

# Factors that influence the intention to use mobile phone caller tunes for patient reporting of adverse drug reactions: a qualitative study

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## Abstract

**Background:** Patient reporting of adverse drug reactions (ADRs) is low in low- and middle-income countries, in part because of poor awareness to report. With the increase in mobile subscription, mobile phones can be used as a platform to disseminate information on ADRs. The aim of this study was to qualitatively assess the potential of using mobile phone caller tunes (the message or sound the caller hears before the receiver answers the call) to encourage patient reporting of ADRs.

**Methods:** A total of 38 key informant interviews and 12 focus group discussions (57 participants in groups of 4–5) were conducted in Accra, Ghana. The transcripts were analysed using key constructs of the Technology Acceptance Model (TAM) including perceived usefulness, perceived ease of use, and behavioural intention to use caller tunes for patient reporting of ADRs.

**Results:** Respondents mentioned lack of knowledge on reporting ADRs, and their willingness to use mobile phone caller tunes to promote patient reporting of ADRs. Many respondents pointed out how ADRs usually led to discontinuity in medication use, usually without consultation with health professionals. Caller tunes were regarded an innovative, accessible and convenient platform to disseminate information on ADRs. Most respondents intended to use caller tunes with drug safety information to promote ADR reporting, particularly to help their friends and family members. Simplicity of the message, use of songs or messages in local languages and price of downloading the caller tunes were important considerations.

**Conclusion:** There is a need for the creation and testing of caller tunes on ADRs in Ghana to promote patient or consumer reporting of ADRs. Further studies are needed to assess factors that could influence the creation and use of caller tunes to disseminate information on drug safety.

**Keywords:** adverse drug reactions, caller tunes, mobile health

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## Introduction

Complications arising from medication errors cause avoidable harm across health systems in the world. In comparison with high-income countries, people in low-income countries experience twice as many disability adjusted life years owing to medication-related harm.<sup>1</sup> Patient morbidity and hospitalization because of adverse drug reactions

(ADRs) have well been documented in Africa.<sup>2</sup> Weak medication systems, as well as human factors such as fatigue, poor environmental conditions and staff shortages, can result in severe harm, disability and death caused by ADRs.<sup>1</sup> The World Health Organization (WHO) estimates that 30% of medications being sold in Africa can be counterfeit and that 50% of all medications are prescribed,

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dispensed or sold inappropriately.<sup>2,3</sup> The sources of medication-related adverse effects can be diverse. Reporting suspected side effects, adverse effects, quality concerns and errors are a priority in pharmaceutical management.<sup>2</sup> This requires consumers to be active participants in detection and generation of ADR information.

A systematic review of factors affecting patient reporting of ADR showed barriers such as poor awareness, confusion on reporting process, and prior negative reporting experience.<sup>4</sup> The review identified motivators of patient reporting of ADRs, including preventing others from getting ADRs, improving drug safety, wanting personal feedback and having been asked to report adverse effects by healthcare professionals. Patients are better positioned to understand their health conditions and to report ADRs.<sup>5</sup> However, accurate and timely patient reporting of ADRs requires adequate information through the correct channel to aid informed decisions about their health.

With the increase in mobile subscriptions in Africa, the prospect of using mobile phones to address health challenges has grown. In Nigeria, the introduction of the toll-free telephone line was recommended as a potential mechanism to increase drug safety.<sup>6</sup> Similarly, the use of mobile phones in interviewing patients on ADRs was shown to be half as costly as home visits in Ghana.<sup>7</sup> Whereas many mobile health (mHealth) interventions focus on short messaging system (SMS), issues such as internet connectivity, reporting syntax and cost of messaging need to be considered before implementing these interventions.<sup>8</sup> In Africa, mHealth interventions that resulted in positive health-related outcomes were aided by factors such as accessibility, acceptance and low-cost of the technology, efficient adaptation to local contexts, active stakeholder collaboration and active government involvement.<sup>9</sup> To date, SMS, video messages and phone calls have been used to implement mHealth interventions.<sup>9</sup> However, the success of mHealth interventions lies in identifying innovative approaches that can be cost-effective and acceptable in local context.

#### *Mobile phone caller tunes as a new communication approach*

Mobile caller tunes are a popular phenomena in sub-Saharan Africa and Asia. Caller tunes are the opposite of ringtones. Unlike ringtones, which call recipients hear notifying them of incoming

calls, callers hear caller tunes (or ringback tones) when they make calls.<sup>10,11</sup> Instead of callers hearing the normal ringback tone when awaiting an answer, callers to mobile phones in some sub-Saharan African countries could hear a song or message before the called party answers. These messages or songs that callers hear before call recipients answer the calls constitute caller tunes. While ringtones are managed by the phone's owner under 'settings', caller tunes are managed by the mobile telecommunication operator.

