An SMS-based HIV/AIDS Education and Awareness Model for Rural Areas in Papua New Guinea

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Abstract. Access to basic healthcare in many parts of Papua New Guinea (PNG) remains a challenge partly because the majority of the population is thinly scattered across a geographically rugged country. The major health problems in PNG pertain to malaria, tuberculosis and diarrheal diseases while HIV has reached epidemic levels. The proliferation of the mobile phone technology in PNG has been unprecedented since the introduction of competition in the sector in July 2007. Users in rural areas now access the mobile phone signal making it their preferred form of modern communications medium. This paper introduces an SMS-based HIV/AIDS education, awareness and information dissemination model for a predominantly rural-based PNG society.

Keywords. HIV/AIDS, mobile phone, short message service (SMS), rural areas, antiretroviral treatment (ART), business coalition against HIV/AIDS (BAHA), national AIDS council

Introduction

Against the backdrop of the health issues, the availability of the mobile phone service across the country can be harnessed to support education, awareness and information dissemination initiatives along the healthcare value chain. PNG is a country with over 800 languages and cultures [1]. In some areas, discussions regarding sexually transmitted diseases are incongruent with social and cultural values. The SMS-based HIV/AIDS education and awareness program can be designed for personalized use, the youth and even for general health service institutions.

Data collected over the past 12 months on the perception, attitude, use and experience towards mobile phones, provides evidence that the mobile phone technology can support healthcare service delivery in rural areas of the country [2]. This evidence is used to support a model for delivering an SMS-based HIV education, awareness and information dissemination program for a predominantly rural-based PNG society. The ease with which the SMS signal reaches its destination even if the 'network is busy' for many hours [3], lends itself useful in this model.

This paper sets out a general design, purpose and format of the SMS-based HIV/AIDS education model which can be implemented through a collaborative effort

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between the mobile phone service providers, Business Coalition against HIV & AIDS (BAHA), ICT regulator, National Aids Council and the PNG Department of Health.

1. HIV/AIDS Situation

It is not uncommon to read about the deteriorated state of healthcare infrastructure across PNG in the print media or even discussed publicly. Many hospitals including those in the main centres lack specialist equipment or even medical supplies and waiting times for patients can be anything from a few hours to days [1]. In the rural areas where 85% of the population lives [1], the situation is aggravated by inaccessibility and lack of regular clinics, non-availability of staff including dilapidated health facilities [4].

    The first case of HIV was reported in PNG in 1987 and since then the number of reported cases has risen to 42, 275 as at December 2006 [4, 5] without signs of slowing. HIV/AIDS is not only a health issue but has become a new socio-economic problem [6] because it has the potential to greatly affect the gross domestic product of the nation due to its effect on the workforce and to lower average life expectancy [7]. A number of initiatives are in place in an attempt to mitigate the epidemic, but the results of these initiatives have been mixed thus far. Some of the obstacles to these initiatives include the lack of a clear understanding of the causes of HIV/AIDS even among literate youths [5]. When interviewed, even some university students had misguided views about the disease ranging from HIV/AIDS being a curse from GOD or SATAN for promiscuous behaviour, to some claiming it was a 'town disease' and not a 'village disease', while others asserted it was a sign the 'end' is near [5].

Table 1. Estimates and projections of key indicators on the HIV epidemic in Papua New Guinea.

	Indicator	2003	2005	2007	Trend
People living with HIV/AIDS	Adult and children	19,738	32,904	56,175	Rising
AIDS deaths	Deaths in adults and children	2,185	3,871	5,995	Rising
Orphans due to AIDS	Orphans (0-17) currently living with HIV/AIDS	1,549	2,704	3,730	Rising
ART treatment	Number of adults (15+) on ART	80	1,098	3,000	Rising

The belief that HIV/AIDS is a 'town disease' is a misconception as indicated in a report [8] which showed that HIV indicators are increasing particularly in the rural areas [7]. Table 1 shows projected increases in the number of AIDS-related deaths, the number of people requiring treatment and the number of children and youth (0-17 years) being orphaned [8]. The fact that the majority of the population resides in fragmented and geographically challenging areas presents barriers to the delivery of any awareness, testing and treatment efforts. It is proposed that an SMS-based HIV/AIDS education model could be a small contribution to this effort.

