

The Use of Telephones in Rural and Low-Income Communities in Africa

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1 Introduction

In many countries in Africa, the recent uptake of telecommunications services has exceeded all predictions, proving that there is an unexpectedly high demand for services. The premise of an ongoing research project being carried out by Gamos Ltd. and CTO is that the planning of infrastructure investment in less profitable service areas would be improved if data were available on how people in these areas actually use services. Collaborators on the project are the regulatory bodies in Ghana (NCA), Uganda (UCC) and Botswana (BTA). This paper presents some preliminary findings from a research project funded by the UK Department for International Development (DFID), through its Knowledge and Research (KaR) programme.

The research methodology has taken an iterative approach to identifying priority issues, consulting through roundtables, and country field visits. Data has then been gathered using a household questionnaire, administered by local universities (the University of Legon, Makerere Institute of Social Research, and the University of Botswana). The survey has gathered data on a range of telecommunications services: phones (fixed and mobile), fax, SMS, email and internet. The paper presents information on phone use, along with a country specific issue of SMS use in Botswana – a more comprehensive analysis, including other services, will be completed shortly.

2 The Questionnaire

The survey questionnaire was designed to meet 2 objectives:

- To gather information on patterns of use of telecommunications services amongst target groups;
- To identify drivers and barriers influencing use of services.

The first part of the questionnaire is made up of descriptors e.g. age, gender, occupation etc. The second part includes a large number of market variables, the data for which can be used to describe existing patterns of use e.g. frequency of use, duration of transactions, direction of traffic, type of calls etc. An important aspect of this are questions relating to how users access services e.g. through booths, enterprises, or private handsets. The third section explores respondents' attitudes and intentions regarding a range of issues identified as potentially influential on people's use of services. These issues are very much country specific, arising from discussions with users; although there was no intention to create any consistency across countries, it is interesting that there is quite a degree of similarity of issues.

3 The sample

Due to the different telecommunications context in each country, different sampling strategies were adopted, although the resulting total sample sizes were similar:

Ghana	3 geographic nodes	630
Uganda	2 Districts	420
	Kampala	100
Botswana	3 geographic nodes	630

The reason for this was that, in contrast to the other countries, there appeared to be no effective internet infrastructure outside of the major cities in Uganda, so a separate survey instrument was designed for use in Kampala in order to gather data on email / internet use. However, even with this approach, the research has found low levels of internet use in all countries.

The data can be analysed according to the descriptors used, enabling some interesting comparisons to be made across different types of respondent.

3.1 Gender

The gender balance of respondents is given in the following table:

	<i>Ghana</i>	<i>Uganda</i>	<i>Botswana</i>	<i>Overall</i>
<i>Male</i>	69%	60%	44%	58%
<i>Female</i>	31%	40%	56%	42%

A surprising finding is that there is little difference between men and women – either in use of services, or in attitudes towards services. In Ghana, there is no difference between men and women in the frequency of use of fixed phones, neither is there a difference in their intention to use phones. However, correlations show that business or livelihood related issues are important in determining men’s use of phones e.g. the view that phones will improve business, and that phones will enable them to keep in touch with business contacts. Cost savings from other means of communication are also important to men, indicating that they have high priority communication needs, although these may be related to both business issues and family matters (e.g. funerals).

The only issue flagged as influencing women is safety of travel, so this can act as a barrier to use of remote phones in unserved areas, and as a driver towards the installation of local phones.

This pattern is also found in Uganda (rural), where the actual frequency of use of phones by men and women are similar, although men show a slightly stronger intention to use the phone. Again, men appear to be influenced by economic factors (e.g. improve business, cheaper than visiting people), and security is an important issue for women – only in Uganda this is evident in the influence of the ability to use beeping to contact people in emergencies.

