level of education achieved

What is the highest level of education that you achieved?	Do you know how to read and write?		Total
	Yes	No	
No formal schooling	0	25	25
Incomplete primary school	0	3	3
Complete primary school	42	7	49
Incomplete secondary school	25	7	32
Complete secondary school	21	0	21
Post secondary e.g diploma, degree	20	0	20
Total	108	42	150

The main languages are presented in table 19. 92% declared a second language in Ghana, 100% in Nigeria, and 87% in Tanzania. 61% declared a third language in

Ghana, 63% in Nigeria, and 18% in Tanzania. This illustrates the language diversity in Ghana, which contrasts with the language consistency in Tanzania.

Table 19. First languages

Ghana	Nigeria	Tanzania
Ewe (44%)	Nupe (84%)	Swahili (95%)
Krobo (32%)	Hausa (12.9%)	
Twi (13%)		

A number of observations can be made from the table of main occupations (see table 20):

- The Ghanaian sample has the highest proportion of professional respondents;
- The Nigerian sample has no skilled workers;
- The Nigerian sample has a high proportion of elementary manual workers, but note that this includes agricultural workers (nominally contracted labour, as opposed to subsistence farming on own land); however, the field report submitted by the survey team notes the importance of subsistence farming, so it is likely that some of these respondents would be more appropriately coded under Agriculture.
- The Tanzanian sample has the highest proportion of Sales and Service workers – the field report notes that the survey area was on the Dar es Salaam highway, and there many businesses supporting truck traffic.

Table 20. Main occupation

	Ghana (%)	Nigeria (%)	Tanzania (%)
Professional / Technical / Managerial	22.7	12.9	16.7
Clerical		5.7	1.7
Sales and Service	21.3	14.3	36.7
Skilled workers: craft workers (e.g. building, wood trades,	14.7		8.3
Elementary occupation e.g small scale sales, agricultural	8.0	38.6	8.3
Domestic service (e.g. home carer)	4.0	15.7	6.7
Agriculture, forestry, fisheries (e.g. subsistence farmers)	24.0		15.0
Student	5.3	12.9	6.7
Total	100.0	100.0	100.0

Mean estimated incomes for each of the country samples are:

Ghana	78 USD PPP / week (48 cedi / week)
Nigeria	26 USD PPP / week (2,100 niara / week)
Tanzania	74 USD PPP / week (33,000 shillings / week)

For the purposes of the analysis, the combined sample has been divided into four income groupings – see table 21. This grouping shows a clear country bias in that most of the poorest group is drawn from Nigeria, and all of the second highest group is drawn from Tanzania.

Table 21. Estimated income groupings

		Country Code			Total
		Ghana	Nigeria	Tanzania	
ESTIMATED	<10	0	51	3	54
INCOME GROUPS (USD PPP / week)	10 - 35	37	11	11	59
	35 - 100	0	0	33	33
	>100	22	8	11	41
Total		59	70	58	187

10.2.4. Comparison with National Statistics

It was recognised throughout the project that the limitations of the methodology meant that the samples were in no way representative of national populations. Nevertheless, it is important to understand the composition of the sample, and to get an idea of how it compares with characteristics of the broader populations of each country.

This section compares data on a number of key indicators between the limited samples from each country, and national data. The Demographic and Health Surveys (DHS Measure) project has been used as a source of national data sets. Although the primary aim of these surveys is to gather data on health statistics, they also contain information on individuals and households. The most recent surveys available were:

Ghana	2003
Nigeria	2003
Tanzania	2004

Where DHS data has been disaggregated into residence (rural / urban), the sample has been compared with rural data. Where DHS data covers all age ranges, results have been normalised to reflect the distribution within adults only. The youngest respondents were 19, 16, and 16 years of age (Ghana, Nigeria, and Tanzania respectively), so the 15 – 19 years age group has been taken as the beginning of the adult ages.

Age

The following figures compare the age distribution of the samples with national rural, adult age distributions.

- All samples are skewed towards younger ages, especially the 20 – 29 years age group;
- Ghana and Nigeria samples in particular are missing representatives of older age groups (over 60s).

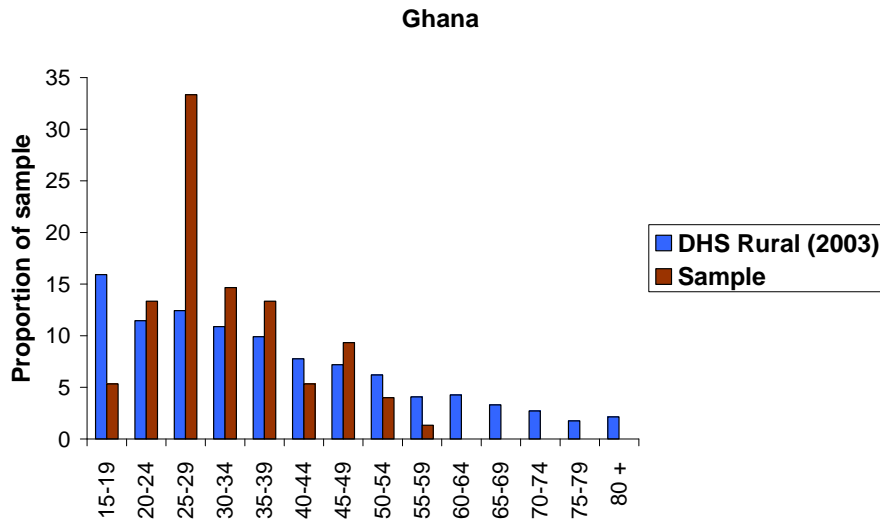


Figure 2. Comparison of sample with national statistics (Rural adult) – age (Ghana)

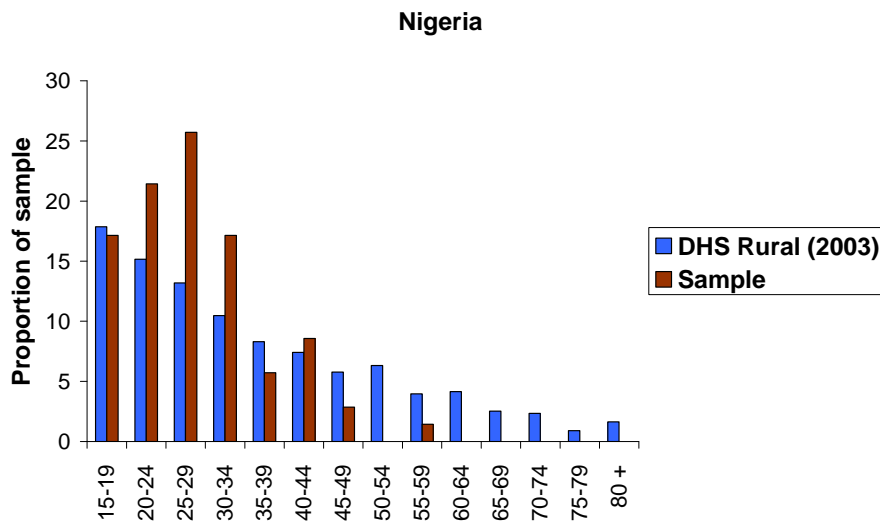


Figure 3. Comparison of sample with national statistics (Rural adult) – age (Nigeria)

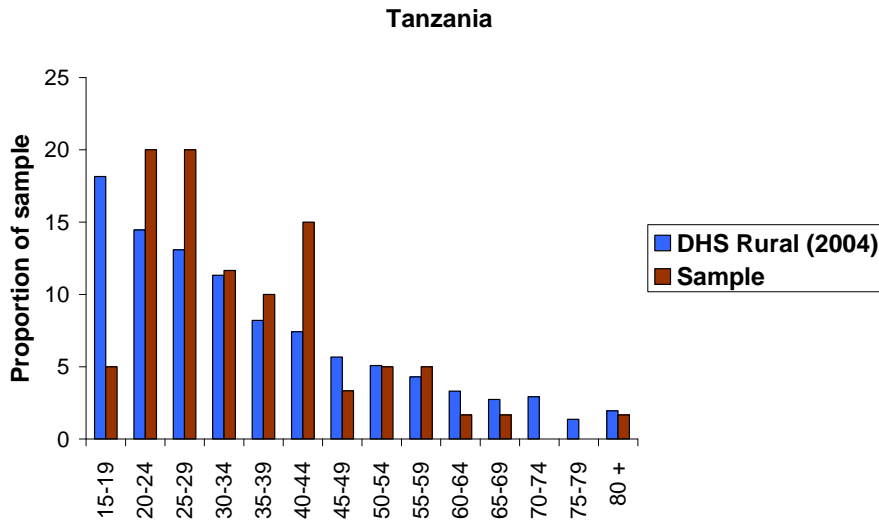


Figure 4. Comparison of sample with national statistics (Rural adult) – age (Tanzania)

Level of education

The following figures compare the education levels of the samples with national statistics for adults.

- All samples have higher proportions of the sample with higher education
- All sample have lower proportions of the sample with no education.

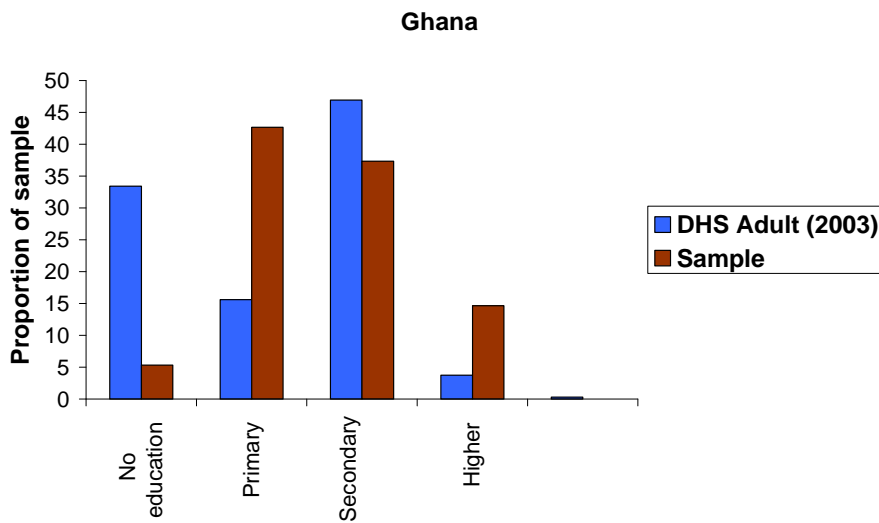


Figure 5. Comparison of sample with national statistics (Adult) – Education (Ghana)

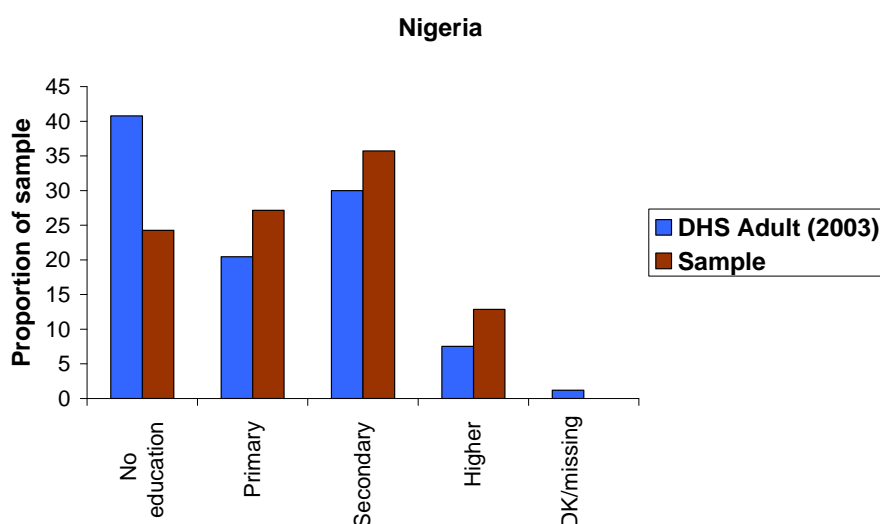


Figure 6. Comparison of sample with national statistics (Adult) – Education (Nigeria)

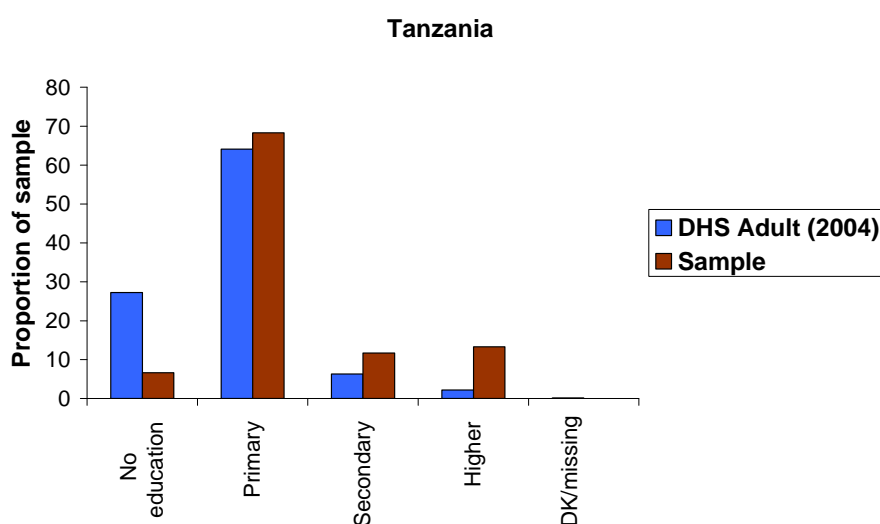


Figure 7. Comparison of sample with national statistics (Adult) – Education (Tanzania)

Literacy

When compared with national statistics for rural adults, the literacy rates of the samples are considerably higher.

