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Problems of policy formulation and implementation: The case of ICT use in rural women's empowerment in Ghana

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ABSTRACT

This paper sheds some light on the logic of designing a disaggregated ICT policy to empower rural women using information from selected rural areas in Ghana. The study uses survey data from three regions in Ghana to determine the factors influencing rural women's' choice of information delivery technology. The three regions are the Upper East, Ashanti, and Greater Accra. The basic hypothesis in the study was that the wide differences in the socio-economic status of rural women households' influences their choice of information delivery technology and also their willingness to pay for a selected technology. This basic hypothesis was addressed using data from a survey instrument administered to 100 households from each of the three designated regions. The study concludes that there is the need to examine ICT use in empowering rural women within a 'holistic' context. The results point to a merit in allocating considerable authority to regional and local authorities in setting priorities and approaches to empowering rural women through the use of ICT.

Keywords*: ICT-women-rural women-radio-extension-policy-empowerment*

INTRODUCTION

The United Nations supported Millennium Development Goals (MDGs) and Ghana's own Poverty Reduction Strategy Program (GPRSP) emphasizes the *empowering of women* as a goal to address the problem of poverty. One study has defined 'empowerment' as,

> *"a process whereby women become able to organize themselves to increase their own self-reliance, to assert their independent right to make choices and to control resources which will assist in challenging and eliminating their own subordination" (Karl 1995, p.190).*

The use of Information and Communication Technology (ICT) is now considered a critical element in the effort to empower rural women because empowerment entails the ability and freedom to make choices in the social, political, and economic arenas. In turn, choice-making is driven by both the quality and quantity of information delivered to women in rural households. The challenge facing a developing country like Ghana is how effectively information could be made available to rural households to enhance choice-making. In attempting to respond to this challenge, policy makers must address a formidable question. Given the budget restrictions facing developing countries, is it possible to disaggregate implementation of ICT policies so as to respond to the unique needs of rural women, or are countries perpetually tied to the implementation of "one-size-fit-all" ICT policies to empower rural women?

SCOPE OF STUDY

This paper sheds some light on the logic of designing a disaggregated ICT policy to empower rural women using information from selected rural areas in Ghana. Specifically, the study uses survey data from three regions in Ghana to determine the factors influencing rural women's' choice of information delivery technology. The three regions are the Upper East, Ashanti, and

Greater Accra. The information delivery technologies considered are private radio, community radio, and extension agents who distribute printed materials.

The Greater Accra Region where the capital city, Accra, is located is the most urban followed by Ashanti Region which has the second largest city of the country, Kumasi. On the contrast, Upper East Region is one of the three poorest regions in the country and therefore has a wider rural coverage. There are marked rural urban differences in Ghana which is generally reflected in all the regions of the country. The Ghana Living Standard Survey 4 (GLSS 4 2000) indicates that household expenditure is almost 60% higher in urban areas than in rural areas, while per capita expenditure is just over 80% higher. In the rural areas, per capita expenditure is higher in the forest zone, (*where Ashanti Region is located*) than in the coastal zone (*where Greater Accra Region is located*), which in turn is higher than in the savannah zone (*which covers Upper East Region*). Table 1 shows a profile of the three regions surveyed. The table gives a description of the proportion of adults who have been to school, by sex and locality; mean annual household and per capita income; and household expenditure on food. Among the three regions being discussed, the Greater Accra Region, being the Region with the capital city has the over all highest proportion of adults who have been to school (85.6%) and even the highest among males and females. This is followed by Ashanti Region and then Upper East Region. A similar trend goes for mean annual household and per capita income. The results on food which takes highest percentage of household expenditure revealed that, the Upper East Region which happens to have the lowest household income had the highest percentage on expenditure on food (61.4%) followed by Ashanti and Greater Accra Regions, 53% and 43% respectively. The rural and urban expenditure on food also provides similar information. This gives an indication that the regions and for that matter households with limited human resource development (education) and financial resources tend to spend more income on food.

Table 1: *Regional educational and economic data*

Region	Education (%)			Economic		
	Male	Female	All	Mean annual household income (cedis(¢)*	Mean annual per capita income (cedis)	Expenditure on food (%)
Greater Accra	92.6	79.1	85.6	3,356,000	932,000	48.0
Ashanti	90.2	72.1	80.0	2,550,000	622,000	53.0
Upper East	35.7	16.9	26.3	1,446,000	321,000	61.4

Source: GLSS 4 (2000); *¢9,300. = US$1.00

The basic hypothesis in this study is that the wide differences in the socio-economic status of rural women households' influences their choice of information delivery technology and also their willingness to pay for a selected technology. This basic hypothesis is addressed using data from a survey instrument administered to 300 households from the three designated regions. Beyond the issue of whether an aggregate rural empowerment ICT policy would be appropriate, the outcome of this exercise has important program planning and implementation applications. For example, since Ghana receives considerable funding and technical support from development partners, the results from this study could be used to channel and target donor support to identifiable needs in rural areas so as to minimize waste and duplication of effort. For the

government's own resource allocation, a disaggregated ICT policy could lead to significant policy efficiency gains.

THE ICT ENVIRONMENT IN GHANA AND THE RURAL SECTOR

Ghana has responded to the ICT challenge. In 2003, the country announced the *Ghana Integrated ICT for Accelerated Development* (ICT4AD) *Policy*, which summarized the vision of Ghana in the information age. While the policy outlines a broad array of objectives, it is clear that the core of the policy is to use ICT to achieve Ghana's vision of becoming a middle-income country by the year 2020 (Ghana, 1996). Ghana's ICT policy is supported by a slew of supporting laws, programs, and initiatives such as, the National Initiative concerning the ICT and Education and Training (NISI), the African Information Society Initiative (AISI), and the Science and Technology Policy Research Institute (Ghana 2003. Despite the wide recognition of the role of ICT in national development, a successful ICT program planning and implementation to accelerate empowerment of women in Ghana is beset by several institutional, technical, political, economic and social challenges. As an institutional matter, ICT policy planning and implementation is spread among several ministries, institutes, research centers, and private agencies. This increases the potential for institutional dissonance and 'turf battles' that could lead to waste and duplication of effort.