3.2 Age

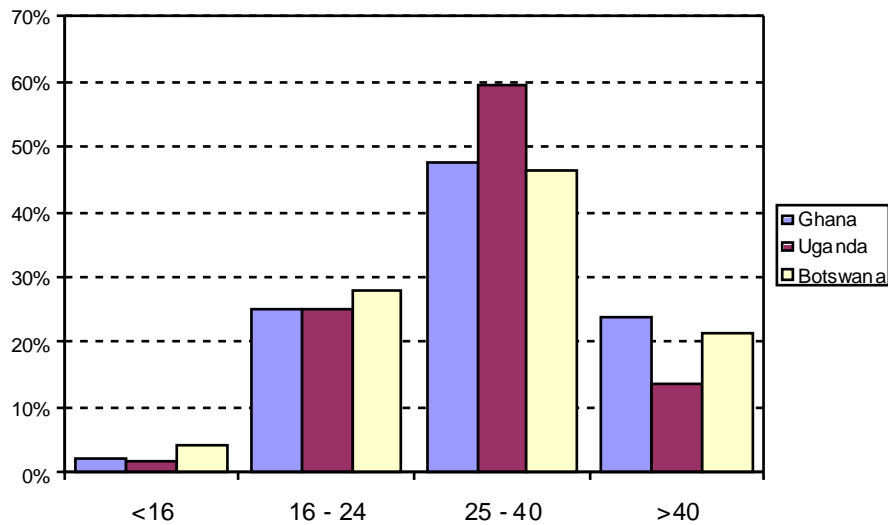


Figure 1 Breakdown of ages of respondents

Comparing data from different age groups shows that there is little difference in either use of fixed line phones, or attitudes towards phones, between the two youngest groups. In Ghana, neither is there much difference between the two older groups – but there is quite a difference between the 16 – 24 and the 25 – 40 year old groups. However, in Uganda and Botswana, the age threshold about which use and attitudes change is 40, with the younger group being more positive towards the phone.

Comparing data between older and younger groups shows that security issues are perceived as more important by older people, and that this is evident in their attitudes to phone use, and that these attitudes act as drivers to their intention to use phones. Older people believe phones improve security, and that that local phones reduce the dangers associated with traveling to access a remote phone. Similarly, it is older people that tend to be involved in business, so the value of phones in keeping in touch with business contacts, and in accessing information is recognized in older groups.

The most common method of communication prior to the use of the phone was letters (74% in Ghana, 50% in Uganda), where literacy is an important factor. Only amongst the oldest group (Ghana) is the belief that phones will reduce the risk of misunderstanding a directly relevant issue. This may reflect the fact that literacy is a more significant issue for older people who, therefore, perceive a strong benefit from expressing themselves verbally by phone.

3.3 Education

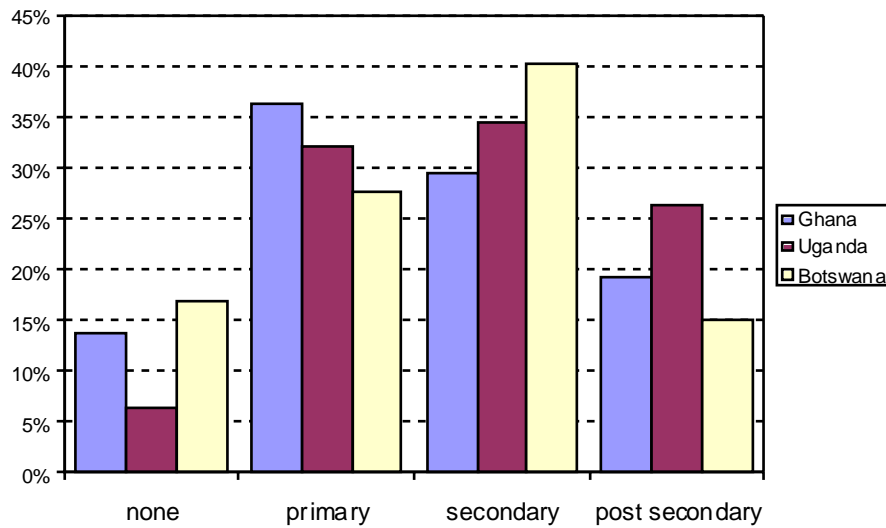


Figure 2 Breakdown of level of education of respondents

Not surprisingly, frequency of use of phones increases with level of education, as does intention to use phones. In Ghana, it is only those people with no education which show no correlation between stated intention and actual use of phones, indicating that there are barriers impeding their use of phones:

- a belief that the phone is too expensive, and that cost is therefore a barrier to increase use of phones, is only evident amongst those with no education (Ghana).
- this is also the only group where lack of knowledge on how to use a phone appears to be a barrier to increased phone use.

The fact that the use of phones can increase money received from family members is an important factor driving phone use across all education groups except those with no education, indicating that this group tends to use phone mostly for other purposes.

Attitudes of Ghanaian and Botswana respondents are not generally sensitive to level of education, in contrast to Uganda where attitudes are stronger amongst the better educated.

3.4 Service Level

Figure 3 shows how the samples in Botswana and Ghana are balanced between four service levels:

- no local access;
- low – fixed line only;
- medium – fixed line plus one mobile
- high – fixed line plus more than one mobile.

This distinction was not made in Uganda due to the dominance of the mobile operator in rural areas.