Table 22. Literacy rates (can read all or most of card)

	<i>Ghana</i>	<i>Nigeria</i>	<i>Tanzania</i>
Sample	72.0	75.7	-
DHS (Rural adults)	39.9	38.0	60.3

Occupations

The following figures compare the occupations of the samples with those of rural adults from national statistics. This shows:

- All samples have lower proportions of the sample engaged in agriculture¹⁷
- All samples have higher proportions of the sample engaged in professional occupations

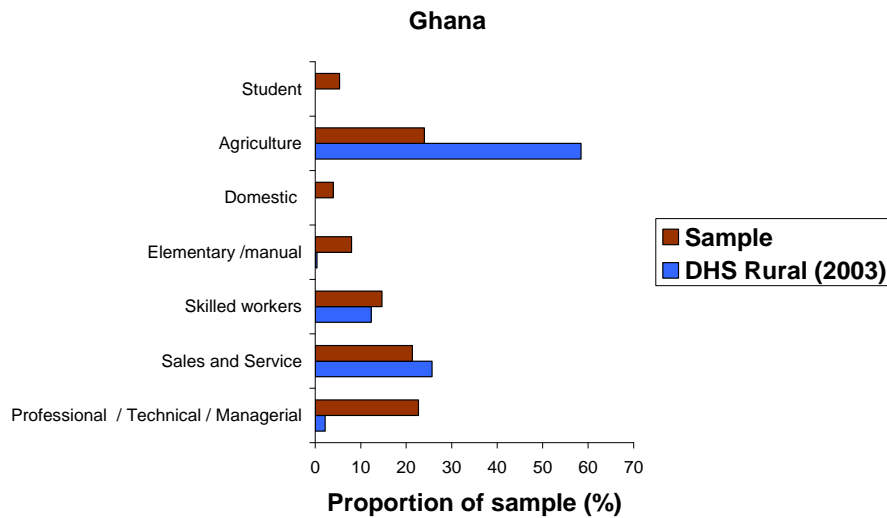


Figure 8. Comparison of sample with national statistics (Rural adult) – Occupation (Ghana)

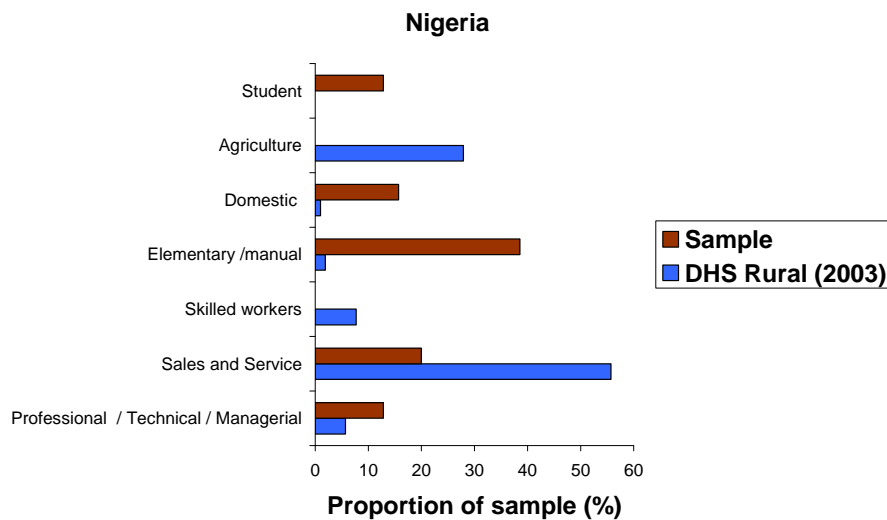


Figure 9. Comparison of sample with national statistics (Rural adult) – Occupation (Nigeria)

¹⁷ The self classification used in the survey may have recoded agricultural workers e.g. subsistence farmers in Nigeria have classified themselves as manual workers, some small scale farmers classify themselves as Sales where they sell produce.

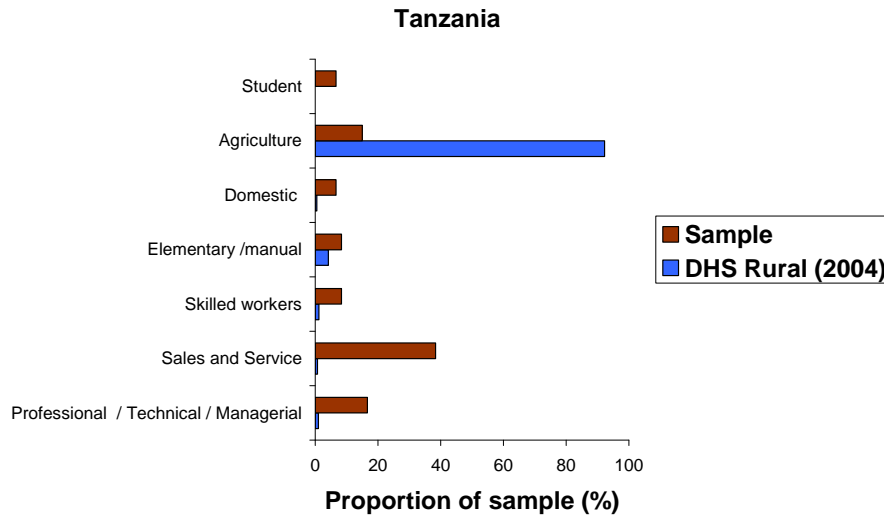


Figure 10. Comparison of sample with national statistics (Rural adult) – Occupation (Tanzania)

Appliances

The following figures compare household assets (electrical) of the samples with those of rural households from national statistics. This shows:

- Very high electrification rates in Ghana, as a result of proximity of the survey location to a power generation dam; TV ownership is correspondingly high;
- High electrification rates in Tanzania, due to network distribution along highways (survey location is on Dar es Salaam highway);
- Relatively high ownership of radio and TV, reflecting higher educational status of samples;

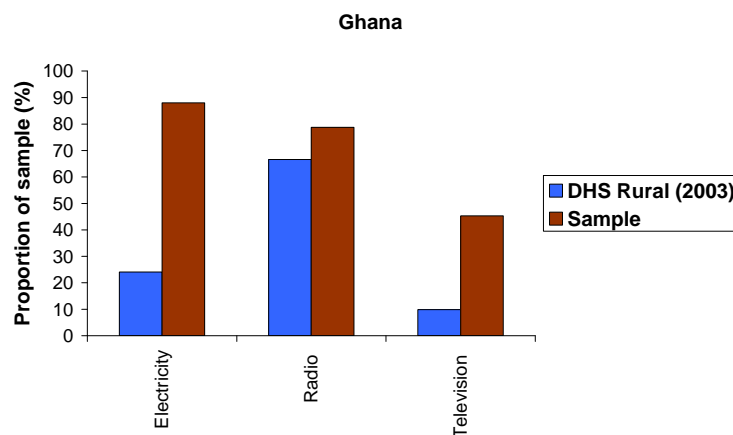


Figure 11. Comparison of sample with national statistics (Rural) – Electricity & goods (Ghana)

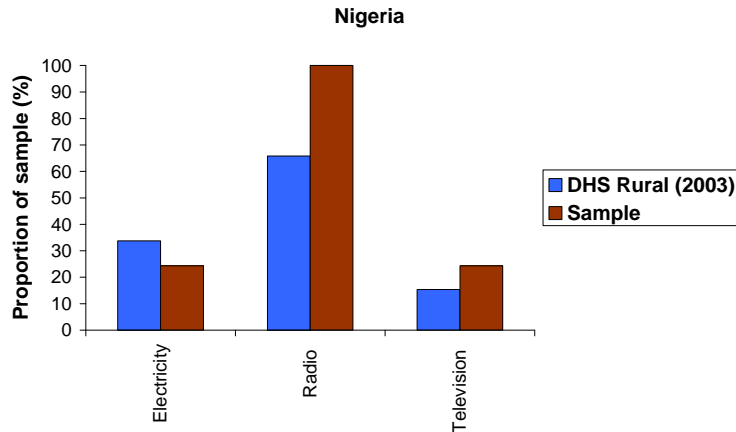


Figure 12. Comparison of sample with national statistics (Rural) – Electricity & goods (Nigeria)

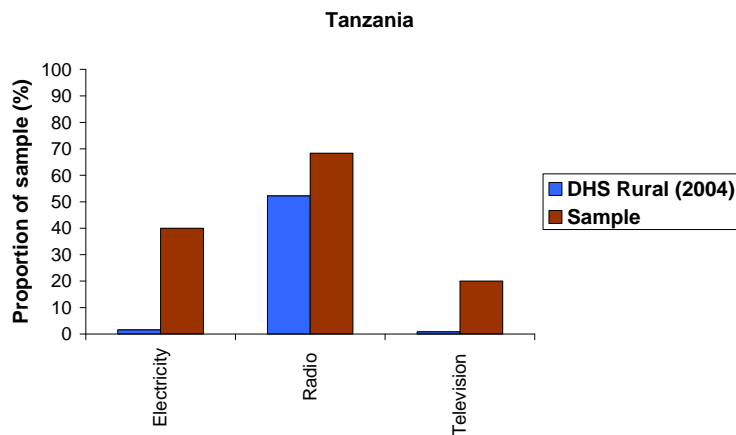


Figure 13. Comparison of sample with national statistics (Rural) – Electricity & goods (Tanzania)

The correlation coefficients presented in table 23 show there is a good degree of consistency between status indicators. It is proposed to use estimated income as a measure of individual status, on the basis that phone expenditure (and wider behaviour) is determined by the individual rather than the household.

Some points of interest include:

- TV ownership appears to be good indicator of status; in contrast to the radio, which is more universally owned;
- Extent of dependence on family members living elsewhere does not correlate with most indicators, but it does correlate with total household expenditure – extent of dependence is greater among poorer households;
- The amount spent on education does not correlate with status indicators, with the exception of total household expenditure;
- The remote nature of the high status Ghanaian community means that correlations with remoteness may be counterintuitive.

10.3. Livelihoods Needs

The importance attributed to various livelihoods issues is presented in Figure 14. This illustrates that the areas of interest (finance and agriculture) are of relatively low priority, compared with social and health issues (N.B. contacting people in emergencies, and prevention and treatment of illnesses are both associated with reducing vulnerability).

Issues that appear to be of most universal relevance (i.e. lowest number of “not applicable” scores) include savings, insurance, microfinance, cash transfers, news & sport, and job opportunities. But at the same time, those issues that are regarded as “not important” by the greatest number of respondents are microfinance, insurance, and cash transfers. Issues that might meet with the greatest demand are those with the greatest numbers of respondents registering them as “very important”:

- Job opportunities;
- Microfinance;
- Savings
- Market information.

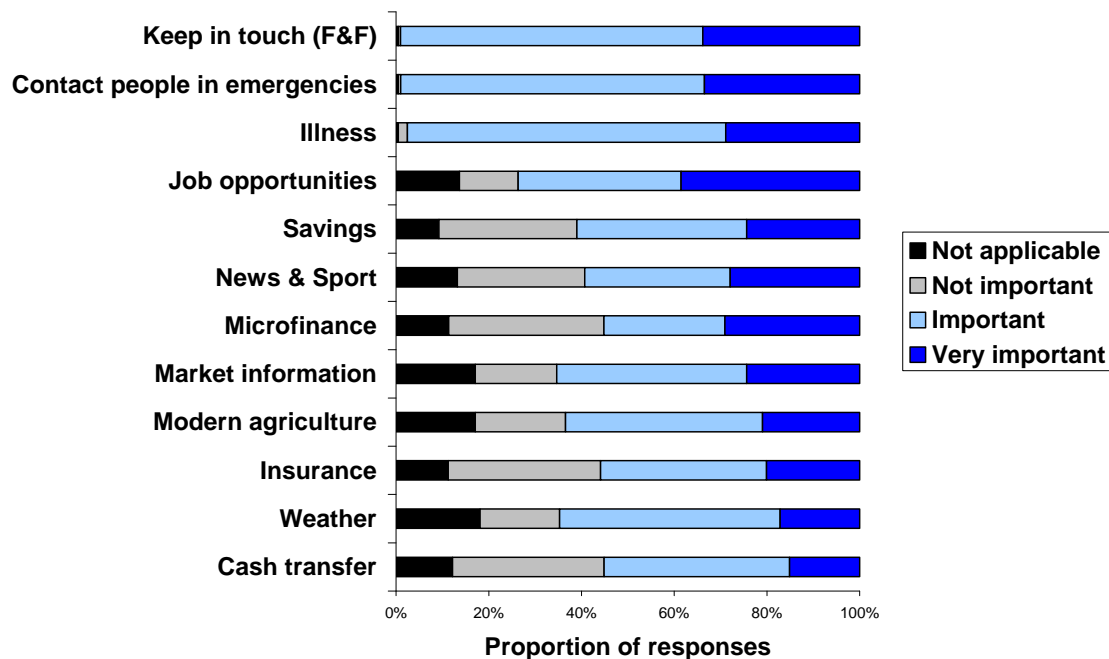


Figure 14. Importance of livelihood issues (ranked by mean importance)

Reliability analysis shows that there is a high degree of consistency in responses to most issues; the Cronbach Alpha coefficient for all indicators with the exception of job opportunities is 0.893¹⁸. This indicates that in terms of responses to these questions, the sample is not very diverse – people ranking one issue as important also tend to rank the other issues as important. There is an especially high degree of consistency (Alpha = 0.955) between the agriculture related indicators:

- Market information on agricultural inputs;
- Introducing modern agricultural practice;
- Weather.