As a political and social matter, there are concerns that the uneven access to education would translate to a 'gender digital divide' in Ghana unless explicit and credible policies are put in place to address the situation. Having some level of literacy obviously enhances one's capabilities and gives one an advantage in the use of ICT facilities. A cursory glance at the educational situation as presented in the GLSS 4 (2000) will show that 50% of adults in Ghana are literate in English or a local language. There are substantial differences between the sexes, and between localities, with regard to basic literacy. A little over 6 out of every 10 men, but fewer than 4 out of every 10 women, are literate. More than two-thirds (66%) of adults in urban areas are literate, but in rural areas only 41% are literate. This reflects in school attendance as well. Not only are a higher proportion of urban dwellers of school going age actually in school, but also attendance rates rise with increased urbanisation. For example, 95% of all boys in Accra (the regional capital) aged 6 to 11, and 91% in other urban areas, were enrolled in school as at the time of the survey, whereas in rural savannah (where Upper East Region is located) the corresponding figure is only 66%. A similar pattern is noticeable in respect of school attendance among girls. The proportion of females in school is significantly lower in all localities and for all ages (apart from age group 6-11 in rural coastal where Greater Accra region is located) when compared with their male counterparts. Table 2 highlights the substantial differences in school attendance, both between the sexes and between the south (represented by Greater Accra and Ashanti Regions) and the north (represented by Upper East Region) of the country. In terms of the sexes, male attendance rates are in general higher than the rates for females throughout the country and across age groups. School attendance here also increases with urbanisation, and female attendance is consistently lower than that of male attendance. Another notable observation is the differences between males and females' rates in urban areas, as compared to the variation in rural areas. The situation for females in this case is worse in rural areas than in urban areas. There is even higher school attendance among rural males than urban females though the percentage of urban female school attendance is higher than that of rural female school attendance. This implies that females no matter their location, whether urban or rural face a critical education situation. However the situation of rural females is the worse of all.

Table 2: *Proportion of adults in each region who have been to school, by sex and locality (%)*

	Urban			Rural		
Region	Male	Female	All	Male	Female	All
Greater Accra	93.0	80.4	86.6	85.8	61.9	72.5
Ashanti	92.6	82.6	86.7	88.8	64.8	75.5
Upper East	85.7	50.0	66.7	29.6	12.3	21.0

Source: GLSS 4 (2000)

Probably the most daunting task facing policy makers in Ghana is making ICT available to a large segment of the population, especially for educational purposes in the rural areas. Some point to the difficult choice between resource allocation to meet immediate needs such as food, shelter, and health as against investing these resources in computers and ICT infrastructure. This 'bread or computers' debate is misplaced because it fails to recognize the symbiotic relationship between ICT and rural households' empowerment to improve their welfare.

Also, ICT policies and programs are expensive to design and implement. Resources are needed for infrastructure and operational purposes. Given the pressure on the government's budget, it may be necessary to solicit contributions from rural households, a rather difficult proposition given the low household income levels in rural areas. It is also well established that technology adoption and use depend on the socio-economic characteristics of rural households. Yet the ongoing policy debate concerning ICT in empowering rural households seems tilted to the belief that all Ghana needs is to make ICT available and rural households will jump at the opportunity. A credible and sustainable ICT policy to empower women in rural Ghana should consider the socio-economic characteristics of households, including a determination of their willingness to pay for alternative ICT technologies. This paper attempts to provide such information for ICT policy and program planning and implementation.

Rural Poverty, Status of Rural Women, and ICT in Ghana

The basic document summarizing the state of poverty in Ghana, strategies to defeat poverty, targets, constraints, and projections is the Ghana Poverty Reduction Strategy paper (GPRS 2003). The GPRS defines poverty as "unacceptable physiological and social deprivation." (p. 3) and lists participation in decision making, health, education, environmental sustainability, lack of political power as some of the critical considerations in defining poverty.

According to the GPRS, five out of ten regions had more than 40% of their population living in poverty in 1999. The three northern regions (Upper East, Upper West and Northern Regions) are the hardest hit with nine out of ten people in the Upper East; eight out of ten people in the Upper West, and seven out of ten people in the Northern Regions classified as poor in 1999 (GPRS 2003). Ghana has experienced some success in reducing poverty. Overall poverty decreased between 1991/92 and 1998/99 from 51.7% to 39.5%. Extreme poverty declined from 36.5% to 26.8% over the same period. However, unchecked population growth threatens potential gains in poverty reduction since population growth during the decade of the nineties far outstripped the rate of decline in poverty levels (GPRS 2003).

The high incidence of poverty among women presents a major barrier to ICT adoption. The Ghana Living Standards Survey (GLSS 4 2000) concluded that women form over 70% of food crop farmers, and 90% of those in internal agricultural distribution, marketing and processing. About 80% of Ghanaian women in the labor force are employed in small, semi-formal and informal undertakings.

There are other constraints that could limit the employment of ICT in empowering rural women. Women constitute the higher percentage (42%) of adult illiterate population (Defined in the GLSS 4 as people who are 15 years and above, and can read and write at least a sentence) in Ghana. Studies have shown that women experience greater poverty, have heavier time burdens, lower rates of utilization of productive resources and lower literacy rates (GLSS 4 2000). School participation rate for basic and second cycle schools is 77% for men and 38% for women. Due to socio-cultural factors like early marriage, teenage pregnancy and child labour that affect women this discrepancy widens as one ascends the educational ladder (Ghana 1995, p. 6, Ghana 1996). Prospects for a change in the near future are not bright given record of current recruitment into the literate class. Dropout rates remain high at about 20% for boys and 30% for girls at Primary School and 15% for boys and 30% for girls at Junior Secondary School. Programs targeting empowerment of rural women through ICT applications must take into account the targeted population to use the technology.