2. Causes of HIV/AIDS

While many Papua New Guineans believe that the HIV/AIDS epidemic is some sort of a curse [5], its verifiable cause is through promiscuous behaviour [6]. In this lies the belief that ignorance and lack of awareness is a major cause of the epidemic. Sex with multiple partners and a lack of knowledge about HIV/AIDS are significant factors that contribute to the rapid spread of the virus in PNG. Other known causes of HIV/AIDS include sexual violence, rape, sodomy and incest [6] together with blood transfusion with infected blood.

In a country with challenging geography and diversity in cultures and languages [1], efforts to effectively deliver HIV/AIDS education, awareness and information dissemination among the populace have not been easy [9]. The situation is aggravated by literacy and numeracy issues [10] in the rural areas where the majority of the population lives. The use of the SMS-based HIV/AIDS education and awareness model could be implemented in this scenario. However, if the model were to be applied to specific target groups such as antenatal clinics, a certain level of success could well be realized.

Moreover, mother to child transmission of HIV/AIDS during pregnancy, delivery and breast feeding was studied and documented in the remote mountainous area of Simbu province [4]. This study stressed antenatal clinics as the entry point for an HIV prevention program and asserted that with proper and timely interventions such infections could be prevented. Hence, this entry point could be a target area for the proposed SMS-based model through which the majority of the rural people can be reached. This is possible through the mobile phone network that has extended and reached many rural areas of the country [11].

3. Initiatives and Challenges

Change of attitude is the most effective method of controlling the spread of the HIV virus [6]. The Catholic Church, influential in PNG, supports HIV-awareness programs that are based on the communication of an authentic value-centred understanding of the meaning of the human person [5], principally supporting behaviour change as the effective way to mitigate the spread of the virus.

BAHA, having encountered difficulties in mitigating the HIV epidemic, has experimented with strategies to bridge the communication divide [9] leading to a lack of awareness and ignorance of the causes of the disease. Business employing authorities are combining in an effort to prevent new infections and to manage the growing epidemic in the country [7] by developing workplace HIV/AIDS policy for their workforce. They support the supply of antiretroviral therapy (ART) and the availability of a number of treatment facilities now makes HIV a treatable and manageable chronic condition.

Other challenges remain such as traditional and customary taboos that make discussions of HIV/AIDS topics within family units difficult. In traditional PNG, discussion of sex-related topics within the family unit can be embarrassing and is usually avoided. It is assumed that the proliferation of the mobile phone technology can be used to overcome these difficulties by enhancing the initiatives advocated by BAHA and other stakeholders.
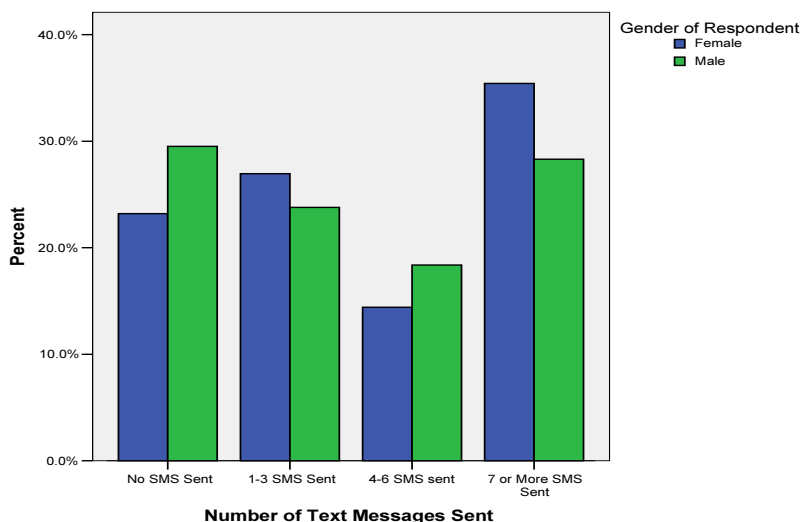
Figure 1. Percent of respondents according to gender and the number of SMS they sent the previous day.