¹⁸ an Alpha coefficient of >0.6 is usually taken to demonstrate reliability.

Similarly, there is high consistency (Alpha = 0.888) between a group of finance related indicators:

- Microfinance;
- Insurance;
- Saving money;
- Sending / receiving cash within the country.

Table 23. Correlation coefficients across countries and indicators

	Country Code				Gender			AGE GROUPS				
	Ghana	Nigeria	Tanzania	Asymp. Sig.	Male	Female	Asymp. Sig. (2-tailed)	15 - 24 years	25 - 29 years	30 - 39 years	40 + years	Asymp. Sig.
Microfinance (loans)	2.11	0.94	2.19	0	1.67	1.79	0.398	1.55	1.61	1.86	1.95	0.133
Insurance (e.g. house,crops, vehicles etc)	1.95	0.94	2.1	0	1.62	1.68	0.644	1.54	1.41	1.84	1.86	0.025
Saving money	2.17	0.94	2.2	0	1.7	1.82	0.356	1.57	1.8	1.76	1.95	0.197
Sending/receiving cash within the country (e.g. payments, remittances)	1.85	0.94	1.98	0	1.49	1.68	0.123	1.5	1.47	1.62	1.77	0.311
job opportunities	2.2	1.59	2.18	0.009	1.95	2.02	0.767	2.11	2.18	1.96	1.61	0.057
market information on agricultural inputs	2.07	1.03	2.12	0	1.82	1.63	0.179	1.52	1.47	1.76	2.27	0
Introducing modern agricultural practice	2.07	1.03	1.93	0	1.8	1.54	0.055	1.5	1.42	1.72	2.16	0.001
weather	1.95	1	2	0	1.71	1.56	0.231	1.5	1.43	1.58	2.14	0.001
Contacting people in emergencies	2.39	2	2.61	0	2.26	2.38	0.11	2.25	2.38	2.26	2.4	0.343
Keeping in touch with friends and family members	2.41	2	2.59	0	2.31	2.34	0.735	2.25	2.44	2.18	2.43	0.029
Prevention and treatment of illness	2.39	2	2.41	0	2.18	2.34	0.018	2.27	2.29	2.24	2.23	0.832
News and Sport (local and international)	2.12	0.7	2.48	0	1.75	1.73	0.776	1.46	1.89	1.67	1.98	0.039

Statistical tests have been carried out to identify significant differences between the key social groupings (country, gender, age, education, and income). The mean scores for each grouping are presented in table 23, and the p value (asympt. Sig) gives a measure of the significance of the differences between the groups (p values of less than 0.05 are taken as representing statistically significant differences).

Expressed importance for all issues is significantly lower among the Nigerian sample, which is consistent with this being the lowest status sample.

There is only one issue for which the men and women register significantly different scores, and that is prevention and treatment of illness, which is of more importance to women.

A number of agriculture related issues are regarded as more important by older age groups (over 30s) – market information, modern agricultural practice, and weather; insurance is also more important to these age groups, and might be linked to agricultural risk. News and sport is less important to the under 25s.

Financial issues appear to be less important to those with lowest education (none or incomplete primary); importance appears to be highest among those with complete primary education, so there is not a direct relationship with level of education. Importance of job opportunities, however, does appear to be linked to education, as it is higher among better educated groups.

Importance attributed to all issues is lowest among the lowest income group. The second highest income group (of four groups) registered the highest importance scores, with the exception of job opportunities and prevention and treatment of illness, for which the highest income group registered the highest scores.

10.4. Communications – Patterns of Behaviour

Figure 15 confirms the reach of radio as a broadcast medium; TV is accessed by around half of the sample, and has overtaken newspapers.

In terms of telecommunications, there is almost universal access to mobile phone – even in areas selected for survey because of poor or limited mobile coverage. Note also negligible use of fax, and low use of internet (around 5% register some use of internet).

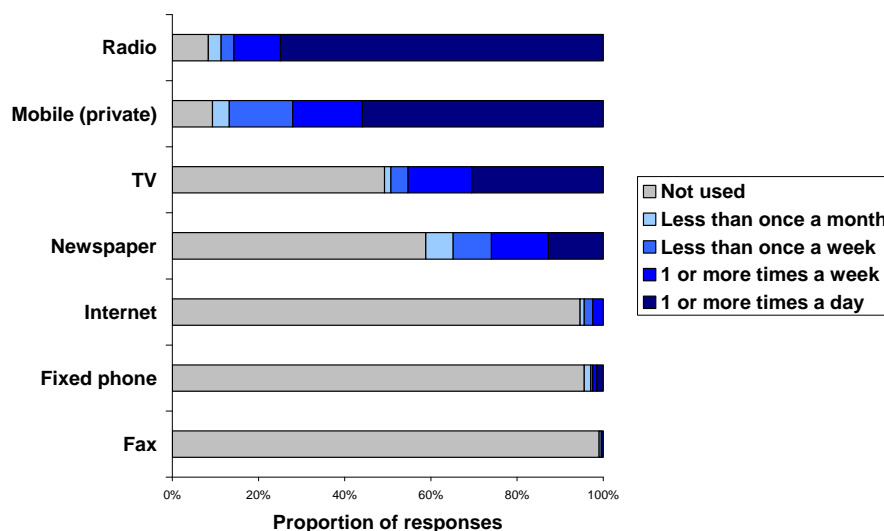


Figure 15. Intensity of use of communication media

For the sample as a whole, mean expenditure figures are:

Fixed line phone	0.08 USD PPP per week
Private mobile phone	6.35 USD PPP per week
Other phone	1.31 USD PPP per week

N.B. this includes respondents who do not use services. Expenditure is considered in more detail in Section 10.5.2.

Statistical tests have been carried out to identify significant differences between the key social groupings (country, gender, age, education, and income). The mean scores for each grouping are presented in **Error! Reference source not found.**, and the p value (asymp. Sig) gives a measure of the significance of the differences between the groups (p values of less than 0.05 are taken as representing statistically significant differences).

Use of all media is lowest in Nigeria, with the exception of radio, for which intensity of use is highest.

Men tend to make more intensive use of media – newspapers, mobile phones, and radio.

Intensity of use of communications tends to be linked to education status, with the notable exception of radio.

The same can be said of income groupings, although within this sample it is the second highest grouping that tends to exhibit highest use. Again, radio is the exception, where it is the poorest group that registered highest use.

10.4.1. Mobile phones

90% of the total sample (N = 185) claim to make some use of mobile phones (see Figure 15). Fixed line phone use is complementary to mobile phone use – of the 9 respondents who registered some use of fixed line phones, only one claims not use to private mobile phones.

Most mobile phone users responded to the question on spend on mobile phones – 83% valid responses (N = 170). Even among intensive mobile phone users, there is a significant proportion that claim not to pay:

Table 24. Mobile phone users – zero expenditure

	Users	Number of valid spend responses	Number of zero spend responses	Proportion of valid responses with zero spend (%)
Less than once a month	8	4	4	100
Less than once a week	30	29	14	48
1 or more times a week	33	29	14	48
1 or more times a day	114	108	8	7
Totals	185	170	40	

Figure 16 shows that 77% of the sample has some form of ownership of a mobile phone i.e. most mobile users already own a means of accessing the network, even in poorly served areas. The extent of personal ownership is confirmed in Figure 17, but this figure also shows that extensive use is made of other private mobiles (e.g. belonging to friends and family). It also shows remarkably low use of public facilities – poor service in the survey locations may make it difficult for businesses in trading centres to offer a service (if there is no signal), and the Nigeria field survey noted that there were no public payphones but individuals provide commercial phone services in places where there is a reasonable signal.

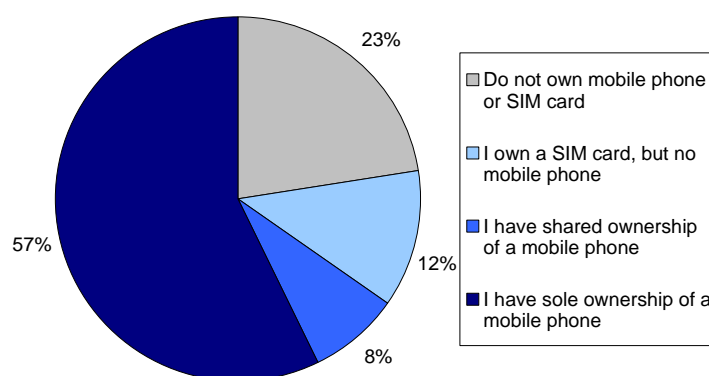


Figure 16. Mobile phone ownership

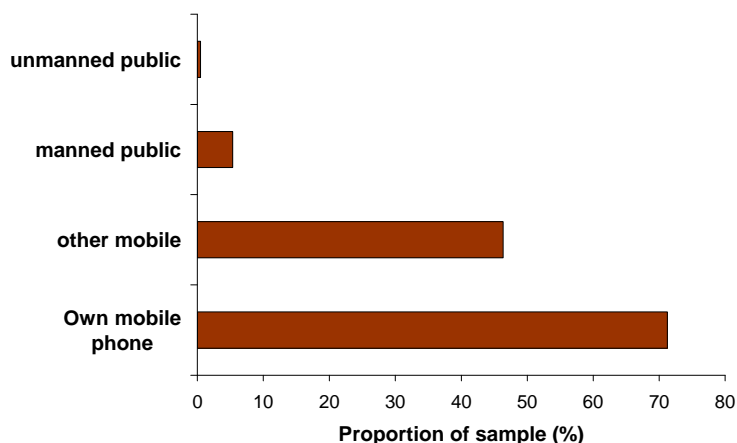


Figure 17. Means of accessing phones

Regarding availability of signal, the field reports note:

- Ghana – signal is available on the outskirts of the village, especially on the school park which is 1 km away from the southern end of the village; people in the village walk to the park to make calls, and some travel to neighbouring villages;
- Nigeria – in one location there is poor signal from two out of three networks; in one location there is no signal so people go to Jibbo where there is a poor signal from two networks.
- Tanzania – the area is poorly served by mobile phone networks i.e. there are access issues, problems with quality of service etc.

The places most commonly cited as the nearest place to make a call reflect the patchy coverage referred to in the field notes:

- Spots along the expressway;
- School Park;
- Particular places in the village;
- Outskirts of the village;
- On a hill;
- Market place;
- At home.

The need to travel is reflected in Table 25, in which almost all mobile users indicated a need to travel.

Table 25. Frequency of travel specifically to make a call (phone users only)

	Frequency	Percent
Valid 1 or more times a day	96	51.9
1 or more times a week	8	4.3
1 or more times a month	26	14.1
less than once a month	29	15.7
none	26	14.1
Total	185	100.0

There is a strong correlation between the frequency of mobile phone use and both the amount spent on the journey ($r = -0.320$, $p = 0.000$) and the length of the journey ($r = -0.361$, $p = 0.000$), which probably confirms the obvious – that the cost of travel acts as a barrier to more frequent use of phones. However, the mean figures presented in table 26 does not show a clear trend, beyond the fact that people within walking distance spend nothing on the journey. This indicates that if people were able to access a phone without the need to spend money on travel, they would use the phone more frequently. Among those who pay to make the journey ($N = 72$), then mean distance is 2.4 km, and the mean cost associated with travel is 0.70 USD PPP. Table 27 shows the clear distinctions between country contexts – note that those who claimed some cost associated with travel to make a call are drawn mostly from the Nigerian sample.