There are also major barriers to introducing ICT to rural women due to the political context within which rural women function in Ghana. In a true sense, the idea of empowerment' is captured by the participation of rural women in all phases – design, implementation, and evaluation - of policies and programs that affect them. The literature is replete with calls for 'stakeholder ownership' of development policies and programs to ensure success. Unfortunately, the participation of women in decision-making is the weakest link in the fight against poverty. The GLSS concluded that women are poorly represented at all levels of decision-making. Within the household, culture and norms designate men as heads of households and therefore the principal decision-makers. At the highest level of government, women are again disadvantaged (Ofei-Aboagye 2000). Considering these, policies and programs to promote ICT in empowering women in rural areas have to be undertaken with due considerations of the broader socio-economic environment within which women function in Ghana.

Another consideration is the availability of complementary inputs such as computers, voice and video systems, and in some cases, physical access to rural locations. The current infrastructure for telecommunication broadcast to regions in Ghana is limited to serving the major regional centers and capitals. Resources for expanding the reach of the telecommunication infrastructure may be quite limited in the light of the findings of a recent survey of budget allocations to the ICT sector. According to the report, majority of government ministries and public sector organizations have less than 10% of their total budget on ICT (including acquisition of hardware, software, training, maintenance of ICT systems, etc.). Close to 60% indicated that their ICT expenditure as a percentage of their total expenditure is below 10%. Close to 34% of the organizations reported devoting about a quarter of their total expenditure on ICTs. On the whole, most of the organizations in all the sectors spend less than half of their annual budget on ICT (Ghana 2003).

BACKGROUND LITERATURE AND METHODOLOGY

There exists an extensive and diverse literature on the potential role of ICT in poverty alleviation, and more specifically on rural women's empowerment in Sub-Sahara Africa and other developing areas. The literature cuts across disciplines, methodologies, theories, and motivations. The literature has been reviewed along theoretical and empirical studies.

Theoretical Literature

Policy documents from domestic sources, international conferences and meetings, speeches, presentations, and private research initiatives have generally contributed to (1) defining the concept of ICT use in rural adult education, and (2) understanding the factors influencing ICT use in rural adult education. There are not many formal models of the interface between ICT and empowerment of rural women through adult education. Rather, researchers have focused on the formal relationship between technology, education and poverty alleviation generally. A typical study in this context was conducted by Wagner and Kozima (2003) of the International Literacy Institute – National Centre on Adult Literacy, University of Pennsylvania. The study, *New Technologies for Literacy and Adult Education: a Global Perspective* emphasizes the need for a refined concept of adult education that meets the needs of the modern era and takes advantage of technology opportunities. The authors defined ICT as: "A set of potential delivery and instructional tools that can be used to help people acquire the skills associated with the traditional notions of literacy" (p.15). The authors' view of the role of ICT in adult education is built around the notion that literacy, technology, and development must be considered as an integrated set of tools. Literacy is defined broadly beyond text. They identified two approaches by which technology could improve literacy. One approach is to use capabilities of technology to deliver instruction in support of the cognitive skills needed to read and understand text. The second approach focuses on how technology could be used to efficiently support the use of text and developing literacy skills for learning at a distance when instruction and other resources might not otherwise be available. These approaches are best suited to a society that has computers and related equipment and power systems to access information. Looking at the level of infrastructural development this may not be readily accessible to majority of the people in developing countries like Ghana. However if Government initiatives for improving ICT infrastructure is hastened, the nation will soon have the systems to harness all the potentials that ICT offers.

Holmes (2004) presents a rich framework for understanding ICT and rural development. Holmes has examined the relationship between ICT and adult education. In defining ICT for development, Holmes adopted the Association for Progressive Communications definition of ICT as

> *"Technologies and tools that people use to share, distribute, gather information, and to communicate with one another, one on one, or in groups, through the use of computers and interconnected computer networks. They are mediums that utilize both telecommunication and computer technologies to transmit information" (Holmes 2004, p. 24).*

Holmes makes several important observations. For example, the author emphasizes that ICTs are tools that facilitate sharing information and foster communication. Also ICT include both new and traditional information and communication technologies, and even though there is often an emphasis on the new personal computers, the Internet, World Wide Web, mobile phones, satellite and wireless technologies, an African ICT tool kit for development also encompasses traditional media including, telephone, radio, television, print media (e.g. newsletters, cartoons and graphic posters) and community communication initiatives (e.g. listening groups and community theatre). Even though Holmes' framework focuses on the role of ICT on a specific sector (governance of the economy), it still offers valuable insights to understand how good governance and the various strategic actors and their roles influence women's empowerment in other contexts. One such context is rural women's empowerment through ICT. The framework points to the comprehensiveness and complexity of the empowerment problem given the many stakeholder interests that must be reconciled to achieve an efficient policy outcome. The model also indicates that empowerment may entail the expenditure of considerable human and financial resources. For example, what the author refers to as "gender budgeting" ensures that resources available serve the needs of all women, especially rural women. A second example to illustrate the need

for human and financial resources is the need to have the relevant information to guide policy making. Holmes' framework emphasizes the need to collect gender and location (urban/slum/rural) disaggregated data to evaluate government policy and develop new policies that support the empowerment of women. One important conclusion from Holmes' framework is the extent of resources needed to develop programs to empower women through the use of ICT. It is in this context that a study of sustainable ICT use in rural empowerment must pay some attention to the sources of funding to implement programs.