4. Mobile Phone Survey

Over the past 12 months, 365 cases of survey data were collected to gauge the experiences, attitudes and perceptions of the people of PNG on the use of mobile phones. Whereas other sampling methods would have been prohibitive, convenience sampling was selected because of the nature of the country and the distribution of the people. Sampling selection was designed to reflect the geographical and cultural diversity in the country from the highlands, the coastal and to the islands regions of PNG.

The SMS usage trends were assessed by asking the respondents the number of SMS messages that they had sent the previous day. The data shows that SMS use is popular among both genders with slightly more females sending more SMS (Figure 1) than males at the higher end. SMS is even popular across the population among age groups with 16-20 years, 21-25 and 26-30 years old being the leading users of SMS (Figure 2).

5. Factor analysis

The 23 variables from the 365 cases of survey data pertaining to experiences, attitudes and perceptions were reduced using factor analysis to seven factors which were extracted using a combination of the Principal Component Analysis (PCA) extraction method, with an orthogonal version of Varimax rotation. The extracted factors are summarized below in Table 2.
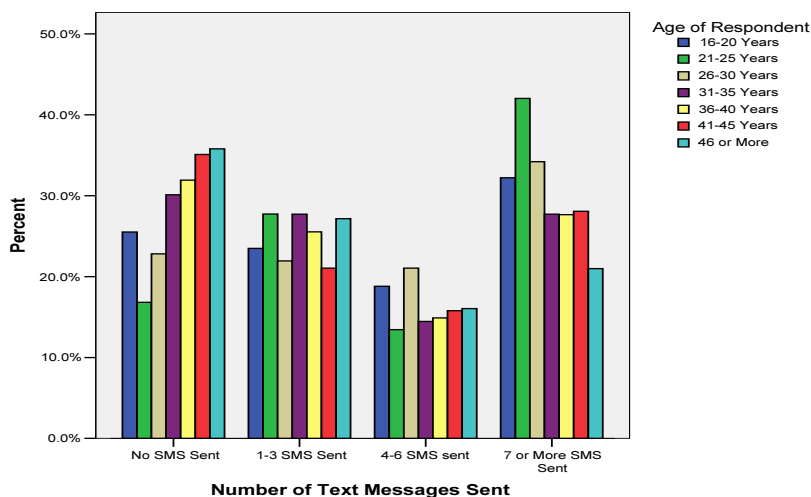
Figure 2. Percent of respondents according to age groups and the number of SMS they sent the previous day.

Table 2. Seven factors were extracted from the survey pertaining to the perception and experience of the mobile phone technology in PNG. These are presented in the following table with interpretation.

No	Factor	Interpretation
1	Spoken English & *Tok Pisin* skills	This factor reveals the use of mobile phone for improving spoken English and *Tok Pisin*.
2	Business use & community Welfare	This factor relates to the use of mobile phones in Business, emergency and healthcare.
3	Social Media	Mobile phone is taken as a personal friend and source of entertainment.
4	Acceptance & adoption of Mobile Phones	Popularity of mobile phones across PNG.
5	Mobile Phones use in Schools	Use of mobile phones in Schools.
6	Adverse impacts of mobile phones on local *lingua franca*	Reduces culture and local *lingua franca*.
7	Personal aid and tool for work	Mobile phone as an aid/tool for work.

Sampling adequacy and statistical significance of the data were ensured through KMO[2] and Bartlett's tests supporting the application of PCA. Shown in Table 2 are the headings of the factors with their respective brief interpretation to which contextualized explanations are offered in the forthcoming section.

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[2] Kaiser-Meyer-Olkin measure of sampling adequacy was .696 and the p-value was less than .001, hence statistically significant.