Table 26. Relationship between cost and frequency of travel specifically to make a call (phone users only)

How often do you make a journey specifically to use a mobile phone?	N	How far is it to this place? (km) (mean)	SPEND ON JOURNEY (USD PPP) (mean)
1 or more times a day	96	0.3	0.0
1 or more times a week	8	2.9	1.1
1 or more times a month	26	2.3	0.6
less than once a month	29	1.8	0.4
None	26	2.0	0.5

Table 27. Need to spend money making journey to make a call by Country

		Country Code			Total
		Ghana	Nigeria	Tanzania	
SPEND ON JOURNEY (BIPOLAR)	nothing	58	4	52	114
	something	6	65	1	72
Total		64	69	53	186

Figure 18 shows that social calls dominate phone use (friends and family). However, a substantial minority of respondents (11%) use the phone mainly for work related calls. Figure 21 and Figure 22 show that none of these are drawn from the low status Nigerian sample. Note that although people may purchase a handset primarily to make social calls, it will also be used to make work related calls. Figure 19 and Figure 20 show that the majority of calls are made with people outside of the locality; a substantial proportion of work calls are made more locally.

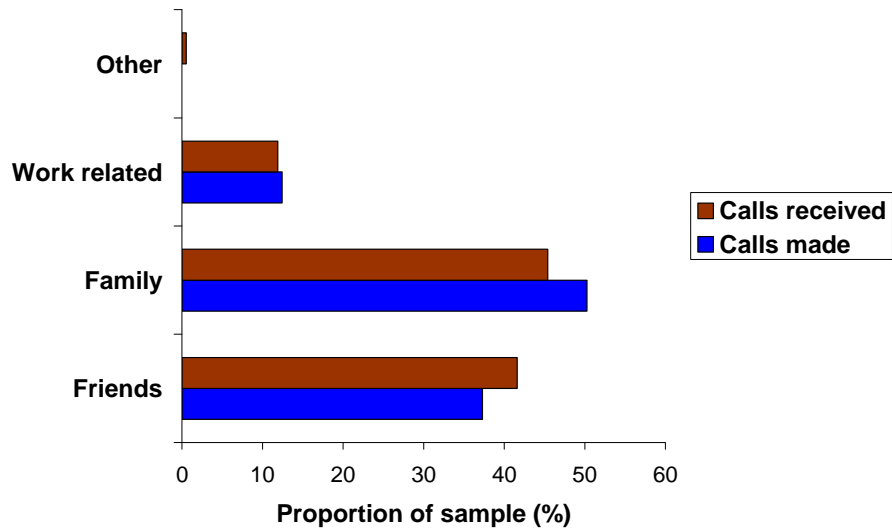


Figure 18. Most common types of calls (mutually exclusive) – made and received (phone users only)

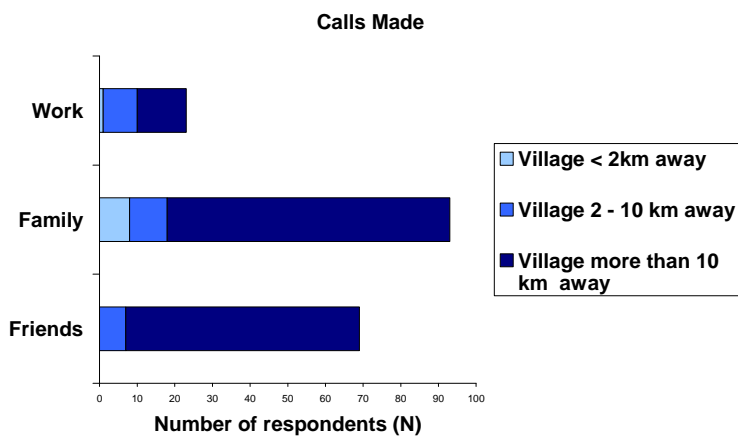


Figure 19. Location of termination – calls made (phone users only)

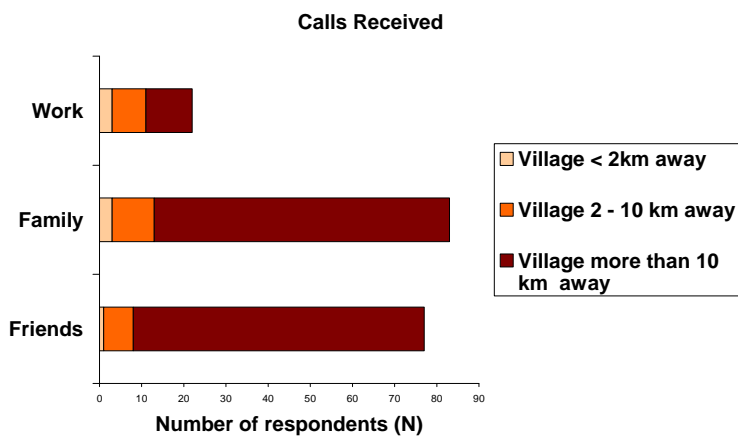


Figure 20. Location of initiation – calls received (phone users only)

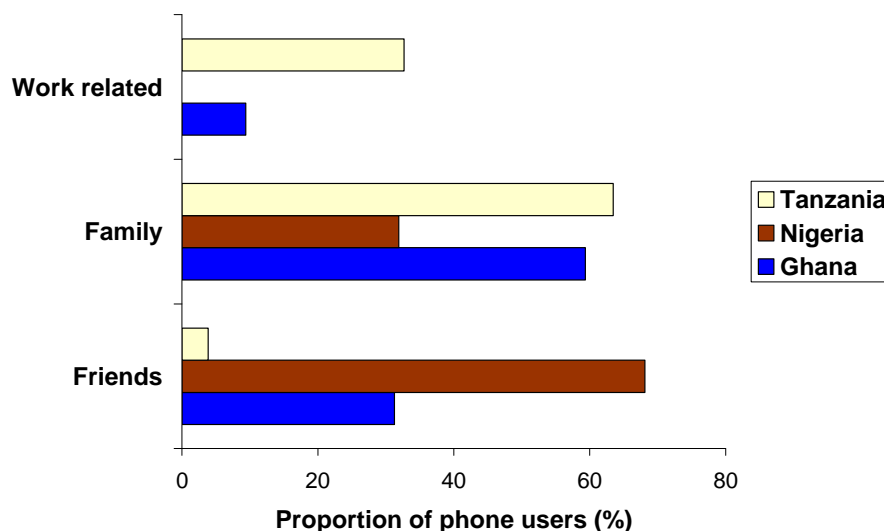


Figure 21. Most common types of calls made (mutually exclusive) (phone users only)

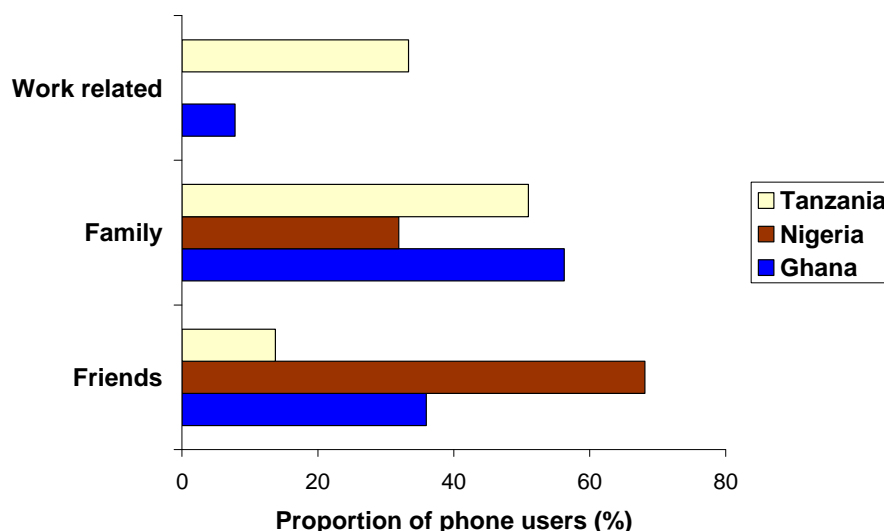


Figure 22. Most common types of calls received (mutually exclusive) (phone users only)

Expenditure figures for all respondents are presented in table 28. However, among mobile phone owners (including shared and SIM ownership), the mean expenditure is 7.6 USD PPP / week. A substantial proportion of respondents spend nothing, and there is a large spread of spend (the median is 3.2 USD PPP / week).

Table 28. Weekly spend on mobile phones (phone owners)

	Mean	Median
spend on own mobile phone (USD PPP)	7.61	3.21
Spend on voice (USD PPP)	6.55	2.79
Spend on SMS	1.21	0.25

Among all mobile phone users, the mean spend on airtime is 2.91 USD PPP (median is 1.61 USD PPP).

Table 299 shows that most calls are between 30 seconds and 3 minutes. It appears difficult to complete a call in less than 30 seconds. It is not immediately obvious from table 30 that the duration of calls depends on the principal type of calls.

Table 29. Estimated duration of calls (phone users)

	Frequency	Percent
Valid less than 30 seconds	8	4.3
30 secs - 1 min	84	45.4
over 1 and up to 3 mins	44	23.8
over 3 and up to 5 mins	22	11.9
over 5 mins and up to 10 mins	10	5.4
over 10 mins and up to 20 mins	6	3.2
more than 20 mins	11	5.9
Total	185	100.0

Table 30. Estimated duration of calls (phone users) – disaggregated by types of calls

	Friends	Family	Work
less than 30 seconds		6.5	8.7
30 secs - 1 min	53.6	44.1	26.1
over 1 and up to 3 mins	26.1	19.4	34.8
over 3 and up to 5 mins	4.3	17.2	13.0
over 5 mins and up to 10 mins	8.7	4.3	
over 10 mins and up to 20 mins	4.3	3.2	
more than 20 mins	2.9	5.4	17.4
Total	99.9	100.1	100.0

Levels of ownership of mobiles are highest in the Tanzanian and lowest in Nigerian samples. Similarly, the frequency of journeys specifically to make a call is highest in the Tanzanian and lowest in Nigerian samples, but the distance and associated cost is inverse – highest in the Nigerian and lowest in the Tanzanian samples. A greater proportion of the Tanzanian sample tends to communicate with people nearer to them. The Ghanaian sample tends to make longer calls.

There are no significant differences in behaviour between men and women.

Ownership of mobiles is highest among the 25 – 29 years age group, and lowest among the under 25s. Older people tend to make more frequent journeys to make a call, and they tend to spend less on the journey. They types of calls made / received are sensitive to age – younger groups tend to make more calls to friends than family.

Mobile ownership and travel to make calls is not sensitive to level of education. Those with higher education are more likely to call people further away, and are likely to make longer calls.

Mobile ownership is higher among higher income groups. It is the poorest group that makes the most frequent journeys specifically to make a call, who travel furthest, and who spend most on travel. A greater proportion of the poorest group call friends as opposed to family, and work related calls are most common among the second highest income group. The poorest group has the greatest proportion of calls made / received to remote locations (>10 km).

10.5. SMS

The figures in Table 3131 show that, among phone users, the number of messages sent and received are balanced, which reflects the high degree of phone ownership (public access makes it more difficult to received messages).

Table 31. Number of SMS messages sent & received (phone users)

	Mean	Median
SMS messages sent in a week	5.2	2
SMS messages received in a week	6.2	2
SMS ratio (sent / received)	1.1	1

Not all phone users make use of SMS – while 62% of phone users send SMS messages (N = 114), 69% receive SMS messages (N = 127). Among those sending SMS messages, the mean number of message sent is 8.4, and among those receiving SMS messages, the mean number of messages received is 9.0.

All the most frequently given reasons for not using SMS revolve around this issue of interaction and use of voice e.g. It's better to make a voice call; Eager to speak with other party; it's better to talk; prefer to talk etc. Other reasons include:

- Illiterate, no typing skills;
- Slow and time consuming;
- It's complicated;
- Don't know how to use it.

On the other hand, the main benefit of using SMS is the perception that it is cheaper. Other reasons include:

- Good to expressing information;
- Privacy (secret).

The average spend on SMS among phone owners is 1.21 USD PPP / week (Table 28), but the average spend among respondents sending SMS messages is 1.57 USD PPP / week (see Table 32), indicating that SMS users make quite intensive use of the service – it accounts for a mean of 20% of total spend on mobiles. In

contrast, little use of SMS is made on other phones (which includes public access).

Table 32. Expenditure on SMS (SMS senders)

	Own phone	Other phone
Total spend on own mobile (USD PPP / week)	7.96	1.15
estimated spend on SMS (USD PPP / week)	1.57	0.03
Proportion of total expenditure on SMS (%)	20	2

Although 55% of the total sample regularly sends SMS messages, very few make use of SMS information services – see Table 3333. Airtime transfer stands out as the only service that is widely used.

Table 33. Use of SMS text services (among phone users)

Service	Number of users (N)
Airtime transfer	120
News	7
Download ringtones	5
Sport updates	4
Dating / matrimonial	4
Religious / inspirational	4
Jokes	3
Games	2
Astrology / horoscopes	2
Travel enquiries (trains, airlines, visas)	2
Download wallpaper / logos / animations	1
M-banking	1
Commodity prices	1
Job alerts	0
Forex	0

Use of SMS is much higher among the Tanzanian sample than the other two, although interestingly, differences in the declared amounts spent on SMS are not flagged as significant (using own mobile phone).