Nath (2001) has presented a formal model of the role of ICT in empowerment of women. The author explains that,

> *"ICT in the context of knowledge societies is understood as building the ability and skills of women to gain insight of actions and issues in the external environment which influence them and to build their capacity to get involved and voice their concerns in these external processes, and make informed decisions" (Nath 2001).*

The author adds that this entails building the capacities of women to overcome social and institutional barriers, and strengthening their participation in the economic and political processes to improve their quality of lives. Nath's model implies that women's access to strategic information leads to their empowerment. Though the model takes cognizance of the various conceptualisation processes that information goes through in the women's system, it does not take into consideration various inhibiting factors and obstacles that could affect women's empowerment. For example, the model does not point one to how the socio-political milieu could affect the availability of information. Also, the implicit assumption that access to strategic information automatically empowers a rural household is suspect given the set of hierarchical cultural structure within which rural women function. That means women's access to strategic information does not lead to automatic empowerment. Furthermore, there is no indication of how the needed information is to be acquired and who is to pay for it. Nath's model does not indicate a feedback loop so that access to information is seen as a unidirectional process. The essence of empowerment is the ability to use information in making choices that supposedly would influence future participation in policy to alleviate poverty. Despite these observations about the model, it must be pointed out that Nath is one of the few authors to rigorously define the theoretical underpinnings of ICT and rural adult education.

A theoretical framework explaining the relationship between information technologies for empowerment of rural women through adult education must at a minimum address five important issues. First, the framework must address the process of information technology policy formation and implementation. Second, the model must explore alternative information delivery technologies recognizing the cost and sustainability implications of the alternatives. Third, there is a need to recognize that rural households' choice of information technology is not only a technical issue but more importantly depends on the socio-economic characteristics of the household, especially the willingness and ability to pay for the technology. Fourth, the framework must point to selected indices that are general enough to capture the broad meaning of the concept of 'empowerment', and finally, the framework must contain a feedback loop that highlights the critical role of information in the 'learning' process. This last characteristic of the framework emphasizes the need to treat information availability and decision-making as an ongoing process, and not a one-shot discrete event that is unrelated to the future choices made by rural households. The outcome of the 'learning' process is reflected in the decisions made by households to achieve their empowerment goals (participation in the political process, improved income, increased job opportunities, good health etc). More significantly, the lesson from the 'learning' process becomes an input in subsequent policy planning and the generation of new information that informs future decisions made by rural households. Thus, there is the need for a 'feedback' loop that goes back to the policy planning level. This makes 'learning' an important component of the empowerment process.

Empirical Studies

There are two strands of the empirical literature relevant to the study. First, there is the literature that examines the cost of establishing ICT systems in different cultural contexts, and second, there is the literature that summarizes the impact of introducing identifiable ICT interventions on rural households, for example, the effects of age, gender, income, educational level, etc on a households' choice of ICT. An example of the first strand of empirical literature is the study by (Perraton 2000). The author provides some data on cost of some adult basic education projects from several countries to show the economic advantage that distance education has over face-to-face. One is likely to break-even if the product is highly accessed. In any case the type of media is also a factor. For instance, Perraton explains that studies have revealed that radio offers a moderate cost for distance programmes for adults in health and agriculture. Radio has a large audience, moderate cost of production and delivery leading to a lower cost per learner.

The concern over sustainability of ICT use in rural areas raises a second policy issue concerning the choice of ICT infrastructure to adopt in a given location. Given that there are several ICT protocols (personal radio, community radio, telephone, television, etc), what factors could influence a household's choice of a protocol? The literature suggests that cost is probably the driving factor. The idea of the 'community radio' for example, seems targeted directly to reducing the cost of delivering information to rural households. The major international development agencies have spearheaded the community radio efforts. For example, the FAO Rural Radio and Simbani have developed training partnerships that use rural radio to raise awareness about issues critical to rural development.

Studies on the use of radio in rural learning dominate the second strand of the literature on empirical studies. In a study by Abbey-Mensah (2001) entitled, *'Rural Broadcasting In Ghana'* exemplifies this literature. The author concluded that radio is the most useful and efficient medium available to the Ghanaian rural population, and recommended radio broadcasting as one of the vehicles through which national aspirations could be pursued. Westoff and Bankole's (1997) study, *'Impact Data - Accessing Mass Media on Reproductive Behavior - Africa'* arrived at a similar conclusion as Abbey-Mensah about radio use in rural education. The authors conducted demographic and health surveys, in Burkina Faso, Ghana, Kenya, Morocco, Madagascar, Namibia and Zambia to study the impact of mass media on people's reproductive health decisions. Controlling for the effects of such variables as household income, socio-economic status, age, gender, and geographic location, the authors found that there is a persistent and frequently strong association between exposure to the mass media and reproductive behavior change in Africa. The findings from Westoff and Bankole's study reinforce the need to focus on the use of radio in rural education in Ghana. Even if some reasonable measure of cost could be obtained, there is still the issue of households' ability and willingness to pay for the information. This issue has been part of the structural reform and market-led policies initiated in Ghana and in several other African countries in the early 1980s. Researchers have addressed the broader question of households' willingness to pay for public services through the imposition of user charges, Thobani (1983), Tan, Lee and Mingat (1984) for education; Boadu (1993) for rural water supply; Haba 2004 for rural extension information. While these studies do not address user charges in the context of ICT in rural education, the findings from the studies are useful in understanding how socio-economic factors influence households' decisions regarding user charges for public goods in general.

The findings in Haba and Boadu's studies are especially relevant to the current research. Haba studied rural Rwandan households' willingness to pay for selected technologies – farmer-to-farmer, expert visit, radio, television, and print in the delivery of extension information. The author hypothesized a household's willingness to pay for technology to depend on several socio-

economic factors including income, age of head of household, gender, and education. Using simple regression analysis, the author found very little impact of the selected socio-economic variables on a household's willingness to pay for extension information. The most significant finding from Haba's study is that most farmers preferred the farmer-to-farmer approach to delivering information. This result is not surprising given that the study targeted coffee growers who are more likely to feel comfortable sharing experiences with fellow growers. Boadu's study on the other hand found a positive and significant relationship between income, education, distance to nearest water source and a household's willingness to pay for water. Both studies suggest the need to focus on household's characteristics in formulating policies to implement a user charge regime in the provision of public goods such as information. Thus the socio-economic characteristics (gender, age, income, education, occupation, location, etc) of rural households are important in rural households' decision-making. Utilizing information from this literature search, a survey instrument was developed and tested in the three targeted Regions of Ghana.