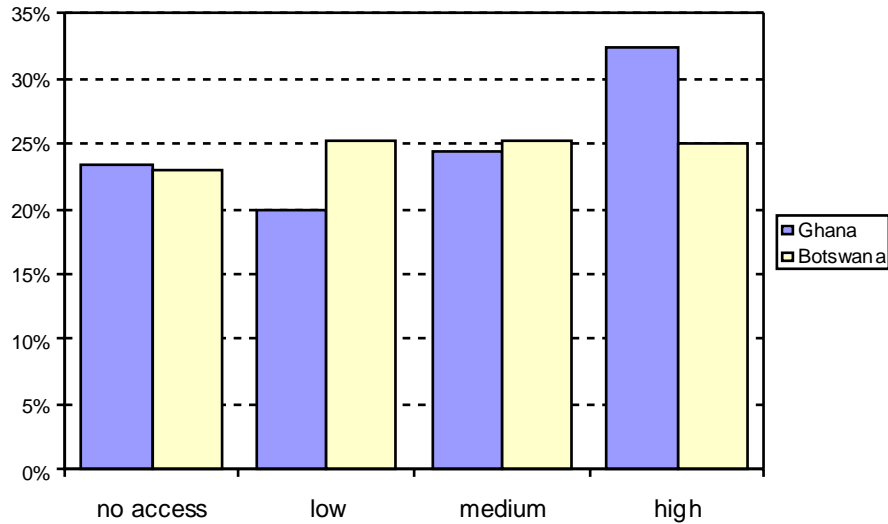


Figure 3 Breakdown of service levels

It can be assumed that service level corresponds roughly to urban / rural context as there is a link between service level and main occupation - most farmers are in no service areas, and most professional people are in high service level areas.

The belief that using a phone will reduce the risk of misunderstanding is an important factor only in areas with no service. As with older people, this may reflect the fact that literacy is a more significant issue for rural people who, therefore, perceive a strong benefit from expressing themselves verbally by phone

Across all respondents (Ghana and Uganda), letters were the most common means of communicating. However, in areas of Ghana with no service, the reliance on letters is less (66%) and people preferred to travel to visit people instead. There is, therefore, a double cost implication – greater reliance on travel, and higher cost of traveling from remote areas. This is reflected in the importance attached by people in no service areas to the fact that use of a phone saves costs of communicating by other means.

Important factors influencing people’s intention to use phones are the ability to communicate with friends and family abroad, their potential to improve business, and the contribution they can make to improve security. It is interesting to note that in Ghana these links are evident across all service levels with the exception of high service level areas. This may reflect the heterogeneous mix of people in urban society, and the different nature of security issues in urban areas.

3.5 Perception of Access

In each country, a range of possible points of access to services was identified, and respondents asked to indicate which they use most often; the sum of these responses gives an indication of their perceived access to services. In contrast to Figure 3, the distribution of responses from Ghana presented in Figure 4 indicates that very few people claim to have no means of access - most people have 1 or 2 means of access. People from rural villages tend to travel to trading centres to visit communication centres or use booths.

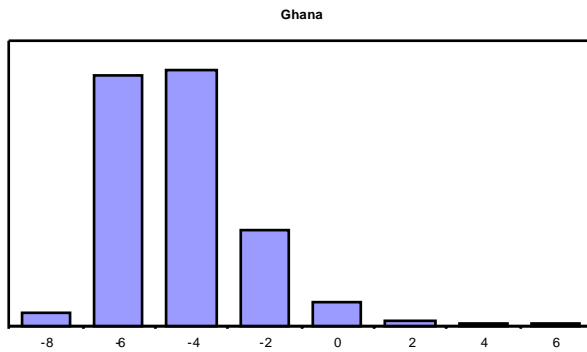


Figure 4 Perceived access - Ghana

3.6 Awareness

An index of ICT awareness was derived on the basis of responses to questions regarding respondents' knowledge regarding a range of communication services e.g. voicemail, fax, prepaid phonecards etc.

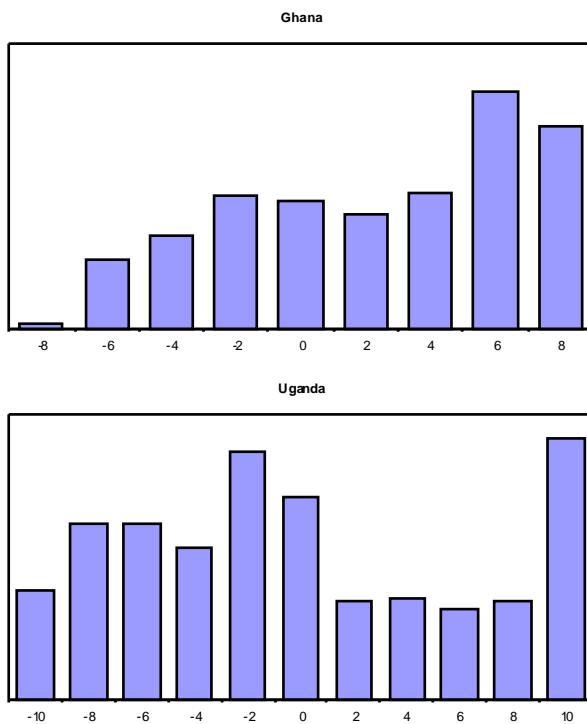


Figure 5 Index of ICT Awareness - Ghana and Uganda

Figure 5 shows that there is a spread of awareness amongst respondents, although awareness in Ghana appears to be higher. Particularly interesting is the fact that very few people in Ghana claim to have no knowledge of ICT services.