No gender differences are significant.

The youngest age group spends less on SMS, yet differences in the number of SMS message sent / received are not flagged as significant.

Use of SMS is highest among the highest education group, as is the amount spent on SMS.

Use of SMS is linked to income, although it is the second highest income group that shows the most intensive use of SMS (in terms of numbers sent / received).

10.5.1. Voicemail

Only 4% of phone owners use a voicemail service; 23% don't know what voicemail is. Among those who do not use voicemail, the main reason is lack of awareness (including don't know how to use it); other reasons include:

- Cost;
- It is complicated;
- Don't like it;
- No need for it.

10.5.2. Expenditure

The mean estimated weekly income for the sample as a whole is 57 USD PPP; differences between countries are presented in table 34 and show that incomes in the Nigerian sample are markedly lower than the other two samples.

Spend on communications is much higher in Tanzania than the other two countries. This is partly due to the fact that the PPP factor used in converting local currency to international dollars is considerably higher in Tanzania than in the other two countries (see table 34). Because the income levels are low in Nigeria, the figures for proportion of income spent on communications are similar between Nigeria and Tanzania. These figures need to be treated with caution as declared income figures will be unreliable, and samples are not diverse, but they show similar trends to national statistics. The OECD lower user basket costs¹⁹ expressed as a proportion of GNI given in the ITU's WSIS Report 2007²⁰ are 18.8%, 23.0% and 35.3% for Ghana, Nigeria, and Tanzania respectively. Although these 2006 figures are now somewhat dated, they confirm that expenditure on mobiles is relatively high in Tanzania.

Table 34. Estimated income and telecommunications expenditure (all respondents)

	<i>Ghana</i>		<i>Nigeria</i>		<i>Tanzania</i>	
	<i>mean</i>	<i>median</i>	<i>mean</i>	<i>median</i>	<i>mean</i>	<i>median</i>
Estimated income (USD PPP per week)	77.56	32.00	26.49	7.90	74.14	61.25
Estimated spend on telecommunications (USD PPP per week)	4.6	3.2	3.5	2.2	16.5	13.6
Spend on comms as proportion of income (%)	10.4	5.0	59	17	82	19
spend on own mobile phone	3.4	1.6	2.0	1.3	15.0	11.3

¹⁹ The OECD low-user basket gives the price of a standard basket of monthly mobile usage in USD, and is used as a measure to compare tariffs between countries.

²⁰ World Information Society Report 2007: Beyond WSIS. ITU, UNCTAD. 2007

(USD PPP / week)						
Estimated spend on SMS - mobile phone (USD PPP / week)	0.9	0	0.3	0.3	1.9	0

No differences according to gender are significant.

Total spend on communications is directly linked with age – spend is higher among the higher age groups. While spend on private mobile phones is also linked to age, it is interesting to note that all groups spend similar amounts on other phones (e.g. kiosks).

Within these sample, it appears that those with completed primary education are particularly intensive mobile phone users, so they have the highest spend figures; spend is lowest among those with no or incomplete primary education.

Spend is linked to estimated income, but is highest among the second highest income group.

10.6. Attitudes

10.6.1. General issues

If the called person is not available, most people are content to simply try again later. However, when disaggregating the sample, it can be seen that only one half of those who need to pay for the journey to make a call are content to try again later (see Table 365). It is interesting to note that the willingness to send an SMS appears consistent.

Table 35. Preferred means of getting in touch when person not available

	Frequency	Percent
Valid try again later	130	63.4
wait for them to call back	16	7.8
send them an SMS	39	19.0
leave a voicemail message for them	2	1.0
send message by another means	14	6.8
Total	201	98.0
Missing System	4	2.0
Total	205	100.0

Table 36. Preferred means of getting in touch when person not available – disaggregated by cost of journey

	Zero cost of journey	non-zero cost of journey
Valid try again later	71.1	50.0
wait for them to call back	3.5	15.3
send them an SMS	20.2	19.4
leave a voicemail message for them	1.8	

send message by another means	1.8	15.3
Total	98.2	100.0

Although cost is clearly a factor lying behind SMS use, Figure 23 indicates that there is a part of the sample (around 15%) for whom cost is not necessarily a key feature.

Only one half of the sample feels that local language is an important issue; this is somewhat surprising given the dominance of local languages.

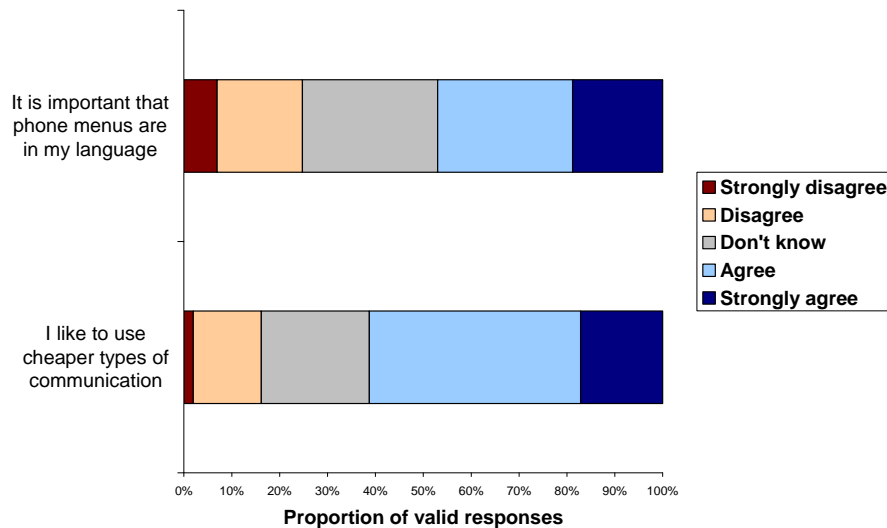


Figure 23. Attitude scores – general issues

10.6.2. Phone issues

Two thirds of the sample indicated that a ringback facility (when the line is no longer engaged) would be useful.

Table 37. If a line is engaged when you make a call, how useful would it be to get a ringback when it is free?

		Frequency	Percent
Valid	don't know / no opinion	41	20.0
	not at all	13	6.3
	useful	75	36.6
	very useful	74	36.1
	Total	203	99.0
Missing	System	2	1.0
Total		205	100.0

Results presented in Figure 24 confirm the importance of interactivity (immediate response) and the importance of using voice.

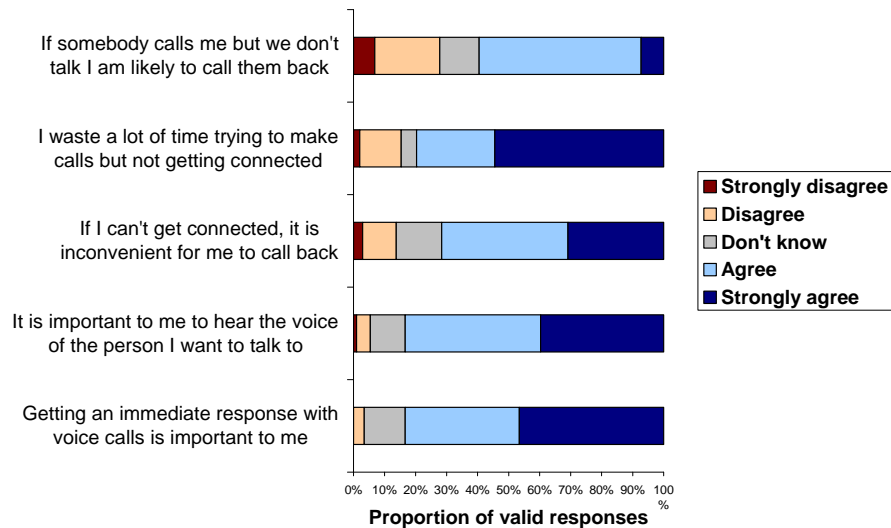


Figure 24. Attitude scores – phone issues

10.6.3. SMS issues

In general, people feel positively about SMS (see Table 38).

Table 38. Overall attitude towards SMS

	Frequency	Percent
Valid negative	9	4.4
no opinion	62	30.2
positive	91	44.4
very positive	43	21.0
Total	205	100.0

Some observations can be made from the responses to more detailed attitudes related to SMS that are presented in Figure 25:

- People feel strongly about needing confirmation of message delivery;
- Use of SMS appears to be constrained by literacy (ability to type);
- A perception that junk SMS will be a problem is quite widespread (two thirds of the sample);
- Less than two thirds of the sample feel that SMS is cheaper than voice calls;
- There is a part of the sample (one quarter) who would rely on an intermediary to send an SMS – this corresponds with the proportion that would be happy to share personal details with an operator, and who would find SMS too complicated to use.

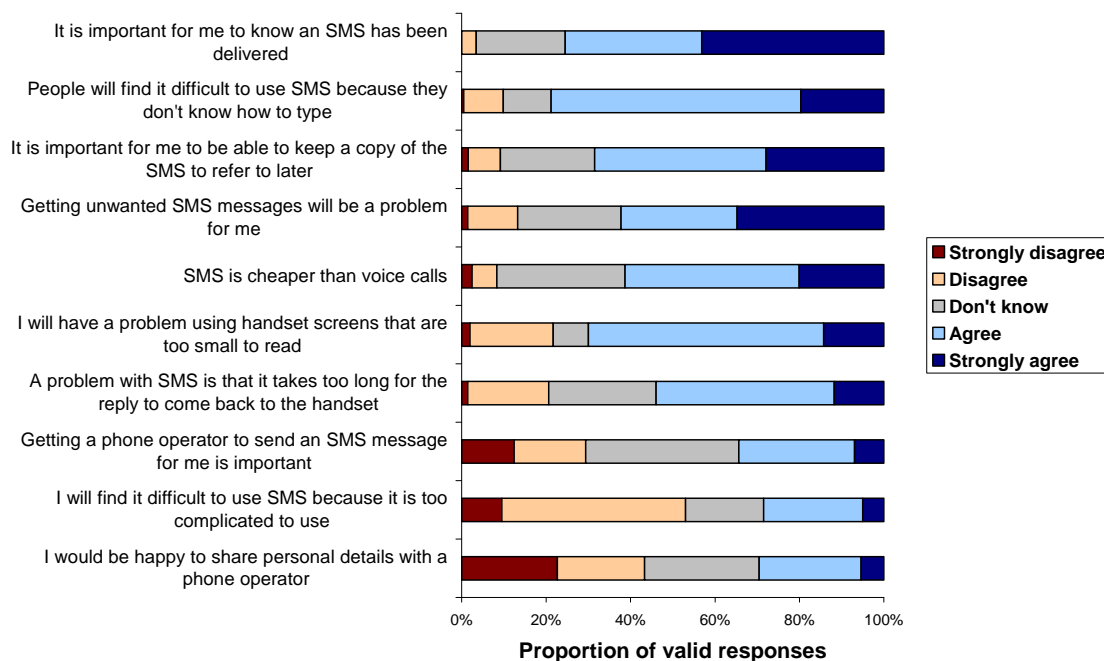


Figure 25. Attitude scores – SMS issues (ranked by means)

10.6.4. Voicemail issues

In general, there is a neutral view of voicemail (see Table 399).

Table 39. Overall attitude towards Voicemail

	Frequency	Percent
Valid very negative	8	3.9
negative	20	9.8
no opinion	128	62.4
positive	31	15.1
very positive	18	8.8
Total	205	100.0

Although there is quite a strong resistance to leaving voicemail messages, the results in Figure 26 confirm there is a general lack of awareness about the service.