Typically, the default ringtones are free but caller tunes are not. The phone owner may pay the telecommunication company for the service. Many telecommunication companies such as T-Mobile in the United States,<sup>10</sup> as well as MTN, Vodafone and Airtel that operate in Africa and Asia, have caller tunes.

Currently most caller tunes in Ghana, for example, promote religious messages and popular songs.<sup>12</sup> To the best of the authors' knowledge, studies that test the use of mobile phone caller tunes for promoting patient reporting of ADRs are lacking. To assess the potential of using caller tunes for promoting patient reporting of ADRs, an appropriate theoretical framework is required.

#### *Theoretical background*

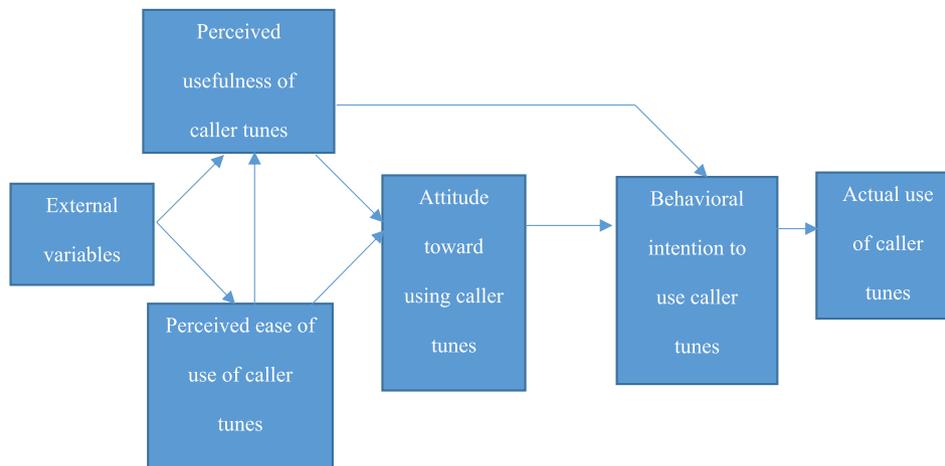
Among the theories that can be used to explore intention to use information technologies is the technology acceptance model (TAM). According to the TAM, behavioural intention to use an information technology such as caller tunes is largely based on perceived ease of use of the technology, perceived usefulness of the technology, attitudes to the technology and some external factors (Figure 1).<sup>13-14</sup>

The TAM has been found to be particularly useful in assessing technological use in the health sector,<sup>15</sup> hence our decision to use it as the theoretical basis for this qualitative study. The primary purpose of the study was to qualitatively assess the intention of consumers to download caller tunes on ADRs.

#### **Methods**

##### *Setting*

Participants were purposively selected at blood donation sites in Accra, Ghana, as part of a larger study that explored the potential of using caller



**Figure 1.** Technology acceptance model (TAM).

tunes for changing behaviours such as blood donation and patient reporting of ADRs.

Participants were eligible if they were at least 18 years old, had access to mobile phones, understood English and were present at blood donation sites in Accra, Ghana, as either blood donors or nonblood donors.

#### *Ethics approval*

The study was reviewed and approved by the ethics committees of the Ghana Health Service (GHS-ERC 05/08/16) and Texas A&M University (IRB2016-0655D). Respondents gave written consent before participating in the study.

#### *Data collection*

The interviews were conducted by two qualitative methods experts familiar with drug safety issues in sub-Saharan Africa (BA and LAA) and one familiar with qualitative methods (DAA). In summary, 38 were interviewed whereas 57 took part in the focus group discussions (FGDs). Those who participated in the FGDs received Ghana cedi equivalence of US\$4 whereas those who took part in the key informant interviews received US\$1 as compensation for their time and transportation to the venues. The interviews occurred from October to December 2016. The questions for the semistructured interview and FGD were the same and covered general attitudes to reporting drug safety and topics linked to the constructs of the TAM: perceived ease of use, perceived usefulness, attitudes and intention to use. FGDs

guides also included demographic information such as age. The interviews and FGDs were audio-recorded and transcribed by two members of the research team. The key informant interviews lasted from 7 min 27 s to 28 min 25 s, and the FGDs lasted from 1 h 14 min to 1 h and 31 min.