With regard to the use of services, communication centre staff and booth attendants play an important part in assisting people to use telephones, and all report giving assistance to customers; the estimates of customers needing assistance ranges from 30% – 80%. All can

give examples of ways in which customers are not familiar with how to use the technology, although the view is that people learn quickly – they only have to be shown once.

4 How People Use Services

The extent of use of various services across the countries are presented in Figure 6. This shows the dominance of mobile phones in Uganda, in contrast to the other two countries. It illustrates that Botswana is the only country where significant use is made by mobile users of SMS. It also illustrates the low use of email and internet - especially surprising in Botswana where greater use is made of phone services.

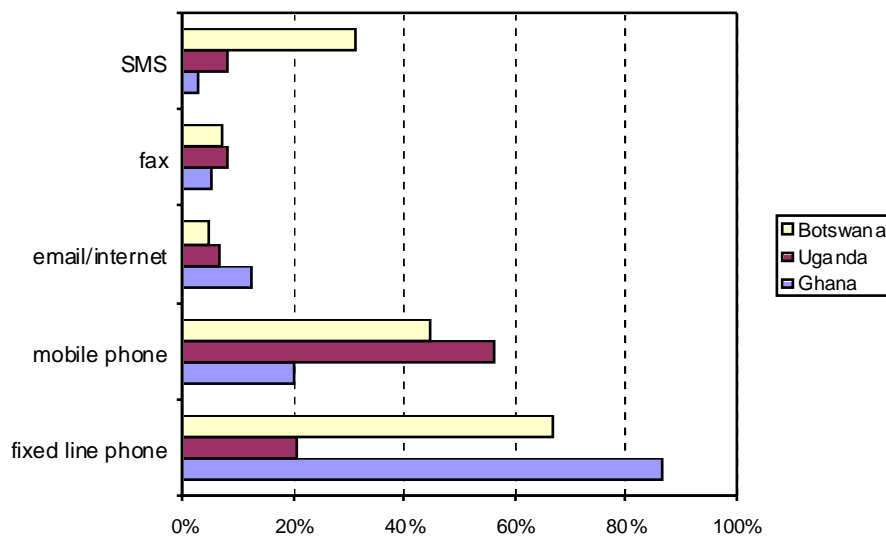


Figure 6 Use of services

Figure 7 and Figure 8 illustrate that fixed line and mobile phone users in Botswana use services more heavily than users in the other countries. It is striking from Figure 8 how many phone users in Uganda use the service infrequently.

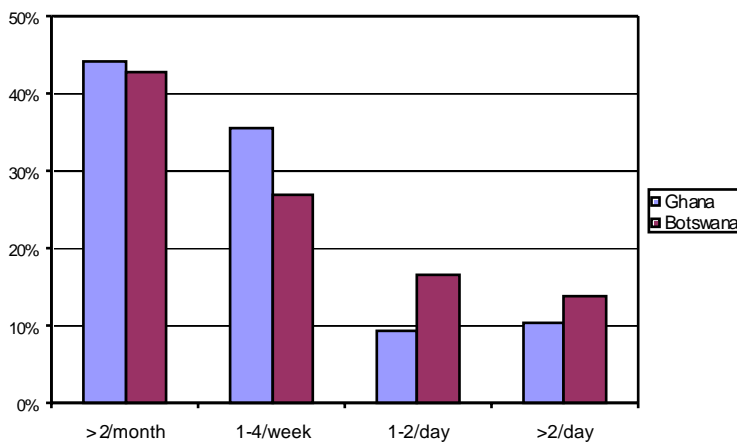


Figure 7 Frequency of use of Fixed line phones

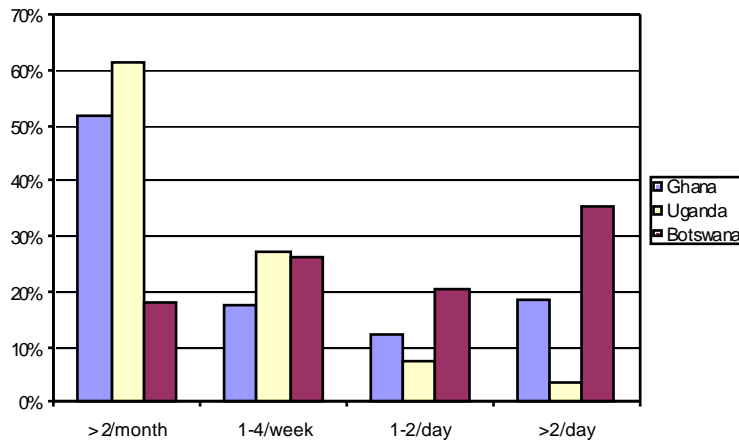


Figure 8 Frequency of use of Mobile phones

Level of education clearly has an influence on the extent to which people use services, as illustrated in Figure 9. The same data for Uganda is more striking, but less reliable due to the relatively small number of respondents with no education.