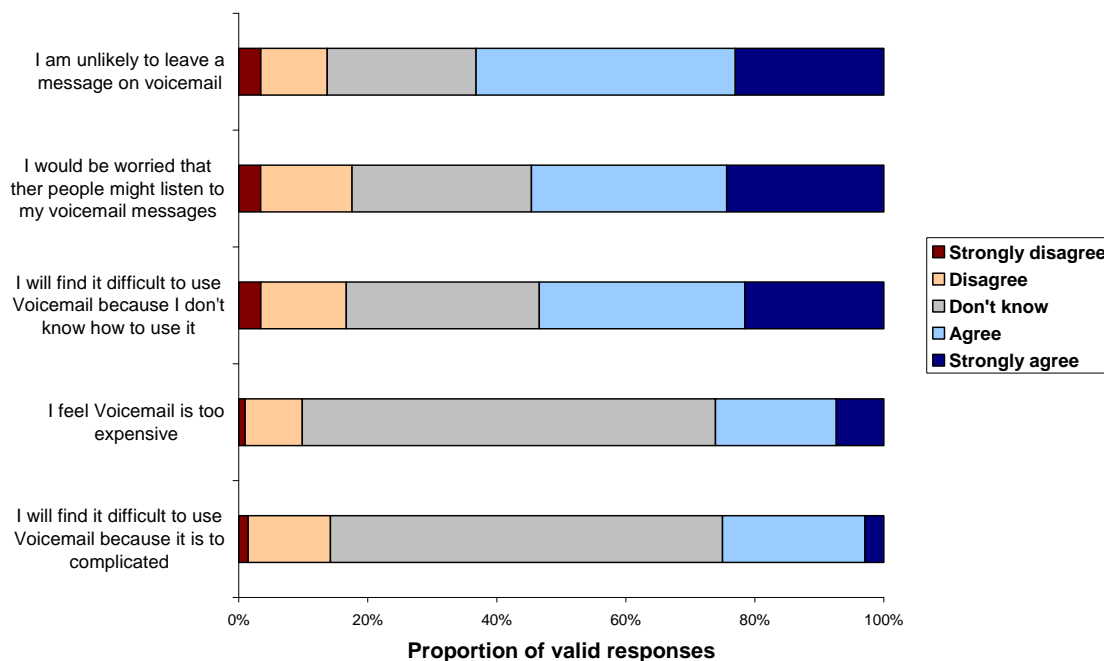


Figure 26. Attitude scores – Voicemail issues (ranked by means)

10.7. Intentions

10.7.1. Mobile phones and voice / SMS use

A few questions were asked to explore intentions to change behaviour in the future. The following tables show that intentions are generally positive – over two thirds of the sample intends to get a new mobile; there is a more positive intention to make increased use of voice calls than SMS.

Intention to get a new phone is weakest in Tanzania (although overall intention is still positive), and likelihood of increasing use of voice calls is also weakest in Tanzania (although overall intention is still to increase use).

No differences according to gender, age, or education are significant.

Intention to get a new mobile and to increase voice calls is strongest among lower income groups, indicating unmet demand.

It is interesting to note that intention to increase SMS use does not appear to be sensitive to any of the key groupings.

Table 40. Intentions – mean scores

	Mean score
How likely are you to get a new mobile phone within the next year?	0.80
How is your use of mobile phones for voice calls likely to change in the next year?	0.78

How is your use of SMS on mobile phones likely to change in the next year?	0.56
----------------------------------------------------------------------------	------

Scale -2 (very unlikely / much less) through +2 (very likely / much more)

Table 41. Intention to get a new mobile within the next year

		Frequency	Percent
Valid	Very unlikely	1	.5
	Unlikely	32	15.6
	No opinion	14	6.8
	likely	117	57.1
	Very likely	40	19.5
	Total	204	99.5
Missing	System	1	.5
Total		205	100.0

Table 42. Intention to change use of voice calls within the next year

		Frequency	Percent
Valid	less	5	2.4
	no change	47	22.9
	more	139	67.8
	much more	13	6.3
	Total	204	99.5
Missing	System	1	.5
Total		205	100.0

Table 43. Intention to change SMS use within the next year

		Frequency	Percent
Valid	less	5	2.4
	no change	87	42.4
	more	102	49.8
	much more	8	3.9
	Total	202	98.5
Missing	System	3	1.5
Total		205	100.0

The correlations presented in Table 4440 indicate that an appreciation for characteristics of a voice conversation appears to drive demand for voice calls – people to whom the sound of the voice and an immediate response are important have stronger intention to increase their use of voice calls. It is interesting to note that a couple of factors likely to constrain use of SMS also appear to be linked to increased use of voice calls – people who perceived spam SMS as a problem, and who feel difficulty in typing is a constraint to SMS use are more likely to increase their use of voice calls.

The following issues appear to act as drivers supporting increased use of SMS (see table 43)²¹:

- The relatively low cost of SMS is clearly the strongest driver;
- Inconvenience associated with making a call (making another call, wasting time getting connected) – probably due to the necessity to travel in the sample locations
- Having a copy of the SMS text to refer to later.

The following issues appear to act as barriers constraining increased use of SMS:

- Perception it is too difficult to use;
- Issues of privacy associated with using an operator to send an SMS.

There are a number of issues linked to increased use of SMS which might be expected to constrain demand for SMS, but do not appear to:

- Importance of knowing an SMS has been delivered (assume this is not a feature of current SMS service);
- Spam SMS

The fact that the sound of the voice and an immediate response also appear to act as drivers supporting increased use of SMS indicates that voice calls and SMS are complementary rather than mutually exclusive.

Note that none of the attitudes explored appear to be linked to intention to get a new mobile.

Table 44. Correlation of attitudes with intentions

	How likely are you to get a new mobile phone within the next year?	How is your use of mobile phones for voice calls likely to change in the next year?	How is your use of SMS on mobile phones likely to change in the next year?	if the cost were reduced, how would your use of SMS change?
I like to use cheaper types of communication (e.g. SMS instead of voicemail)			0.348***	0.387***
It is important that phone menus are in my language				
Getting an immediate response with voice calls is important to me		0.275***	0.223***	
It is important to me to hear the voice of the person I want to talk to		0.248***	0.251***	0.283***
If I can't get connected to somebody, it is inconvenient for me to call back			0.208**	0.212**
I waste a lot of time trying to make calls but not getting connected				0.228***
If somebody calls me but we don't talk (e.g. beep) then I am likely to call them back		-0.278***		
It is important for me to know an SMS has been delivered			0.313***	0.422***
It is important for me to be able to keep a copy of the SMS text to refer to later			0.32***	0.389***
Getting a phone operator to send an SMS message for me is important				
A problem with SMS is that it takes too long for the reply to come back to the handset				
Getting unwanted SMS messages will be a problems for me		0.267***	0.204**	0.295***
I will have a problem using handset screens that are too small to read				

²¹ The two questions on change in SMS use are conceptually similar - the question relating to reduced cost simply removes (or reduces) one potential barrier to increased use.

People will find it difficult to use SMS because they don't know how to type		0.216**		
I will find it difficult to use SMS because it is too complicated to use				-0.301***
I would be happy to share personal details with a phone operator				-0.366***
SMS is cheaper than voice calls			0.395***	0.407***
I am unlikely to leave a message on voicemail				
I feel Voicemail is too expensive				
I will find it difficult to use Voicemail because it is too complicated				
I would be worried that other people might listen to my voicemail messages				
I will find it difficult to use Voicemail because I don't know how to use it				

Significance of correlation: * p < 0.05 ** p < 0.01 *** p < 0.001

10.7.2. Price elasticity – SMS

Overall, it appears that use of SMS is sensitive to price – judging by responses presented in Table 455, stated benefits of SMS use, and issues acting as drivers promoting increases SMS use.

Table 45. Change in SMS use given roughly 50% reduction in cost

	Frequency	Percent
Valid less	2	1.0
no change	59	28.8
more	58	28.3
much more	86	42.0
Total	205	100.0

Price sensitivity has been analysed for each of the groups of SMS users presented in Table 46. Note that the lower two groups include a mix from all three country samples, but the high intensity group is comprised mostly of Tanzanian respondents.

Table 46. Groups of SMS use (by number of SMS messages sent)

	Frequency	Percent
Valid none	86	42.0
less than 10 / week	96	46.8
10 or more / week	23	11.2
Total	205	100.0

It is not possible to create a conventional price elasticity curve because the survey used a subjective indicator of increased use (using scale of -2 (much less) to +2 (much more)). There is a declared intention to increase use of SMS anyway, given the prevailing cost structures (see Section 10.7.1). Price sensitivity is gauged by the further increase in demand that a reduction in price would create – this is illustrated in Figure 27, where the two sets of point plotted are:

- the mean score for intended change in SMS use at current prices (relative price = 1);
- the mean score for intended change in SMS use if the cost were reduced to roughly one half (relative price = 0.5).

The curves in Figure 27 illustrate the following points:

- elasticity is highest among low intensity users
- demand among intensive users is less elastic, implying that use is nearer saturation among this group;
- among non-users demand remains relatively inelastic, implying it will be difficult to encourage them to adopt an SMS culture.

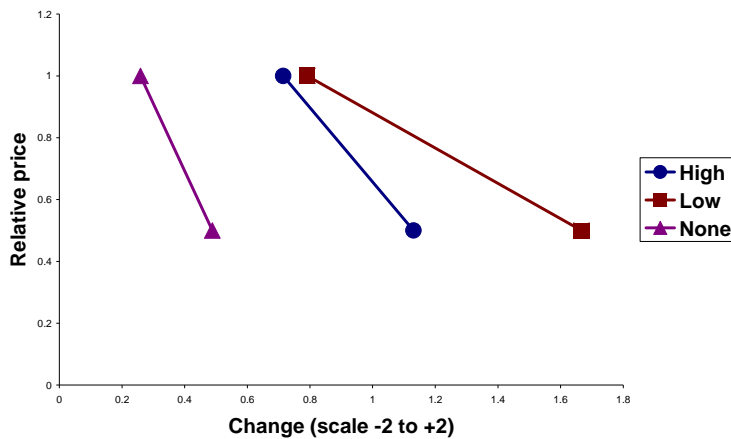


Figure 27. Price elasticity curves for intensity of SMS groups

It has been pointed out that the high intensity SMS use group is drawn mainly from Tanzania, so curves from the three country samples have also been drawn up in Figure 28. This shows a reasonable degree of consistency between all three samples; elasticity is less elastic in the Tanzanian sample (which is also has the most intensive SMS use).

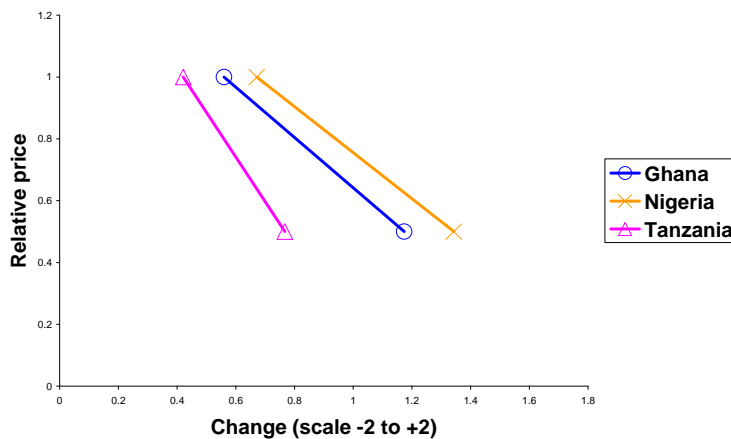


Figure 28 Price elasticity curves for country samples

10.7.3. Ringback facility

Overall, there is a positive view of the potential value of a ringback facility – see Table 477.

Table 47. Perceived value of ringback facility

		Frequency	Percent
Valid	don't know / no opinion	41	20.0
	not at all	13	6.3
	useful	75	36.6
	very useful	74	36.1
	Total	203	99.0
Missing	System	2	1.0
Total		205	100.0

The perceived value of a ringback facility is linked to several attitudes (Table 48):

- People who place a high value on the characteristics of a voice call (sound of voice and immediate response) also place a high value on being able to make a voice call successfully;
- Perceived value of ringback is clearly higher among those who experience inconvenience with making calls (calling back and wasting time);
- There is a strong correlation with willingness to call back: people who will not return a call regard ringback as of greater value i.e. they place value on the call initiator being able to make a call successfully;
- Perceived value of ringback (and the ability to make a voice call successfully) is higher among those who have concerns about voicemail security; ringback could act as an alternative to voicemail.

Table 48. Correlation of attitudes with value of ringback

	how useful would it be to get a ringback when the line is free
I like to use cheaper types of communication (e.g. SMS instead of voicemail)	0.366***
It is important that phone menus are in my language	-0.261***
Getting an immediate response with voice calls is important to me	0.497***
It is important to me to hear the voice of the person I want to talk to	0.354***
If I can't get connected to somebody, it is inconvenient for me to call back	0.348***
I waste a lot of time trying to make calls but not getting connected	0.417***
If somebody calls me but we don't talk (e.g. beep) then I am likely to call them back	-0.432***
I am unlikely to leave a message on voicemail	
I feel Voicemail is too expensive	
I will find it difficult to use Voicemail because it is too complicated	
I would be worried that other people might listen to my voicemail messages	0.301***
I will find it difficult to use Voicemail because I don't know how to use it	

Significance of correlation: * p < 0.05 ** p < 0.01 *** p < 0.001

10.8. Survey Findings and Conclusions

10.8.1. Access and use of communications

90% of the sample make regular use of mobile phones. Moreover, most users actually have some form of mobile ownership (77% of the sample) – ownership of a

SIM card (without the handset) is quite common (16% of phone ownership), as is shared ownership of a handset (10% of ownership). Declared figures indicate that respondents spend just under 20% of their income on communications (Nigerian and Tanzania), although the figures from Ghana are substantially less; these figures should be treated with caution given the unreliability of declared income. All of which confirms that even in areas of poor mobile network coverage, people are prepared to invest time and money in communications, and this includes time and money spent on travel to access a phone (or a signal, to be more precise).