#### *Data analysis*

Using an inductive thematic analysis based on the framework analysis,<sup>16</sup> two coauthors (BA and AP) developed a thematic index involving general attitudes to patient reporting of drug safety and the constructs of the TAM as used during the interview and FGDs. AP used Excel spreadsheets to summarize the data by assigning exemplar quotes to the themes. Two of the authors (BA and AP) met several times to review the themes and quotes. The remaining coauthors provided feedback on the exemplar quotes and the themes.

#### **Results**

In our sample of 95 participants, the mean age was 29.5 years and 73.6% of the respondents were male. There were 38 participants in interviews and 57 in FGDs. Table 1 details the demographic information of the participants in each group.

#### *Perceived usefulness*

Most respondents used the words ‘exciting’, ‘interesting’ and ‘inspiring’ to describe their experience with caller tunes. The participants either had caller tunes on their phones or knew of someone who

**Table 1.** Demographic characteristics.

Sample characteristics	Interviews	Focus group discussions
Age (Mean $\pm$ SD)	35.31 $\pm$ 14.53	25.61 $\pm$ 7.83
Gender (%)		
Total	n=38	n=57
Male	76.31% (29)	71.92% (41)
Female	23.68% (9)	28.07% (16)

did. In general, participants took the messages given through the caller tunes positively, although its usefulness depended on who was delivering the message. For instance, the message from celebrities, or religious leaders were taken more positively than those by regular people. Respondents said:

*'Well, depending on what is playing uh, if it is something I don't like, I have a bad feeling about it and then if it is a song or a message I like, then I feel okay.'* Interview, Male, Age 26

*'It depends on the type of caller tune that the person has. . . most [of the] times what I've come across is some religious messages like the person preaching to you. I take it in good faith. At times too some gospel tunes..[and] some secular tunes. So far I've not come across a caller tune that probably insults or talks rudely to you so in a nutshell, I've taken it in good faith.'* FGD, Male, Age 42

#### Perceived ease of use

Most respondents considered downloading caller tunes on their phones as an uncomplicated process:

*'It's easy. Sometimes they normally tell you to press either star or hash to activate the caller tune if you like it or not.'* FGD, Male, Age 30

*'Nowadays, most of the networks especially if you use MTN they will text you to select a song for your caller tune, so you just use the one that you love.'* Interview, Male, Age 42

*'They're easy. But the cost sometimes I find it very expensive.'* FGD, Male, Age 26

#### Attitudes of people towards drug safety

Many respondents reported discontinuing their medications often without consulting the doctors when they experienced side effects. Other

participants mentioned that ADRs caused people to warn their family and friends from taking the same medication.

*'When people are on medication, and they develop side effects, the only thing that they do is they cease taking the medication. And then two, they discourage people from buying those medicines to take.'* Interview, Male, Age 60

*'In general they don't go back to the pharmacist or the hospital. You'll rather hear it from someone "oohh edro wei die enyeo" [this medicine is bad] from our local dialect. So if you were prescribed the same medicine the person will discourage you from taking it because he took it or she took it and didn't have any good outcome.'* Interview, Female, Age 28

*'They don't actually report because they, they will prefer telling their neighbours and friends rather than going to the hospital or reporting it to the medical centre.'* Interview, Female, Age 30

Some indicated that ADRs lead some people to rely on herbal medications. In addition, self-medication, relying on family and friends for suggestions, and waiting for the side effect to subside before consulting the doctor were other popular ways participants indicated they coped with adverse drugs reactions. One participant, for instance, stated:

*'If they feel okay I think they'll also get to take note of the drugs they're using but if they don't feel okay that's where they now try to see the doctor. Some wait for too long and you realize that the sickness becomes worse.'* Interview, Male, Age 28

#### Knowledge of drug safety reporting

From the perspectives of the respondents, patients generally did not know where or to whom they should report side effects. There was a general

lack of knowledge and significance of ADRs reporting:

*'When the side effects occur, . . . people . . . do not know how to go back all the way to the hospitals to go and report again so if this is introduced, I think that is a very good idea and people will have outlets to really talk about side effects of medications.'* Interview, Female, Age 43

In general, participants did not know that patients could also report ADRs by telephone instead of only going back to hospitals. Thus, most considered reporting as a waste of time and money.