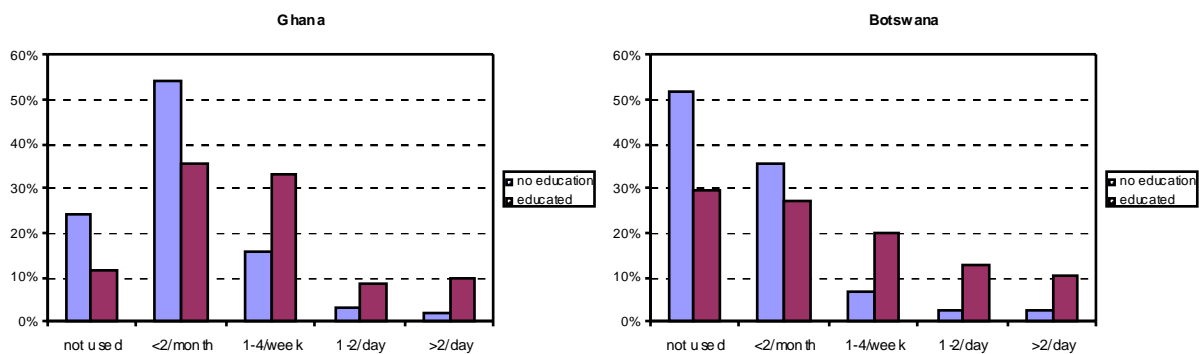


Figure 9 Influence of education on use (fixed phone) - Ghana and Botswana

It is surprising that there is little difference in use of phones across the four levels of service coverage in Botswana, including those in areas with no service. This demonstrates how people are prepared to travel to access services. This is not the case in Ghana where, although intention to use phones is the same, actual use is significantly lower in areas with no service. This does not, however, contradict the assertion made earlier (Section 3.5) that people do travel to access phones. The high intention indicates that demand exists, and there is scope for increasing service use.

4.1 Direction of Traffic

For each service, respondents have been asked to estimate the proportion of calls received as opposed to those made. The data in Figure 10 shows that most users do receive calls (using fixed line phones), and incoming calls account for 38% of all calls; in Botswana the figure is 27%. It is noted later that communication centres are the preferred means of access to phones in Ghana. One of the characteristics of these is their messaging service, which enables people calling into a community to make an arrangement to call back later, which overcomes a constraint on incoming traffic.

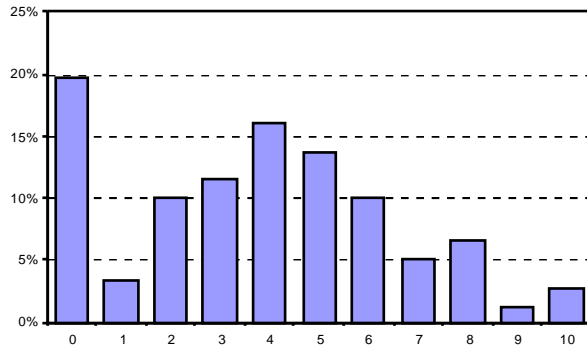


Figure 10 Calls received (out of 10) - Ghana

In addition, respondents have been asked to estimate the average duration of calls. In all countries, incoming calls are around 20% longer than calls made - the difference is greater in Uganda at 25%. It should be borne in mind that the number of people receiving calls is considerably smaller than the number of people making calls.

This data makes it possible to estimate traffic times (for all respondents) for both outgoing and received calls. From the Ghana data (fixed line):

mean outgoing traffic = 2.9 min/day
 mean received traffic = 3.9 min/day

The fact that incoming traffic is so much greater than outgoing traffic is surprising, given that only 38% of calls are received. This might imply that incoming calls are of much longer duration, but mean figures based on average duration of calls reported by the total sample indicate that incoming calls are only 12% longer than calls made. However, when looking into the relationships between direction and duration of calls, it can be seen that there is a close correlation between the proportion of calls received and the duration of incoming calls, such that where people receive a higher proportion of calls, they are of longer duration. It should also be noted that mean traffic estimates are sensitive to those few individuals who make extensive use of phones.

The following table shows how traffic varies according to population characteristics. People with no education not only have a considerably reduced level of traffic, but they have a relatively low amount of incoming calls, which may be due to a number of constraints.

	outgoing traffic	received traffic
no education	1.1	0.6
some education	3.2	4.5
no service	1.0	0.3
some service	3.5	4.9

People in areas with no service coverage show the same trend of reduced use, but face even more severe constraints on receiving calls. This is due to practical reasons: as they are remote from service providers, it is not possible for attendants to deliver messages arranging a time to receive an incoming call. The impact of access on the ability to receive calls is confirmed by statistics on the proportion of calls received: this is 34% for those with no education (compared with 38% for those with some education), but drops to 27% for those in no service areas (compared with 41% for those in areas with some level of service coverage).