Among respondents who pay for the journey to make a call, there does not appear to be a relationship between intensity of phone use and the cost of the journey i.e. users are prepared to pay a premium associated with travel. However, there must be a limit beyond which the time and cost associated with travelling specifically to make a call become prohibitive. It is interesting to note that it is the poorest group that makes the most frequent journeys specifically to make a call, who travel furthest, and who spend most on travel.

The majority of calls both made and received are to family, then friends. A substantial minority of respondents (11%) use the phone mainly for work related calls. These respondents attribute a much higher degree of importance to financial issues – microfinance, insurance, and savings (although still less than social issues).

The vast majority of calls are made / received out of the locality; the proportion of calls made within a 10 km radius appears to be of order 15%, and very few are made within a 2 km radius. The poorest group has the greatest proportion of calls made / received to remote locations (>10 km), so in even more remote communities it is likely that demand for local calls will be even lower.

Around 65% of phone users also make use of SMS. The direction of SMS messaging (sent / received) is balanced, reflecting the high ownership levels of the sample. In poorer communities with lower levels of ownership, the balance is biased towards sending because it is difficult to receive texts on public phones. The median number of texts sent / received is 2 a week (use, but not spend, is much higher among the Tanzanian sample). The average spend among respondents sending SMS messages is 1.57 USD PPP / week (private mobiles) – this accounts for a mean of 20% of total spend on their mobiles. Little use is made of SMS services currently available; news and sports are most commonly accessed.

SMS use is clearly driven by the perception that it is cheaper. Other drivers include the inconvenience associated with making a call (making another call, wasting time getting connected), probably due to the necessity to travel in the sample locations, and having a copy of the SMS text to refer to later.

Price elasticity is highest among low intensity users, and relatively inelastic among non-users, implying it will be difficult to encourage them to adopt an SMS culture. Demand among intensive users is less elastic, implying that use is nearer saturation.

The main drawback with SMS is that “it’s better to talk”. Barriers constraining increased use of SMS include the perception it is too difficult to use, and issues of privacy associated with using an operator to send an SMS. Although literacy was cited as a reason for not using SMS, the analysis did not flag this as a barrier, and it is interesting to note that nearly one third of respondents classified as illiterate claim to make regular use of SMS; further research is needed to confirm that these people are receiving assistance with sending messages. Voice calls and SMS appears to be complementary rather than mutually exclusive.

Only 4% of phone owners use a voicemail service, and 23% don’t know what voicemail is. While one quarter of the sample felt positive about voicemail, two thirds had no opinion. Insufficient valid responses were given to questions to permit an analysis of potential demand.

Overall, there is a positive view of the potential value of a ringback facility – over two thirds of the sample feel it would be useful or very useful. Perceived value of ringback (and the ability to make a voice call successfully) is higher among those who have concerns about voicemail security; ringback could act as an alternative to voicemail.

Only 5% of the whole sample use the internet; note that among the Nigerian sample, which is the lowest status sample, internet use is zero. So although 5% represents an increase in use from previous research (typically less than 2%), the fact that most internet users are from Tanzanian sample indicates that this figure should be treated with caution.

10.8.2. Content priorities

The survey explored the role of a number of livelihoods issues, focusing on financial and agriculture issues. Of the limited number of issues explored, it is clear that social capital is most important – respondents almost universally rated keeping in touch with friends and family, and being able to contact people in emergencies as important or very important. Financial and agriculture matters are ranked as less important. This is consistent with previous experience, which indicates that the poor are more concerned with reducing vulnerability and maintaining strong social contacts that they can call upon in times of trouble, than with improving their own income generating potential (economic capital).

Although there is no clear division of interest in livelihood issues (people ranking one issue as important also tend to rank the other issues as important), it is possible to make some distinctions. Financial issues generally command more interest than agriculture matters, especially job opportunities, microfinance and savings. Note that financial issues are less important among the poorest members of the sample. Concern with agriculture matters is greater among older members of the sample (over 30s).

Overall, one half of the sample registered some dependency of their household on family members living elsewhere (i.e. remittances), and the degree of dependency is greater among the poor. Transferring remittances does not appear to be a problem, however, as there is no significant correlation between dependency and importance attributed to sending / receiving cash within the country. It is perhaps useful to make a distinction between national and international remittances – although the survey did not make this distinction, it is likely that these remote rural communities benefit from national remittances. International remittances tend to benefit relatively high status families that are able to provide their children with good education; children can then get professional jobs abroad and send money home to their families.

10.8.3. Where to start

The survey has highlighted some salient features that will influence demand for services – these are summarised in

Table 49. A number of these factors tend to indicate that Tanzania would be well suited – high literacy, large rural population, large service sector, and high levels of SMS use; on the other hand it has the lowest penetration of mobiles and is the poorest of the three.

Table 49. Factors influencing demand for services

<i>Issue</i>	<i>Description</i>	<i>Data source</i>	<i>Ghana</i>	<i>Nigeria</i>	<i>Tanzania</i>
Mobile subscribership	Where subscribership is high, there will be less intensive demand for public access, but public access remains important.	Mobile subscribers (per 100 inhabitants) 2007. ITU ²²	32	27	21
Internet use	Internet use remains so low that demand will be insignificant	Internet users (per 100 inhabitants) 2007. ITU	2.8	6.7	1.0
SMS use	Demand for SMS is likely to be higher in countries where SMS use is more widespread (SMS “culture” exists)				
Coverage	There will be greater scope for the service in countries where coverage is poor.				
Wealth	The better off use phones more frequently	GNI per capita PPP (international dollars)	1,330	1,770	1,200
Literacy	SMS will be more readily adopted where literacy is high	Literacy among rural adults (DHS) 2003/4	39.9	38.0	60.3
Dependency	The poor are more dependent on remittances (premium communications application)				
Urbanisation	There will be greater scope for the service in countries where more people live in rural areas	Urban population as % of total (World Bank ²³) 2007	49	48	25

²² <http://www.itu.int/ITU-D/ict/statistics/index.html>

²³ Country “At a Glance” tables

Non-farm income generating activities	Potential demand for financial services appears stronger than demand for agriculture services	Services sector as % of GDP (World Bank ²⁴) 2007	38.4	28.1	37.3 (2006)
---------------------------------------	-----------------------------------------------------------------------------------------------	--------------------------------------------------------------	------	------	-------------

10.8.4. Conclusions

- Widespread mobile ownership even in poorly served communities indicates that cost of ownership does not appear to be a major obstacle. This could indicate low demand for public access facilities, but the widespread (though infrequent) use of “other” phones (including public access) indicates a complementary relationship between use of private and public phones i.e. they are not mutually exclusive. This is often the case where there is a high tariff for off-network calls.
- Given that people are prepared to travel to make a call, there is likely to be demand for a local service in remote areas – save costs (time and money) associated with travel. It is also likely that people will be prepared to pay a premium to access phones (or network) nearer their home.
- In remote rural communities, demand will be almost exclusively for calls to / from distant locations (>10 km); people are not prepared to pay for calls to people they may see in the course of local travel.
- Although SMS use is higher in high status groups, illiterate people are able to make use of SMS.
- SMS use is driven by cost. Demand is also linked to the inconvenience associated with getting connected (poor quality of service), which will be more acute in remote locations where people travel to make calls.
- Price elasticity of SMS use is highest among low intensity users, and relatively inelastic among non-users, implying it will be difficult to encourage them to adopt an SMS culture.
- There is widespread interest in ringback; it may act as an alternative to voicemail.
- In contrast, there is little interest in voicemail and many respondents are not familiar with the service.
- Issues that might meet with the greatest demand are those with the greatest numbers of respondents registering them as “very important”:
 - Job opportunities;
 - Microfinance;
 - Savings
 - Market information.

²⁴ Country “At a Glance” tables

10.9. Supporting tables

Table 50. Correlation coefficients – indicators relating to status

	Distance to the main market centre	What is the highest level of education that you achieved?	Main occupation	Household item - Electricity supply	Household item - Television	Household item - VCR / DVD	Household item - Fridge	Household item - Radio	TOTAL SPEND ON COMMUNICATIONS (USD PPP)	TOTAL HOUSEHOLD EXPENDITURE	ESTIMATED INCOME (USD PPP)
Distance to the main market centre		0.225***		-0.349***	-0.214**				-0.212**	0.205**	
What is the highest level of education that you achieved?	0.225***		-0.379***	-0.308***	-0.351***	-0.409***	-0.38***			0.212**	0.243***
Main occupation		-0.379***		0.322***	0.245***	0.221***	0.308***		-0.214**	-0.324***	-0.329***
Household item - Electricity supply	-0.349***	-0.308***	0.322***		0.618***	0.512***	0.532***			-0.543***	-0.485***
Household item - Television	-0.214**	-0.351***	0.245***	0.618***		0.782***	0.68***	0.209**		-0.299***	-0.238***
Household item - VCR / DVD		-0.409***	0.221***	0.512***	0.782***		0.708***	0.241***			-0.224**
Household item - Fridge		-0.38***	0.308***	0.532***	0.68***	0.708***		0.231***		-0.275***	
Household item - Radio					0.209**	0.241***	0.231***				
TOTAL SPEND ON COMMUNICATIONS (USD PPP)	-0.212**		-0.214**							0.379***	0.27***
TOTAL HOUSEHOLD EXPENDITURE	0.205**	0.212**	-0.324***	-0.543***	-0.299***		-0.275***		0.379***		0.67***
ESTIMATED INCOME (USD PPP)		0.243***	-0.329***	-0.485***	-0.238***	-0.224**			0.27***	0.67***	

Significance of correlation: * p < 0.05 ** p < 0.01 *** p < 0.001

	Country Code				Gender			AGE GROUPS				
	Ghana	Nigeria	Tanzania	Asymp. Sig.	Male	Female	Asymp. Sig. (2-tailed)	15 - 24 years	25 - 29 years	30 - 39 years	40 + years	Asymp. Sig.
Microfinance (loans)	2.11	0.94	2.19	0	1.67	1.79	0.398	1.55	1.61	1.86	1.95	0.133
Insurance (e.g. house,crops, vehicles etc)	1.95	0.94	2.1	0	1.62	1.68	0.644	1.54	1.41	1.84	1.86	0.025
Saving money	2.17	0.94	2.2	0	1.7	1.82	0.356	1.57	1.8	1.76	1.95	0.197
Sending/receiving cash within the country (e.g. payments, remittances)	1.85	0.94	1.98	0	1.49	1.68	0.123	1.5	1.47	1.62	1.77	0.311
job opportunities	2.2	1.59	2.18	0.009	1.95	2.02	0.767	2.11	2.18	1.96	1.61	0.057
market information on agricultural inputs	2.07	1.03	2.12	0	1.82	1.63	0.179	1.52	1.47	1.76	2.27	0
Introducing modern agricultural practice	2.07	1.03	1.93	0	1.8	1.54	0.055	1.5	1.42	1.72	2.16	0.001
weather	1.95	1	2	0	1.71	1.56	0.231	1.5	1.43	1.58	2.14	0.001
Contacting people in emergencies	2.39	2	2.61	0	2.26	2.38	0.11	2.25	2.38	2.26	2.4	0.343
Keeping in touch with friends and family members	2.41	2	2.59	0	2.31	2.34	0.735	2.25	2.44	2.18	2.43	0.029
Prevention and treatment of illness	2.39	2	2.41	0	2.18	2.34	0.018	2.27	2.29	2.24	2.23	0.832
News and Sport (local and international)	2.12	0.7	2.48	0	1.75	1.73	0.776	1.46	1.89	1.67	1.98	0.039

Table 51. Means and Non-parametric differences – Livelihood needs

	EDUCATION					ESTIMATED INCOME GROUPS (USD PPP / week)				
	None / incomplete primary	complete primary school	secondary school	Post secondary	Asymp. Sig.	<10	10 - 35	35 - 100	>100	Asymp. Sig.
Microfinance (loans)	1.34	1.96	1.55	1.86	0.01	0.91	1.86	2.31	1.8	0
Insurance (e.g. house,crops, vehicles etc)	1.38	1.88	1.47	1.64	0.016	0.91	1.83	2.15	1.61	0
Saving money	1.38	2	1.62	1.79	0.006	0.93	1.9	2.21	2	0
Sending/receiving cash within the country (e.g. payments, remittances)	1.31	1.82	1.33	1.68	0.002	0.94	1.69	1.82	1.71	0
job opportunities	1.03	1.93	2.32	2.54	0	1.41	2.05	2.06	2.46	0
market information on agricultural inputs	1.88	1.91	1.52	1.46	0.08	1.13	1.9	2.21	1.59	0
Introducing modern agricultural practice	1.91	1.8	1.45	1.5	0.092	1.11	1.85	2.03	1.51	0
weather	1.72	1.86	1.35	1.5	0.019	1.11	1.76	2.03	1.51	0
Contacting people in emergencies	2.25	2.39	2.29	2.25	0.447	2.02	2.19	2.58	2.46	0
Keeping in touch with friends and family members	2.25	2.37	2.32	2.29	0.697	2.02	2.17	2.61	2.44	0
Prevention and treatment of illness	2.16	2.25	2.25	2.43	0.219	2	2.22	2.24	2.37	0
News and Sport (local and international)	1.53	2	1.53	1.64	0.02	0.76	1.88	2.64	1.85	0