Research Methodology

The information from the literature survey was combined with key elements of the general framework to develop a survey instrument that was used to collect the primary data for estimating the quantitative impact of the variables hypothesized to influence households' willingness to pay for information. Some of the critical socio-economic characteristics of households and their potential implication for a household's technology choice are discussed below.

Income

It is difficult to predict the effect of income on the willingness to pay for ICT in rural households. Generally, a positive relationship between income and the willingness to pay for ICT is expected. Households with high incomes tend to spend a smaller proportion of income on food while poorer households spend a higher proportion of income on food. Thus, one would expect the effect of income on ICT to be positive in the relatively richer regions. Furthermore, one would expect households with high incomes to use private radios instead of community radios in receiving information.

One could argue that even though poorer households spend a higher proportion of income on food, their interest in obtaining information to 'kick' out poverty may encourage them to be willing to pay for ICT information. In essence, there are no statistically significant differences in households' willingness to pay across regions. In this sense, it is difficult to predict the exact sign (positive or negative) on the income variable, and the issue is left to empirical determination. An indirect approach was used to obtain measures of income from rural households. Households were first asked to list the major sources of income, and then inquired about their expenditure patterns. This was done due to the difficulty in obtaining direct income figures from households and also to capture the effect of transfers. These expenditure amounts were used as proxies for income. Studies of willingness to pay for amenities in rural households have found direct rural income measures to be unreliable and have resorted to proxies to estimate income (Boadu 1993).

Education

Rural females have lower school attendance rates across all regions with the lowest rates recorded in the Upper East. Generally, it is hypothesized that educated households will be willing to pay for any ICT media given the premium on information in decision making. While an illiterate

household naturally would depend on the radio and extension visits for information, a literate household has the additional source of information delivered through extension bulletins, and other printed sources.

Age

It is hypothesized that older households will be more willing to pay for community radio systems and extension visits. There are good reasons for this expectation. First, older households are likely to belong to community organizations and hence more comfortable with sharing the media. On the other hand, a young household is also likely to be less involved in community organizations, and would be willing to pay for their own private radio system.

Household Size

The household is defined to include all persons who are under the direct responsibility of the female respondent. At a given income level, large households are less likely to pay for private radios given the cost of these radios. Thus, large households will be more willing to pay for community radios and extension services, while small households are more likely to be willing to pay for private radios.

Membership in Community Organizations

It is hypothesized that households who belong to a community organization will be willing to pay for information delivered via community radio. Community radio is cheaper than a private radio and more importantly, these households have cultivated the spirit of sharing through their membership in an organization. Results of the GLSS 4 (2000) indicate that rural households make more contribution to community initiatives than do urban households. By analogy, it is hypothesized that households in the more deprived areas, especially in the Upper East Region will be more willing to pay for community radio and extension services compared to those rural communities located near the urbanized regions such as Greater Accra, and Ashanti.

Marriage

Married women are likely to be more willing to use and pay for private radio media. The reason for this assertion is that married women are more confined to private life. Several socio-cultural factors affect their level of participation in public life and interaction with *strangers*. In addition child care, home care and other domestic activities form the priority of married women's engagements. These limit their ability to engage in leisure and other empowering socio-economic activities. Limited by these inhibiting factors they are likely to prefer to have their own private radios. Another contributing factor to married women's willingness to use and pay for private radios could be that married women may have higher income (spouses combined income) and could therefore afford the more expensive media for information delivery.

These hypothesis were tested using data from the three regions. The data used in this study was based on a contingent valuation [1] survey instrument administered in several villages in Ghana in a face-to-face interview. The survey was divided into two main parts. The first part sought information on basic characteristics of households - age, education, dependents, occupation, expenditures, and membership in community organizations. The second part consisted of a bidding game for alternative information delivery technologies. Three main information delivery technologies were considered – community radio, private radio, and extension agent (who disseminate printed materials). The main distinguishing feature of these technologies is price. For example, information delivery by community radio is considered the cheapest since several

households contribute to the purchase and maintenance of the system. Extension agents are considered the next cheapest of the three technologies considered because the government pays these agents. The idea was to explore the extent to which a part of the cost of extension information delivery could be shifted to households and lessen the burden on government. The most extensive delivery technology is the private radio since a household owns it individually and pays full amount for it.

Bidding took the form of a series of specific questions. For example, a respondent was asked whether she would be willing to pay ¢1,000 (approximately ten cents) per year to use a community radio. If 'yes' the question was posed again with an increase in the amount to ¢2,000 (approximately twenty cents). The process continued until 'No' was the answer. The final amount to which the respondent answered 'yes' was recorded as the maximum amount the respondent was willing to pay to have the community radio installed in the village. For extension agents, the beginning bid was at ¢5,000 (approximately fifty cents), while for private radios, the beginning point was ¢10,000 (approximately US$1.00). Respondents were also asked to state an amount they will be willing to pay for each of the information delivery technologies.

Field data was collected with the assistance of Regional Officers of the Institute of Adult Education. These officers are located in the Regional Centers of the Institute which is established in all the ten Regions of Ghana and are constantly engaged in community programs with the local people. These field officers were recruited for this survey because they are in partnership with the community members and over time have won the confidence and trust of the rural households. They have good knowledge of the regional demographics and have established mutual working relationship with the women in the local communities. They are also able to communicate in the language that the people understand. Their accumulated community research and training experience, residence in the regions, and effort helped to do rapid field data collection.

The interview was conducted **face-to-face** where the interviewer had the opportunity to explain the purpose of the survey and the need to obtain truthful responses from the respondent. The interviewers were quite familiar with the villages and based on their experiences understood the need to interview in a manner that did not impair the integrity of the effort. As a strategy, they interviewed the female household head in every other house. Respondents were also cautioned not to discuss their responses with other households. There was broad agreement among field staff that respondents took the process seriously and were willing to offer truthful information to assist in achieving the objectives of the survey.