4.2 Purpose of calls

The preliminary surveys came up with similar, but different, categories of types of phone calls. Data shows that “chatting” with friends and family is clearly the most common use of phones (see Figure 11). Trends from Ghana are similar with “family wellbeing” in the lead, followed by friends and family (financial). Business use in both countries is around 40%. The Uganda data shows the importance of high priority, or urgent calls.

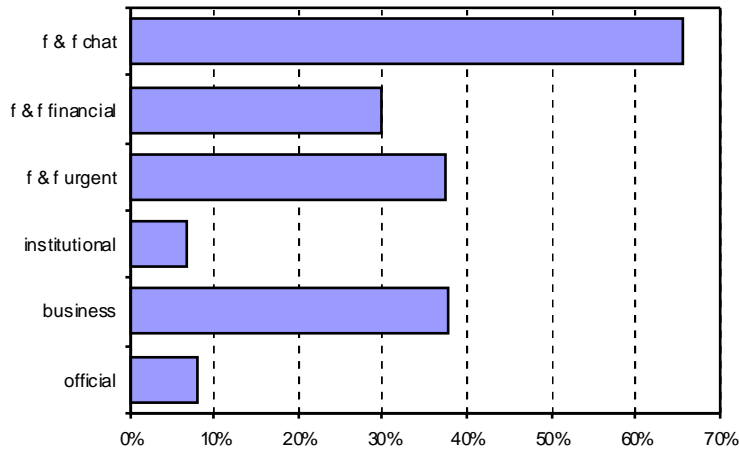


Figure 11 Purpose of calls (Uganda)

Users in Ghana with no education show patterns of use similar to the average, with a couple of notable exceptions – a higher proportion of calls relating to social events (e.g. funerals, festivals), and a lower proportion of business use. These social calls are equivalent to the “urgent” category used in Uganda.

Interestingly, users in areas with no service have similar type of call patterns to the average, with the exception that business use is lower. The proportion of low use users calling family is similar to the sample average, but the numbers calling friends and business are reduced, showing that the family is the most important factor amongst low users. This would indicate, however, that people are meeting this priority demand, but that there exists scope for increasing use through communication with friends and business contacts.

5 Beeping

“Beeping” is the practice of dialling a number and hanging up before the phone is answered, in the hope of prompting the other party to initiate a return call. This was picked up as an important issue during the preliminary survey in Uganda and although the practice exists in other countries, it does not appear to be as important an issue.

People beep from both booths and PTSPs, and the patterns of frequency of use are similar, although twice as many people use PTSPs for beeping. The proportion of beeps returned to customers using both booths and PTSPs is also similar, at 40%. The proportion of successful beeps made from personal mobile phones is slightly higher at 45%, but these people are more economical with their own air time, and return only 34% of people who beep them.

Both intention and attitude towards beeping are split more or less equally across the sample, but not surprisingly, both intention and attitude are positive amongst those who use the service.

Across the sample as a whole, a couple of beeping issues act as drivers influencing intention to use phone services. Where people believe beeping can help them communicate without being charged, or that they can get in touch with people in case of emergencies, they have a stronger intention to use phone services. It is interesting to note that both these issues appear to act as drivers amongst those with low awareness of ICTs, but not for those with higher awareness, indicating the importance of these issues to the low awareness group; overall attitudes are, nevertheless, less positive than amongst those with higher awareness. Again, the same two issues appear to act as drivers only amongst the infrequent users of phones, although it is the heavy users who demonstrate a more positive attitude towards beeping issues.

The value of beeping to generate an incoming call is more keenly felt by young people (<25), reflecting their reluctance to pay the cost of a call.

6 Access to phones

Use made by respondents of the principal points of access to phone services are illustrated in Figure 12. This shows that whilst in Ghana, customers prefer private communication centres over public booths, the opposite is true in Botswana. The preference in Uganda is also for private service providers, although the two types of access are less distinct due to the fact that most booths are attended (formally), especially in rural areas.

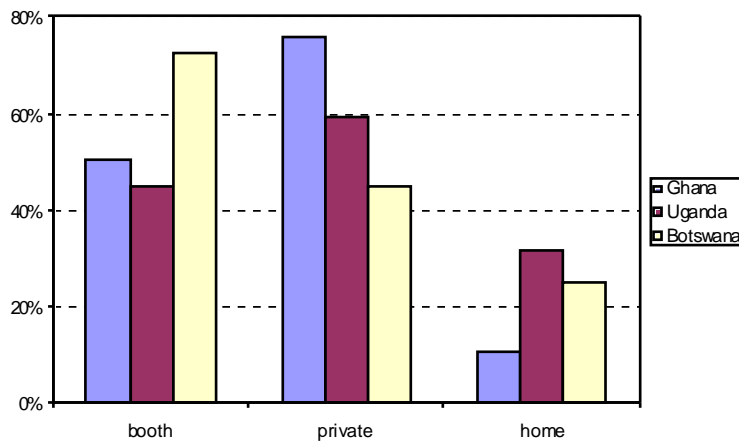


Figure 12 Access to phones

In Uganda, it was reported that individuals with mobile handsets used to make good money by offering service to the public, and charging a high markup. However, it appears that the introduction of public booths with much lower costs has effectively eliminated the market for personal handset use. Several communities reported that it is still possible to use personal handsets, but this stressed that this is offered as a public spirited gesture rather than a commercial service.