	Country Code				Gender			Age groups				
	Ghana	Nigeria	Tanzania	Asymp. Sig.	Male	Female	Asymp. Sig. (2-tailed)	15 - 24 years	25 - 29 years	30 - 39 years	40 + years	Asymp. Sig.
How often used - Radio	4.03	5	4.19	0	4.64	4.16	0.011	4.43	4.57	4.3	4.32	0.676
How often used - TV	3.07	1.57	3.78	0	2.91	2.59	0.248	2.5	3.3	2.5	2.73	0.049
How often used - Newspaper	2.01	1	3.68	0	2.37	1.91	0.047	1.95	1.87	2.24	2.64	0.077
How often used - Fax	1	1	1.1	0.085	1	1.06	0.144	1.11	1	1	1	0.15
How often used - Private mobile phone	4.12	3.8	4.27	0	4.26	3.84	0.01	3.57	4.28	4.38	4.02	0
How often used - Private fixed line phone	1.09	1	1.27	0.019	1.1	1.12	0.672	1.05	1.09	1.22	1.09	0.791
How often used - Internet	1.07	1	1.34	0.002	1.11	1.13	0.696	1.05	1.2	1.16	1.07	0.226
SPEND ON OWN PHONE - FIXED (USD PPP)	0.1393	0	0.0869	0.337	0.0754	0.0775	0.961	0.0122	0.0584	0.2354	0	0.568
SPEND ON OWN PHONE - MOBILE (USD PPP)	3.4133	2.0363	15.0406	0	6.7556	5.9164	0.242	3.8129	5.5004	6.7486	10.1703	0.012
SPEND ON OTHER PHONE (USD PPP)	1.067	1.4978	1.3986	0	1.1152	1.5169	0.05	1.4355	1.4882	1.1414	1.1245	0.112
TOTAL SPEND ON COMMUNICATIONS (USD PPP)	4.6196	3.534	16.5262	0	7.9462	7.5107	0.388	5.2606	7.0471	8.1254	11.2948	0.004
CALCULATED SPEND ON VOICE - OWN PHONE (USD PPP)	2.5999	1.743	13.8905	0	5.9604	5.0229	0.523	3.327	4.4362	5.8118	9.2754	0.003
CALCULATED SPEND ON VOICE - PUBLIC PHONE (USD PPP)	1.5377	1.4978	1.4956	0	1.3915	1.6158	0.366	1.5082	1.835	1.3345	1.3373	0.231
SPEND ON SMS - OWN PHONE (USD PPP)	0.8595	0.2932	1.9417	0.275	0.9264	1.0142	0.319	0.5552	1.1661	1.0745	1.1314	0.017
SPEND ON SMS - OTHER PHONE (USD PPP)	0.0315	0	0.0449	0.005	0.0194	0.0262	0.076	0.0086	0.0599	0.0243	0	0.435
How often do you make a journey specifically to use a mobile phone?	1.85	3.74	1.28	0	2.3	2.36	0.839	2.57	2.47	2.4	1.77	0.041
SPEND ON JOURNEY (USD PPP)	0.2357	0.5792	0	0	0.3357	0.2298	0.271	0.3832	0.2881	0.2527	0.1882	0.019
How far is it to this place?	0.72547	2.35714	0.16408	0	1.16219	1.07225	0.887	1.54179	0.98151	0.9604	0.92982	0.043
personal ownership of mobile phones	3.13	2.5	3.42	0	3.13	2.86	0.111	2.55	3.25	3.04	3.2	0.015
SPEND ON AIRTIME (USD PPP)	4.4546	0.9503	2.7216	0	2.9618	2.5292	0.55	2.1293	3.2007	2.611	3.1382	0.039
Can you estimate the average duration of your calls	4.18	2.17	2.45	0	3.1	2.87	0.595	2.8	3.28	2.94	2.9	0.181
What types of calls do you make most often?	1.81	1.33	2.27	0	1.84	1.72	0.376	1.54	1.65	1.9	2.11	0
And where do most of these people that you call live?	2.8	3	2.36	0	2.78	2.71	0.209	2.75	2.8	2.74	2.67	0.95
What types of calls do you receive most often?	1.81	1.33	2.25	0	1.82	1.73	0.486	1.5	1.64	1.96	2.09	0
Where do most of these people you call live?	2.88	3	2.39	0	2.81	2.75	0.447	2.81	2.87	2.76	2.67	0.27
How many SMS texts do you yourself typically send in a week?	1.83	1.34	18.33	0	3.16	9.99	0.689	7.77	9.69	4.34	3.32	0.363
How many SMS texts do you yourself typically receive in a week?	2.27	1.34	17.32	0	6.11	6.61	0.338	5.88	6.64	7	5.89	0.609

11. Conclusions and Recommendations for the Pilot of Icen Mobile

11.1. The Most Appropriate African Country

The CTO believes that Ghana is the most appropriate Commonwealth African country in which to conduct a pilot of the Icen Mobile solution. Firstly, the well established and proactive Ghana Investment Fund for Telecommunication (GIFTEL) expressed keen interest in supporting Icen Mobile's team. The fund is dedicated to subsidising rural connectivity projects in commercially undesirable areas and is just one example of the conducive policy and regulatory environment in the country.

The commercial success of the Icen Mobile solution will also depend on the number of GSM operators that lease the technology. The implementation of the pilot will be more likely to succeed if the Icen Mobile team can hold discussions with a relatively large number of national GSM operators. All three countries on the final shortlist have relatively high levels of competition between operators. However, with a total of five GSM operators, Ghana has what is arguably the most competitive mobile industry in Africa. The data collected during interviews with Ghanaian stakeholders also suggests that Ghana offers the most scope for the innovation of operators' business models aimed at increasing rural access; Icen Mobile could be one such innovator.

Conducting a successful pilot will be most likely in the Commonwealth African country whose key stakeholders display the highest levels of enthusiasm and interest in the project. The high levels of buy-in/interest received from Ghanaian key stakeholders are at the crux of CTO's decision to recommend Ghana as the most appropriate country for the pilot. Section nine of this report indicates that Ghanaian stakeholders expressed the most interest in holding discussions about the pilot of Icen Mobile. It is the only country on the final shortlist which has representatives from the ministry, regulator, USF and private sector that are prepared to hold discussions with the Icen Mobile team.

The analysis also indicates that Ghana has a number of socioeconomic characteristics that make it ideally suited to the pilot. For example, Ghana is ranked third behind Nigeria and Tanzania in terms of the estimated absolute number of people (millions) living on less than US\$1 per day, which is Icen Mobile's target market segment. In addition, although ranked relatively low alongside other African countries, Ghana has an adult literacy and school enrolment rate of more than 50%, an important consideration for the Icen Mobile team, which wishes to provide a number of data services.

Ghana does not currently have a unified licensing regime like that of Nigeria and Tanzania, the other countries on the final shortlist. However, the liberal nature of the

current policy and regulatory regime, which is said to embrace innovative technologies, and the fact that Icen Mobile is a GSM network extension means the CTO does not consider the lack of a unified licensing regime to be a prohibitive drawback. More importantly, Ghana does have a policy and regulatory environment that is focused on increasing and improving rural access.

Despite the CTO's recommendation for Ghana, it is important to note preliminary analysis and some of the survey findings strongly suggest that Tanzania is another potential country in which to pilot the technology. Mobile phone ownership is lowest in Tanzania out of the three short-listed countries, perhaps suggesting that latent demand is most acute and the use of public ICT terminals (such as those proposed by Icen Mobile) could be widespread. In addition, Tanzania has the highest number of literate citizens, the most widespread SMS use and the largest rural population of the three countries on the final shortlist, as well as a services sector that is marginally smaller than Ghana's. These factors should be considered when the Icen Mobile team make their final decision – in which country to pilot their technology. However, absence of an operational USF, as well as the lack of buy-in from the Tanzanian government and private sector may circumscribe efforts to successfully roll out the pilot.

11.2. Recommendations and Observation for the Icen Business Model and Service Offering

11.2.1. Phone Ownership and Usage

Data from the surveys indicates that there is widespread mobile ownership even in poorly served communities. Amongst our sample the cost of ownership does not appear to be a major obstacle. This could indicate low demand for public access facilities, but the widespread (though infrequent) use of "other" phones (including public access) by the users surveyed indicates a complementary relationship between use of private and public phones i.e. they are not mutually exclusive. This is often the case where there is a high tariff for off-network calls. The Icen Mobile team are considering developing a public access terminal that would be used on their network extension and the evidence from the survey and elsewhere suggests it has the potential to be popular.

11.2.2. Price Differentiation based on location

During the interviews a number of key stakeholders suggested that mobile penetration in rural areas would increase if the mobile operators were able to provide rural users with tariffs that took into account their relatively low incomes. Icen Mobile should consider negotiating discounted tariffs for calls generated on its network solution, especially for those calls that will both originate and terminate within the range of its network extension i.e. the 10km footprint. Although the price elasticity of demand for calls that both originate and terminate on the network was not assessed, it is likely that demand amongst price sensitive rural users will increase if the price of in-network calls is lower than standard tariffs

11.2.3. Promotional Voicemail to catalyse a culture of usage

It is important that Icen Mobile takes the low usage of voicemail into account when developing the business model for its services. There was a consensus amongst interviewed stakeholders that users did not like the voicemail services and did not use it. The wish to hear the receiving party's voice at the end of the phone and users' unwillingness to pay to leave a message were some of the most common reasons cited. These arguments are supported by the survey data: Only 4% of phone owners use a voicemail service, and 23% don't know what voicemail is. While one quarter of the sample felt positive about voicemail, two thirds had no opinion.

11.2.4. Icen Call queuing/Caller Ring Back Service

The Icen Mobile team is considering incorporating a caller ringback service in its service offering. It is a service that will notify the calling party when a receiving party is no longer engaged with another call or when there is free capacity on the network to make a call that will terminate outside the Icen Mobile 10km footprint. The survey data suggests this service would be popular. Amongst our sample of users there is widespread interest in a ringback service and evidence suggests that it may act as an alternative to voicemail. Over two-thirds of the sample feels it would be useful or very useful. Despite, the small sample size of this research, it is clear that Icen Mobile should dedicate more resources to further exploration of the ringback service.

11.2.5. Financial Services

More than one half of the sample registered some dependency of their household on family members living elsewhere (i.e. remittances), and the degree of dependency is greatest among the poor. Family and friends frequently transfer money physically (in person) or via the country's limited banking infrastructure. However, most the rural population do not have access to bank accounts and little is known about the real cost and opportunity costs of transferring these funds physically (loss, theft, time, travel, etc.). It is possible that if the Icen Mobile money-transfer service effectively reduced such costs it would be very popular, especially in countries like Ghana where there is no mobile-based alternative.

The survey tried to shed light on the possible demand for both financial and agricultural services. Financial services were considered more important than agricultural services by users in our sample. Icen Mobile may wish to consider providing a range of financial services to users, including its money transfer offering. The survey data suggests that those users who believed a particular financial service to be important found other financial services also equally important, most notably, microfinance, insurance and savings. It is possible that if marketed successfully these "other financial" services could grow into a substantial market opportunity.

11.2.6. Volume of calls within the 10km footprint of the Icen Mobile Network

One of the key questions for the Icen Mobile team concerned the volume of calls that will be made (both originate and terminate) within its 10km footprint. Despite the

limitation of the survey, the data suggests that a significant proportion of calls will originate and terminate within the Icen Mobile network. The vast majority of calls are made / received outside the network, but amongst our sample 15% of calls were made within a 10 km radius. This finding is important, especially because a number of key stakeholders predict the volume of inter-rural calls will rise significantly in the next few years. This bodes well for Icen Mobile, especially because it provides a value proposition to operators that may feed into the pilot. If the network solution is rolled out in a large enough rural community, the CAPEX and OPEX of the Icen solution could be offset by revenue from calls made within the network alone.

11.2.7. Impact of fluctuating oil prices

The interviews with key stakeholders explore the extent to which fluctuating oil prices will have a negative impact on the future rollout of mobile infrastructure – one measure of the importance of Icen Mobile's key value proposition, its ultra-low power consumption. Only half the stakeholders believe that a volatile oil market will negatively affect mobile rollout. Indeed, many felt that operators would make provision for the increased OPEX associated with diesel generators. Despite this consensus, it is clear that low power GSM infrastructure and devices will become increasingly important in the coming months and years. The world's leading handset manufacturers and infrastructure suppliers' are creating products that have low power consumption as a key selling point. It is important that, in spite of the varied stakeholders' opinions reflected in this report, Icen Mobile continues to highlight the benefits of their solution's ultra-low power consumption.