STATISTICAL ESTIMATION AND RESULTS

A multiple linear regression relationship was assumed between the dependent variable and the independent variables. The mathematical expression of the relationship for households in each region is as follows:

1. $(WTP)_{ijt} = a_0 + a_1 (AGE) + a_2 (EDUC) + a_3 (MARS) + a_4 (DEPEND) + a_5 (EXPEND) + a_6 (MEMBR) + U_{i,}$

Where

$(WTP)_{ijt}$ is the willingness to pay by a household (i) in region (j) for information delivery technology (t),

AGE is age of respondent measured in years,

EDUC is the educational level of respondent. For analytical purposes the educational level was broken into levels, up to primary and above primary.

MARS is the marital status of respondent, and was measured using a *dummy* variable equal to 1 if respondent is married, and zero for otherwise.

DEPEND is the number of dependents of respondent,
EXPEND is the aggregate of all expenditures reported by the respondent measured in Ghana Cedis, and
MEMBR is the membership of respondent in a community organization. Membership was measured as a *dummy* variable, equal to 1 if the respondent belonged to a community organization and zero, otherwise.
The term U is a random error term assumed $N(0, \sigma^2)$.

Equation 1 was estimated for each individual region using the Newey-West estimator. The results of the estimation procedures are presented below.
Table 3 lists the means of selected independent variables for the three regions in the study, and the mean bids for extension services, community radio, and private radio. Mean household size and expenditures are also provided. Consistent with expectation, mean bids for private radio is highest, followed by mean bids for extension information, followed by community radio.

Table 3: *Means of independent variables compared to means from GLSS 4*

	Household bids in Ghana Cedis					
Region	Extension information	Community radio	Private radio	Number of dependents	Expenditure: survey	Expenditure: GLSS 4
Gt. Accra	10202	3656	21162	2.83	11,495,487	6,777,000
Ashanti	8480	3360	22300	3.61	11054650	
Upp. East	8595	3141	21262	3.04	4,059,460	1,793,000

Source: Survey and GLSS 4 (2000) and Survey Data (2004/5)

Ashanti Region

Other than the expected low coefficient of determination when using cross-section data, only the expenditure variable of the regression results for Ashanti Region (Tables 4a, 4b, and 4c) was found to be significant for all information delivery media. Even though the estimated coefficients for the expenditure were small (2.34E-06 for community radio; 3.49E-05 for private radio; 9.31E-06 for extension services), they were all highly significant at the 1% level. Two other variables were found to be mildly important in explaining the variation in households' willingness to pay. Table 4a shows a positive relationship between the number of dependents and households willingness to pay for information delivered via community radio. The estimated coefficient was significant at the 10% level. This outcome is consistent with the hypothesis in this study since households with a large number of dependents spend more on household maintenance and would opt for the cheaper media (community radio) for information delivery. The results for community radio also shows that households with education above the primary level are not willing to pay for information delivered via community radio. The estimated coefficient of –1.89 is significant at the 10% level. It is not immediately clear why this outcome was obtained because one would have expected that since there is a positive relationship between expenditure and willingness to pay for information delivered via any media, educated households would value information and hence be more willing to pay.

Table 4a: *Regression results for households' willingness to pay for community radio: Ashanti Region*

Variable	Coefficient	t-Statistic
Constant	3369.005	11.43
Age (Up to 20)	-666.53	-1.51
Age (Above 20)	158.97	0.67
Married	-117.85	-0.37
Dependants	70.29	1.72
Educ. (Primary)	-526.86	-1.02
Educ. (Above Primary)	-378.76	-1.89
Expenditure	2.34E-06	2.51
Membership	105.99	0.27
R-squared 0.12	N = 100	

Source: Survey Data 2004/5

Table 4b: *Regression results for households' willingness to pay for private radio: Ashanti Region*

Variable	Coefficient	t-Statistic
Constant	21702.51	6.11
Age (Up to 20)	5181.99	1.39
Age (Above 20)	-2787.089	-1.43
Married	-1200.54	-0.45
Dependents	-506.98	-1.14
Educ. (Primary)	-1873.002	-0.28
Educ. (Above Primary)	2771.096	1.25
Expenditure	3.49E-05	4.21
Membership	5696.46	1.83
R-squared	0.14	N = 100

Source: Survey Data 2004/5

Table 4c: *Regression results for households' willingness to pay for extension agent: Ashanti Region*

Variable	Coefficient	t-Statistic
Constant	9077.58	6.50
Age (Up to 20)	1863.68	1.43
Age (Above 20)	-1083.80	-1.57
Married	-536.63	-0.54
Dependents	-52.75	-0.38
Educ. (Primary)	472.70	0.18
Educ. (Above Primary)	424.38	0.31
Expenditure	9.31E-06	3.74
Membership	690.14	0.72
R-squared	0.084	N = 100

Source: Survey Data 2004/5

Greater Accra Region

All three regression equations (Tables 5a, 5b, and 5c) estimated for the Greater Accra Region yielded very low R-squares (13%), thereby making the explanatory power of the regressions very weak. What is interesting about the results for the Greater Accra Region is the consistency in the relationship between income and women's willingness to pay for information delivered via any of the three technologies. In all three cases, the proxy for income is statistically significant at the 5% level. Furthermore, the results show that educated households are more willing to pay for information delivered via a private radio or an extension agent (10% level of significance). The results for the willingness to pay for information via community radio is quite interesting since it is contrary to what was obtained for the other regions. For the Greater Accra Region, younger women (below twenty years) are more willing to pay for information delivered via community radio (5% level), and also when the number of dependents is large (5%).