6.1 Travel

The proportion of respondents who claim they have to travel to access telephone services varies from 20% in Botswana to 46% in Ghana, and up to 69% in Uganda. In Ghana, people in areas with no service still make use of services – 79% of respondents in areas with no access claim to make some form of regular use of phones.

Most of these people in Ghana and Uganda spend up to \$0.60 on travel, but in Botswana people spend more - most are paying up to \$1.40. Where people have no access to phones, they place great importance on the time, cost and danger associated with travelling to access a phone.

Affordability is closely linked to remoteness. Where people can access cheaper services in urban centres, they may not be prepared to pay markups on public booths. Where people are far from the capital (dominant destination for calls), they will be more willing to pay high phone charges, as travelling in person becomes very expensive. However, the need for communication drops with remoteness e.g. one lady in Uganda said she had no need for communication as all her family and friends were in the sub-county.

6.2 The value of Intermediaries

In Uganda, questions relating to patterns of use (e.g. how often people make and receive calls) were asked of respondents' use of both phone booths and private telephone service providers (PTSPs). The data shows there is no relationship between the indicators relating to use of booths, and intention to use a phone, whilst there is a link between indicators relating to PTSPs and intention. The only indicator that appears to have a direct impact on intention to use phones is the frequency of delivery of messages by providers. This shows how the message delivery service is an important and positive factor in encouraging rural people to use phone services.

The second national operator in Uganda has taken an innovative approach to installing public booths whereby they enter into an agreement with a local entrepreneur or institution, who has to make a capital investment in the booth, and can then enjoy a revenue stream from providing a range of services as a booth attendant (including delivering messages). The role of the attendant (or shop staff) is important in helping people overcome both their lack of familiarity and their fears regarding the use of phones.

7 Mobile and SMS Use within Botswana

This section looks at the use of mobile phones and SMS based on those who own or do not own mobile phones. As indicated in Figure 6, the use of text messaging appears to be higher in Botswana, particularly in comparison to Ghana, where the use of fixed line services is more prevalent.

In Botswana 36% of the respondents claimed to own a mobile phone. Of those owning a mobile phone 9% are not using their phones for a variety of reasons, while 36% of mobile users are making more than two calls per day (see Figure 8). In contrast 18% of those who claimed not to own a mobile are regular users via some other form of access. These broad

findings suggest that there is significant scope for increased mobile use within the current service provision context.

7.1 Influence of service provision on mobile use.

Clearly the use of the mobile and therefore SMS is significantly influenced by the provision of telephone services within the respondents' home areas. However, in those areas without coverage i.e.. rural, there is a proportion of the population that both own and use mobile phones; 11% of those owning mobiles live outside the reach of current coverage.

Although, the service coverage has a logical influence, the only significant difference in mobile phone use is noted between the medium and high service areas - the multiple services equate with significantly higher use. Those in no service coverage areas also demonstrate a propensity to use this service. i.e. of those respondents in areas with no service, 28% claim to use a mobile up twice a month, 27% up to 4 times a week, 11% once or twice pre day and 3% more than twice a day (see Figure 13).

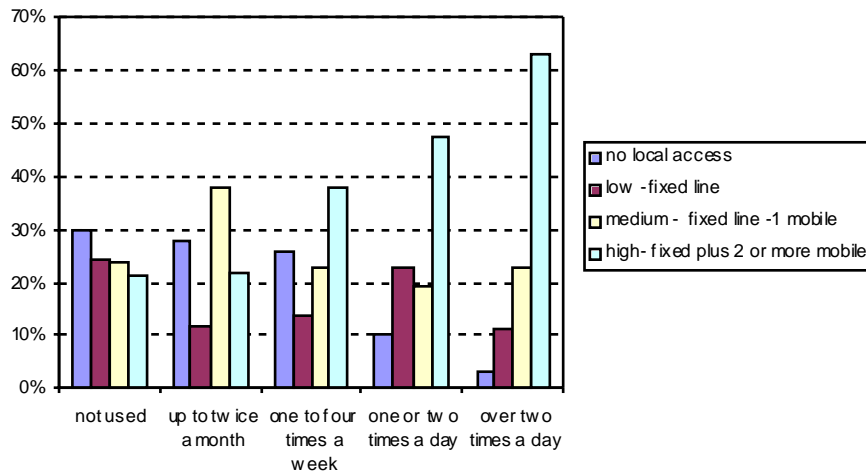


Figure 13 Mobile use by level of service

7.2 Direction of reported mobile traffic

Both Mobile and SMS users enjoy the benefit of being able to receive incoming calls – 49% of calls on mobiles are received, and 52% of SMS use is received messages. When compared with the fact that only 27% of fixed line calls are received, this highlights the potential that exists for increasing the number of incoming calls.