*'You might see it as time wasting. Maybe I've gone to the hospital. They've given me chloroquine. Let's say as she said, chloroquine, I took car about 5 cedis to that side so am I going to take 5 cedis again to take car to go and tell them I have this I have this, you understand? Maybe they'll say ah, time wasting, why should I go? It [side effect] will go.'* FGD 9, Male, Age 25

#### Attitude towards using caller tunes for drug safety

Most respondents expressed how caller tunes could prompt or even motivate people to report ADRs, particularly in cases when they have had inadequate counselling from their healthcare professionals. Patients can use the information on where and to whom to report ADRs through caller tunes:

*'If you have a side effect, definitely you need to consult the doctor. So if something would prompt you to do it, then it is definitely good.'* Interview, Male, Age 44

*'It's a good idea because, most people even actually don't know that, they have to report the side effects of drugs back to their healthcare professional. So now when we have caller tune educating these people, then whenever they take the drugs whether at the hospital or at home and they are having any abnormal feelings, they will be encouraged to report back.'* Interview, Male, Age 25

*'It is a good one. It will help the person to have confidence and then we'll be free in expression. If they get the confidence and then feel relaxed and talk to you [pharmacists] then you can go ahead and treat them and the illness will go without any side effect.'* FGD, Female, Age 24

A respondent added how caller tunes can support existing mass media, such as radio and television, to educate people on ADRs. She stated:

*'It is a good thing because right now the awareness has started on the radio and television. I have heard it on radio, I've seen it on television where they tell you that when you take any drugs or you buy any drugs and you have side effects, report it to the nearest healthcare or to the Food and Drugs Board. It is something that started just this year. With the caller tune, I think it will spread more'* Interview, Female, Age 32

#### Behavioural intention to use caller tunes

Most respondents intended to use caller tunes with drug safety information for the sake of their family and friends. One of the major motivators was the intention to educate family and friends, as one respondent mentioned, *'Yes please uh, because I think if we do that it will help um, my colleagues, family members and outsiders to know that taking drug'* Interview, Male, Age 28.

Some participants intended to use caller tunes to educate people on the benefits of drug safety. One participant said, *'I have to [use the caller tune] because it will educate the others who are not familiar with the. . . this thing, the rules governing the medication.'* Interview, Male, Age 42.

#### Mobile network and caller tunes design factors

Participants were already aware of caller tunes and knew how to access them. Most preferred songs to messages, mostly because music was considered a big part of Ghanaian culture. Some of the respondents were more attracted to caller tunes that had celebrity voices:

*'I will say that most people don't enjoy reading. Like in our country here most people do not enjoy reading so we listen to songs, we watch videos and we are very fine. So if the thing is a caller tune, then I will go for a song or something, yes.'* Interview, Male, Age 27

Since Ghana is a multilingual country, most participants preferred using multiple languages, particularly Twi and English: *'Twi is something that we cannot do away with. So if you take the whole of the nation, about 70% speak Twi. So we can use Twi and English.'* Interview, Female, Age 37.

Simplicity of the message, technical knowledge on downloading caller tunes and price were other important considerations, among them price being the biggest motivators to downloading caller tunes on ADRs. Participants mentioned how subsidized rates to download caller tunes on ADRs could attract more people to use the caller tunes. Examples of statements from participants include:

*'So if they're to make a directive towards that which is free for everyone I think it will be easier but once it involves cost people will not patronize it.'* Interview, Male, Age 28

*'Easy download and cheaper price. The cost should be cheaper than the previous ones.'* Interview, Female, Age 20

To publicize the caller tunes, participants suggested sending phone text messages to people, or having the caller tune in public platforms, such as customer-service lines. One respondent said, *'I believe they can also help by sending text messages to our phone numbers [to publicize caller tunes]'* FGD, Male, Age 24. Meanwhile, another supported the public platform: *'It will really help if they use it [in customer-care service] because normally most people call the customer-care service.'* FGD, Female, Age 20.

### Social norms

Caller tunes were socially accepted. Participants believed that caller tunes could educate both friends and strangers on drug safety. A benefit of using caller tunes for drug safety, as pointed out by some participants was the conversation that caller tunes could facilitate. One respondent said

*'Maybe sometimes they would ask me that; "what is that?" [caller tune on drug safety] And then me too I would educate them that this is what is going on.'* Interview, Male, Age 21

According to the respondents, the messages would be effective among social groups if they had a song format, which can trigger conversations:

*'I do believe that um, people actually enjoy songs and so if the song is interesting they will listen to it and at least they will also understand that fine they are actually promoting this one or that one, so they will just listen to it and go by it.'* Interview, Male, Age 27

### Discussion

In this study, participants were asked to explain their attitude on reporting ADRs and the prospect of using mobile phone caller tunes to encourage patients to report ADRs. Most respondents pointed out how drug safety reporting was an issue in Ghana. In the advent of adverse effects, most patients usually discontinued their medications.