6. Interpretation of Factors

The data analysis was undertaken through factor analysis which identified the constructs underlying the survey data variables. Specifically, seven components or factors were identified which directly or indirectly indicated that the diffusion of the mobile phone technology has the potential to support HIV/AIDS-related programs. The mobile phone is perceived to enhance spoken English and *Tok Pisin*[3] skills among those researched, an essential attribute in any education and awareness programs (factor 1).

While being a useful business tool, the mobile phone is also perceived as capable of supporting healthcare and emergency initiatives. In this discussion on HIV/AIDS education program, this is an essential feature (factor 2).

Factor 3 revealed that the mobile phone is accepted as a personal friend and a source of entertainment by those researched. This is a useful attribute since perceiving it as a friend means a trustworthy device through which useful benefits such as education programs could be offered. The entertainment aspect of it is equally important as it means enjoying and experiencing value from it.

Factor 4 confirmed that the mobile phone, being an in-expensive, simple and less complex technology has permeated across the population. Its acceptance and adoption is a manifestation of its compatibility and comparative advantage over existing modes of communication. In the campaign against HIV/AIDS, this attribute could serve well in reaching the wider population.

The mobile phone technology is also perceived to be useful in the school value chain, an attribute that is important in enhancing literacy and numeracy issues in PNG (factor 5). While helping achieve educational goals, its use in promoting HIV/AIDS-related information and awareness has great potential.

Factor 6 pertains to adverse impacts of mobile phones on local *lingua franca*. Due to the diversity in local languages, people are using English and *Tok Pisin* to communicate across provinces and between different tribal groups. However, this is an advantage since HIV/AIDs education and awareness could be easily implemented using the English and *Tok Pisin* in the face of the number of local languages.

Last but not the least, mobile phone is perceived as a personal aid and useful tool for achieving outcomes (factor 7). From the perspective of implementing an SMS-based HIV/AIDS education program, this attribute will no doubt prove useful, since it is the single form of modern communication technology that has assimilated across the country [12]. This attribute lends itself useful to be harnessed by partners as a collaboration tool to make better and faster decisions [13] in the campaign against HIV/AIDS.

7. Improving the Challenges

Some challenges attenuating HIV/AIDS programs have been identified previously and include the communications divide [9], lack of awareness and ignorance on HIV/AIDS [6]. The geographical diversity where people live and need to be reached with HIV/AIDS programs [4] presents added challenges. Indeed literacy and numeracy

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[3] Tok Pisin is one of the three (3) national languages of PNG, the other two being English and Motu.

issues are also present [7, 10]. The SMS-based HIV/AIDS education model has the potential to overcome these challenges.

However, the most notable challenge is the need for the change of attitude [5, 6] that is required as the most effective method of mitigating the spread of HIV/AIDS. Public discourse makes reference to the 'ABC' for abstinence, being faithful and the use of Condom [7], where the 'C' has been changed to 'Christian Values' by the Catholic Church [5, 6]. Whatever version this change of attitude might take, increased education and awareness of the disease through the SMS-based model can be a part of the response in the campaign against HIV/AIDS. This is because of its versatile potential as revealed through the SMS usage trends and the seven factors but more so its ability to reach greater population centres instantaneously, mitigating temporal and geographic boundaries [2].

8. SMS-based HIV/AIDS Education Model

Notwithstanding the identified challenges among others, the SMS-based HIV/AIDS model can promote change of attitude including building synergies among stakeholders. This model takes advantage of the proliferation of the mobile technology and its perceived characteristics revealed through the seven factors including the popularity of SMS use. These provide supporting evidence for the model's feasibility.