A plausible explanation for this outcome is as follows. The Greater Accra Region is a more urbanized region where one finds considerable number of youth programs, especially to address issues of urban poverty. It may well be that the significant coefficient for the 'below twenty' variable is capturing this youth effect. Also, it may be the case that the high cost of living in these urban-impact rural areas makes women with a large number of dependents more willing to pay for information delivered via community radio since it is the cheapest information delivery technology examined in this paper.

Table 5a: *Regression results for households willingness to pay for community radio: Greater Accra Region*

Variable	Coefficient	t-Statistic
Constant	2785.18	6.10
Age (Up to 20)	1002.97	2.66
Age (Above 20)	248.82	0.89
Married	63.817	0.27
Dependants	103.07	2.19
Educ. (Primary)	44.57	0.17
Educ. (Above Primary)	-30.12	-0.15
Expenditure	3.34E-05	2.19
Membership	-329.51	-1.44
R-squared	0.13	N = 100

Source: Survey Data 2004/5

Table 5b: *Regression results for households willingness to pay for private radio: Greater Accra Region*

Variable	Coefficient	t-Statistic
Constant	13399.44	4.68
Age (Up to 20)	5352.52	1.22
Age (Above 20)	-813.63	-0.34
Married	2727.96	1.18
Dependants	354.42	0.69
Educ. (Primary)	2091.77	0.83
Educ.(Above Primary)	3175.58	1.68
Expenditure	0.00035	2.20
Membership	-2272.74	-1.03
R-squared	0.139253	N = 100

Source: Survey Data 2004/5

Table 5c: *Regression results for households willingness to pay for extension agent: Greater Accra Region*

Variable	Coefficient	t-Statistic
Constant	6051.91	5.17
Age (Up to 20)	41.61	0.04
Age (Above 20)	-844.26	-1.06
Married	216.41	0.28
Dependants	200.41	1.04
Educ. (Primary)	762.70	1.08
Educ. (Above Primary)	1121.74	1.50
Expenditure	0.00	2.54
Membership	-204.13	-0.27
R-squared	0.13	N = 100

Source: Survey Data 2004/5

Upper East Region

The overall explanatory power of the regression for the Upper East Region is low. The highest R-square is 19%. Here also, there are no major surprises given that cross-sectional data is being used in the regressions. There seems to be a consistent pattern in the results for this region in the sense that income seems to be the driving factor for the willingness to pay for information delivered via the three technologies under consideration in this paper. In all cases income is statistically significant at the 5% level. The results also show that as expected, women with a large number of dependents are less likely to pay for information technologies. The theoretical exploration suggested that large households spend more on food and the basic necessities of life, especially health and shelter. It is not surprising that in all the technologies examined, there is a negative relationship between the number of dependents and households' willingness to pay for information. In all cases the estimated coefficient is significant at the 10% level. See tables 6a, 6b, and 6c.

Table 6a: *Regression results for households willingness to pay for community radio: Upper East Region*

Variable	Coefficient	t-Statistic
Constant	2644.48	5.60
Age	597.10	1.67
Marital Status	-51.419	-0.17
No. of Dependents	-159.88	-3.01
Primary Education	-339.16	-1.04
Above Primary Educ.	-188.24	-0.67
Expenditure	0.000012	2.66
Membership	257.79	0.99
R-squared	0.16	(N) = 100

Source: Survey Data 2004/5

Table 6b: *Regression results for households' willingness to pay for private radio: Upper East Region*

Variable	Coefficient	t-Statistic
Constant	11718.43	2.87
Age (Above 20)	2738.82	0.97
Marital Status	1422.34	0.52
No. of Dependants	-763.68	-1.94
Age (Up to 20)	1203.67	0.46
Educ. (Above Primary)	2107.70	0.76
Expenditure	0.0014	2.96
Membership	3785.22	1.58
R-squared	0.19	N = 100

Source: Survey Data 2004/5

Table 6c: *Regression results for households' willingness to pay for extension agent: Upper East Region*

Variable	Coefficient	t-Statistic
Constant	5633.82	3.82
Age (above 20)	1910.57	1.66
Married	-184.53	-0.20
Dependants	-266.84	-1.84
Educ. (Primary)	-604.51	-0.61
Educ. (Above Primary)	66.42	0.07
Expenditure	0.00042	2.95
Membership	1180.72	1.73
R-squared	0.18	N = 100

Source: Survey Data 2004/5

POLICY IMPLICATIONS

The overriding conclusion that emerges from this study is the need to examine ICT use in empowering rural women within a 'holistic' context. No single socio-economic factor emerged as the dominant variable in planning policies and programs to introduce ICT use in information delivery to rural women. Likewise, no single information delivery technology emerged as 'the' technology to use in delivering information to rural women.

The overall results from this study point to household expenditures (used as proxy for income), household education, and membership in community organizations as the principal factors influencing rural women's willingness to pay for the various technologies used in information delivery to women in rural areas. The income variable was found to be statistically significant in explaining the variation in the willingness to pay for information delivered under the selected media for all the regions. The education variable was found to be statistically significant only in the Ashanti while the community membership variable was found to be statistically significant in the Upper East and Greater Accra Regions. Age was found to be significant in explaining the variation in willingness to pay for any media in the Ashanti, and the Upper East Regions. Likewise, the number of dependents variable yielded inconclusive results. Also, the marital status of women did not play a significant role in explaining the willingness to pay for any of the technologies in any of the regions.

Despite the lack of consistency in the regression results several important policy and planning options are suggested by the results from this study.

Need to Disaggregate Policy Planning and Implementation Process

Even though the government sets the overall national ICT policy, the results from this study suggest some merit in allocating considerable authority to regional and local authorities in setting priorities and approaches to empowering rural women through the use of ICT. This is due to the different impacts the socio-economic factors had on different regions. It is in this context that the government must put 'teeth' into the Local Government Act 1988, PNDC Law 207 and the instructions under Article 35 **of Ghana's 1992** constitution. It states that the state shall make democracy a reality by decentralizing the administration and financial machinery of government to regions and districts and by providing all possible opportunities to the people to participate in decision making at every level of national life and in government. The results of the study point to a need to cast rural empowerment policies and programs within the broader poverty reduction policies of the government and also within the attainment of the Millennium Development Goals (MDGs).