Several studies have reported side effects as a reason for medication nonadherence.<sup>17,18</sup> These results are in accord with recent studies that have shown how ADRs are aggravated when patients fail to report the intake of herbal medication to their healthcare provider.<sup>19</sup> Lack of knowledge among the people on the side effects of medication was another reason mentioned in this study for not reporting ADRs. This finding further supports the idea that ignorance among patients prevented ADR reporting.<sup>19-22</sup> In addition, respondents were unaware of where to report ADRs in part because of healthcare professionals not informing patients about why and where to report ADRs. Similar findings have been reported in previous studies in Ghana.<sup>23,24</sup>

Lack of patient reporting of ADRs may result from failure by health professionals to provide adequate information on drug safety to patients.<sup>21</sup> For the same reason, patients believe that it is a waste of time to complete the form on their own.

This study shows that ADRs may be underreported because patients considered going back to the hospital to report them as a waste of time. To address this issue, studies have assessed the potential of providing a more accessible platform for the people to report ADRs. In Cameroon, an innovative telephone-based intervention that allowed parents to report adverse effects following immunization (AEFIs) to health professionals showed significant increase in the reported cases of AEFIs compared with the control group that did not have a telephonic platform to report such incidents.<sup>22</sup> This shows the potential of using a telephone-based medium to increase people's accessibility to information on side effects of drugs.

In Ghana, a previous study documented health education as a successful intervention to improve ADR reporting.<sup>21</sup> Caller tunes can be a novel

platform to educate patients on reporting of ADRs. One of the benefits of caller tunes over other mHealth interventions is that the individuals who listen to caller tunes more often are the frequent callers, usually family and friends. This can initiate a conversation on drug safety among close social groups. Another benefit of using caller tunes to address drug safety issues is its potential to direct the patients to the correct sources and health professionals who can answer questions on ADRs. In our study, respondents indicated how doctors usually do not have enough time to discuss the side effects with their patients. Caller tunes can be used to direct such patients to the right platform or sources to discuss drug safety issues. Finally, caller tunes can be an effective medium supporting other sources of information such as television or radio in addressing issues of ADRs. It can direct individuals to a more elaborate source of information on radio or television.

Important considerations need to be made when designing mHealth intervention, especially in developing countries. In our study, the participants perceived caller tunes as easy to download and use. However, cost, language and content were important considerations. These concerns are consistent with the findings from prior studies that have mentioned language, ease of use, layout and costs as important factors in increasing utility of mobile applications.<sup>25</sup>

Although the average age of the respondents is not representative of most of the population that experiences ADRs (typically those over 50 years),<sup>26</sup> this study shows that young people have high intention to have caller tunes on ADRs on their mobile phones should the caller tunes be available. Currently, caller tunes on ADRs are not available in Ghana. Once available, older people who may call the mobile phones of younger people are likely to become more aware of the need to report ADRs. Moreover, after creating the caller tunes on ADRs, it may be helpful to start inviting staff of pharmacies, healthcare centres, hospitals and other health services to download them to help patients who will call them to become aware of the need to report ADRs.

### Conclusion

As a formative investigation, this qualitative study tried to determine the intention of downloading

mobile phone caller tunes to promote patient reporting of ADRs. Additional studies utilizing stronger research designs are needed to assess this, especially to establish causation. The findings from this study is not representative of the view of the entire population of Ghana because of the purposive sampling used to recruit participants. However, our findings provide evidence of a need for research in this area and provide some direction on next steps. Because the study shows the potential of using mobile phone caller tunes to address issues of drug safety, the next step would be to design, implement and evaluate interventions on ADRs reporting that use this platform. A pilot study can help generate more representative study outcomes with further insight into factors that influence the use of caller tunes in promoting patient reporting of ADRs.

Further studies are needed especially among patient groups on their intention to use caller tunes to promote patient ADR reporting. Intervention studies such as that focusing on a mobile app for ADRs reporting may also be needed to help determine how patients or consumers will use caller tunes to aid reporting of ADRs, and the factors that could influence actual use.<sup>27,28</sup>

There is a need for creation of caller tunes on ADRs in Ghana. In creating and testing such caller tunes, the active involvement of telecommunication companies will be key. Once created, it will be necessary to launch and promote the availability of such caller tunes among the general population so that people will become aware of their existence. Callers to mobile phones that will have the ADR-themed caller tunes are likely to increase their awareness of the need for patient reporting of ADRs in Ghana.

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**Conflict of interest statement**

The authors declare that there is no conflict of interest.

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