Diagrammatically the SMS-based HIV/AIDS education model (Figure 3) consists of a database working through an application server integrated onto the mobile phone network where tailor-made SMS applications could be stored, retrieved and disseminated to target populations. This simplified diagram shows fragmented groups enjoying specifically designed education and awareness HIV/AIDS-related content.
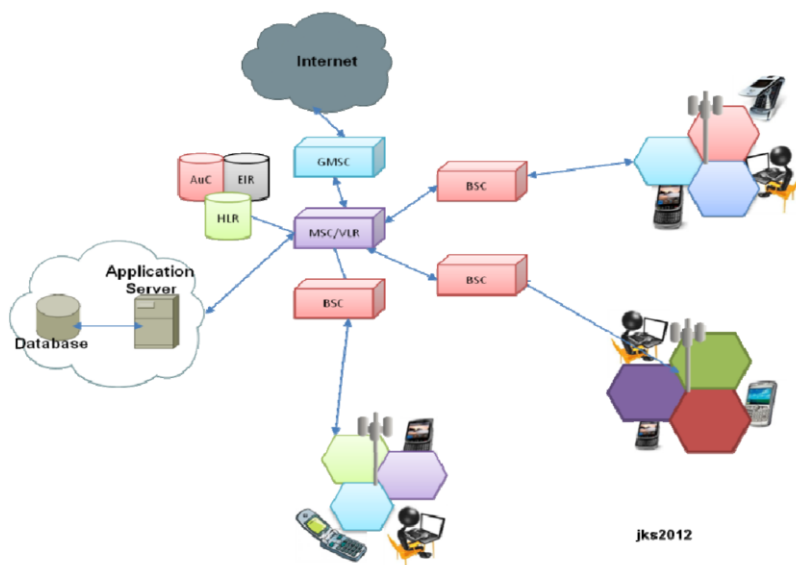

Figure 3: An SMS-based HIV/AIDS education and awareness model for rural areas in Papua New Guinea. This model can ride on the mobile phone network that is extensively reaching many parts of the rural areas providing connectivity for the populace in the country.

Since the mobile phone network spans and extends to many parts of urban and rural population centres, the SMS-based model can provide near ubiquitous connectivity within and between parties in the HIV/AIDS campaign. For example, advocates of 'Change of Attitude' could format short quiz-based text messages pertaining to the 'ABC' message as illustrated in the forthcoming clause.

The model could also be utilized in a Closed User Group (CUG) arrangement where specific target groups could register as a CUG to implement HIV/AIDS education programs [12]. The CUG offers the advantage of unlimited calls or SMS-based education programs for a fixed monthly subscription fee. Church-run health centres [4] could use this model to train health workers in the prevention of mother to child transmission of HIV or to implement programs in their health facilities.

9. SMS-based HIV/AIDS Module

This could take a simple design consisting of multiple choice type questions pertaining to HIV/AIDS, stored in a database server system integrated with the mobile phone network.

The content is then retrieved and disseminated to the members of the CUG according to a regularly scheduled HIV/AIDS training program. For example, this could be implemented as follows:

1. The database server system retrieves and sends a multiple choice type question to the participants according to the schedule.
2. Participants answer the questions by selecting their choice of the answer.
3. The database compares or checks the answer against the correct choice and responds.
4. If the answer is correct, the participants get additional information on the topic.
5. If the answer is wrong, the participants get the correct answer and an explanation.
6. The database server system provides the next question and the above steps are repeated until all the questions are completed.

The above format could be implemented through a collaborative partnership with the mobile service providers and the PNG Department of Health, BAHA, and the National Aids Council including other stakeholders such as church-run health facilities. Alternatively a random selection of questions can be offered in a similar manner, where winners could be pooled into a draw to win free credits or air time as motivation to participate in the program.

10. Conclusion

HIV/AIDS has reached epidemic levels in PNG. It is not only a health issue but a new socio-economic problem that can adversely impact the GDP of the country and reduce average life expectancies of the population. The campaign against its spread continues with more effort required. Lack of knowledge and awareness regarding the disease is one of the many factors. Change of attitude is by far the most effective method of arresting the spread of HIV/AIDS. This paper has proposed an SMS-based

HIV/AIDS education, awareness and information dissemination model as a contribution in the campaign to attenuate the spread of the disease. The model utilizes the ease with which SMS message can transverse and reach the populace over the extensive mobile phone network, even if the network is busy. The seven factors extracted from the mobile phone survey data provide credible evidence that support the feasibility of the model which aims to promote improved knowledge and awareness on the disease to promote a change in attitude.

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