Improving Rural Incomes

The results show that the attainment of this vision would boost ICT use in delivering information to rural households since income was found to be consistently statistically significant in explaining rural women's willingness to pay for information. There are two important issues to address in the context of the relationship between incomes and ICT use to empower rural women.

First, the relationship between ICT use and income must be seen as bi-directional. While high incomes make it possible for rural women to pay for the information delivery technology of choice, the delivered information, in turn, is intended to empower women to be able to make those decisions that would improve their welfare and incomes. These observations lead to the conclusion that knowledge of the importance of incomes in ICT use in information delivery is not enough. There is also a need to emphasize the learning component that allows rural women to better utilize received information in decision making to further improve their incomes.

A second implication of the statistical significance of the income factor is the need to broaden policies to enhance the many possible sources of income available to rural women. Even though the popular view has been to focus on agriculture as the primary source of raising incomes of rural women, the survey results point to a need to broaden the scope of an income policy in rural areas.

Education

Another factor that emerged as important in explaining households' willingness to pay for information is education. The significance of the education factor supports the need to plan and implement ICT policies for rural empowerment in a holistic context. Education is one of the major components of Ghana's poverty reduction program and the MDGs. The survey results show that the government has a major hurdle to clear in its effort to empower rural women using ICT to deliver information. Formal educational attainment appears to be very low among the female rural household heads. The survey showed that about 45% of the household heads had no formal education. Only 1.1% had attained tertiary education. Thus, even though rural women who had some education had expressed a strong willingness to pay for information, policy and program planners have to undertake *specially designed* adult education programs to benefit rural women. The results also imply that information would have to be delivered to rural households in a language they understand and a medium that they would be comfortable with. The significance of the education variable also points to a need to emphasize 'local' content in designing rural information programs.

Community Organizations

The statistical analysis also point to an important role that community organizations could play in the delivery of information to empower rural women. Women who belong to some form of community organizations are more willing to pay for information delivered via the three ICT media examined in the study. The survey showed that slightly more than half (50.3%) of rural women belonged to a community organization and cooperatives. This strong sense of communalism has important policy and program planning implications. For example, the government may want to take advantage of the spirit of communalism and focus on programs that could be delivered to a group as a way to reduce costs and hence be able to extend programs to cover a larger population group. It also means that there is a need to design effective feedback mechanisms since in a group context it may not be possible to easily address individual concerns. A format for a program on information delivery may emphasize discussion as a way to sustain group interest. It is important for the government to allow rural organizations to define their own rules to check practices such as 'free riding' and 'shirking.' Attempts by government to interfere in group organization may be counterproductive.

Need to Develop a Disaggregated Funding Strategy

In addition to disaggregating the policy and planning process in using ICT to provide information to rural women, the results also point to a need to formulate policies and programs to prevent duplication of efforts. This study has helped to identify factors that influence rural women's willingness to pay for different information delivery technologies. The many factors have different effects in different regions. This opens the door for policy and program planners to allocate resources among different agencies and development partners.

Need for the Critical "Political Will"

The Government of Ghana has expressed its commitment to provide information through the use of ICT to empower rural women through various policy pronouncements and position papers. Government's commitment however must be examined within the broader context of the allocation of budgetary resources to rural education programs and ICT development. Over 70% of government ministries spend less than 10% of their budgets on ICT related activities. With the global trend towards e–government, government may want to signal its commitment by increasing its own use of ICT. Furthermore several indicators point to the possibility of significantly expanding ICT use in information delivery to empower rural women.

CONCLUSIONS

This paper looked at the need to design a disaggregated ICT policy to empower rural women using information from selected rural areas in Ghana. Data was collected from 300 respondents from three regions: Upper East, Ashanti, and Greater Accra in Ghana to determine the factors influencing rural women's' choice of information delivery technology. The information delivery technologies considered were private radio, community radio, and extension agents. The basic hypothesis in the study was that the wide differences in the socio-economic status of rural women households' influences their choice of information delivery technology and also their willingness to pay for a selected technology. This basic hypothesis was addressed using data from a survey instrument administered to 300 households from the three designated regions.

Beyond the issue of whether an aggregate rural women's empowerment ICT policy would be appropriate, the outcome of this exercise has important program planning and implementation applications. Even though the government sets the overall national ICT policy, the results from this study suggest some merit in allocating considerable authority to regional and local authorities in setting priorities and approaches to empowering rural women through the use of ICT. The overriding conclusion that emerges from this study is the need to examine ICT use in empowering rural women within a 'holistic' context. No single socio-economic factor emerged as the dominant variable in planning policies and programs to introduce ICT use in information delivery to rural women. Likewise, no single information delivery technology emerged as 'the' technology to use in delivering information to rural women. The results also point to a need to cast rural empowerment policies and programs within the broader poverty reduction policies of the government and also within the attainment of the Millennium Development Goals (MDGs). The results again indicate the need to formulate policies and programs to prevent duplication of efforts and the need for critical "Political Will".

Endnote

[1] Contingent valuation is a survey-based economic technique for the valuation of non-market resources, typically environmental areas and services. It can be used to estimate both use and non use values, and it is the most widely used method for estimating non-use values. While these resources do give people utility, certain aspects of them do not have a market value (price) as they are not directly sold. Example, people receive benefit from a beautiful view of a mountain, but it would be tough to value. Contingent valuation surveys are one technique which is used to measure these aspects. The contingent valuation method involves directly asking people, in a survey, how much they would be willing to pay for specific environmental services. In some cases, people are asked for the amount of compensation they would be willing to accept to give up specific environmental services. It is called "contingent" valuation, because people are asked to state their willingness to pay, *contingent* on a specific hypothetical scenario and description of the environmental service (Ecosystem valuation n.d.; Wikipedia the free encyclopedia n.d).

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