7.3 Education

The level of education has an influence on both mobile and SMS use. Significant differences are noted between those with primary and secondary schooling and between secondary and tertiary education. Although there is a difference between those without schooling and primary level schooling the difference is not significant (see Figure 14).

The influence of education correlates closely with the subjects' awareness of ICTs in general.

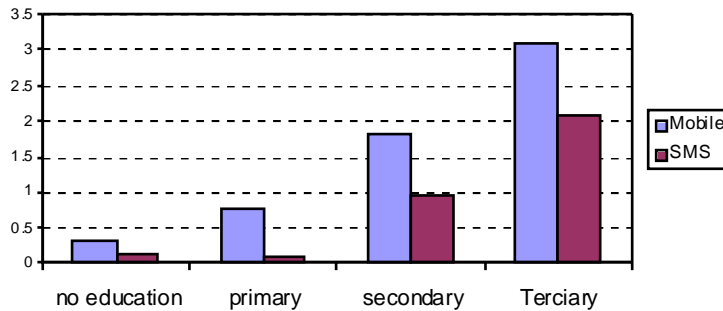


Figure 14 Influence of education on mobile and SMS use

7.4 Influence of other descriptors.

Other usual social descriptors such as age and gender appear to have little significant effect on the use of mobile phones and SMS. However, the case of age the <16 and 40> indicated a significantly lower propensity to use these services.

7.5 Intentions and attitudes toward Mobile and SMS use

One of the areas explored in the study was the intention of the respondents regarding future use of both mobiles and the SMS facility. Intention if supported by a corresponding strength of attitude and or perceived social pressure (subjective norm) to the use of the particular ICT, is considered one of the most reliable indicators of future behaviour.

A positive intention to use mobiles in future was expressed by 67% of the respondents; when compared with the fact that only 36% of respondents currently use mobiles, this suggests that there is significant potential for the future increased use of this service. Only 15% were undecided and 17% negatively inclined.

With regard to the use of SMS, 24% indicated that they were undecided (which may indicate a possible lack of understanding.) and 28% indicated a negative intention to use these SMS in future. However, 48% expressed a positive intention. This also indicates the potential for the increased use of this service if the barriers can be addressed and the service access provided.

The level of service overall has a relatively minor influence on overall intentions attitudes and social normative perceptions regarding the use of these two ICTs. Overall these three variable readings strengthen positively as the service level improves. However, in many instances not as significantly as would have been assumed.

The level of education achieved has a significant positive influence on the subjects' intentions and attitudes regarding mobile phones, when a comparison is made between primary and secondary school leavers. Little difference is noted neither between the unschooled and primary leavers nor between secondary school leavers and those who have attained higher education. This is also mirrored when considering SMS use - the main differences occur between primary and secondary school leavers. In this case all are positive and significant changes.

8 Conclusions

It is generally accepted that ICTs and access to information have a positive development impact, particularly with regard to business information and activities. This study confirms the importance of telecommunications to economic activities, but also demonstrates the dominance of family affairs amongst the target groups.

Issues of security are important to certain groups of people, notably the elderly and women. There is a widely held view that phones improve security, by virtue of the fact that people can call for assistance. Another issue is the perceived danger associated with travelling to access a phone.

Of course cost of phones is an important factor, but it only appears to be regarded as a problem amongst those with no education. Beeping is a useful means of keeping costs down, with 40% of beeps being returned, and this is important amongst those with low levels of ICT awareness.

Even in areas with no service coverage, people will travel to make use of services, to the extent that there is surprisingly little difference in use. Not surprisingly, associated issues of cost, time and safety of travel are important, but the fact that people are prepared to travel demonstrates the high value placed on communications. An important benefit of phone use is the cost and time saved by not needing to visit people.

The importance of literacy in the application of ICTs is well recognised, and this is supported by findings which show that reliance on written communication is lower in remote rural areas. With regard to literacy, phones are attractive as users can express themselves clearly – this is especially true of the elderly, and those in remote rural areas.

The role of an intermediary, or attendant, is most important in rural communications. The study supports anecdotal evidence that people do suffer from lack of understanding of how to use phones, particularly amongst the poorly educated. It is difficult for rural users in particular to receive incoming calls, but attendants provide a useful service in making arrangements for incoming calls. Calls received tend to be longer than calls made (by 20%).

Taking a broad view of telecommunications services, it is clear that users (and potential users) generally have a positive attitude, which is reflected in a positive intention to use services, all of which indicates that demand exists so there is scope for increased use of services if barriers can be addressed.