

## Use of Technology to Improve Healthcare Outcomes is the Need of the Hour!

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### Abstract

**Introduction:** Forgetfulness is often cited as a cause for non-adherence to antiretroviral therapy. High cell phones usage has provided opportunities for utilization of mhealth to improve health outcomes. Short message reminders can be used as a behavioral intervention to remind clients to take medication. It is against this background that we investigated the willingness of HIV clients on ART at Rimuka Clinic to receive SMS reminders for adherence.

**Method:** We used a cross sectional study design. We randomly selected 522 respondents from HIV clients registered at Rimuka Health Centre. Data were collected by means of a pretested interviewer-administered questionnaire and analyzed using Epi-Info 7 statistical software. Independent factors were identified using a stepwise backward logistic regression model.

**Results:** Five hundred and twenty-two respondents were recruited into the study. Respondents who reported owning a cell phone were 512 (92.75%). Ninety-seven (17.8%) reported a lost or damaged cell phone 12 months prior to the study. Four hundred and ninety-nine respondents (97.4%) thought a text message could be useful in adherence to ART. However, 496 (97.06%) among those with cellphones were willing to be reminded by SMS to take their ART medication. Independent factors for willingness to receive SMS reminders were perceiving anti-retroviral therapy to be of benefit (a OR=0.2 p=0.04), having disclosed HIV status to family (a OR=5.37; p=0.04), indicating review schedules at 3 months (a OR=6.59; p=0.04), thinking text messages are helpful in adherence to ART (a OR=185.7; p<0.05), and using a cellphone as a medication reminder (a OR=4.8; p=0.03).

**Conclusion:** Clients attending Rimuka Clinic are willing to receive SMS reminders for adherence.

**Keywords:** Cellphone, SMS, ART, Rimuka Kadoma Adherence

### Background

Forgetfulness is cited in a number of studies as the major cause of non-adherence to antiretroviral therapy (ART).<sup>1, 2, 3</sup> in this regard, a behavioral intervention that reminds an individual to take medication would be required to improve medication. Non-adherence, in turn, is associated with adverse health outcomes.<sup>4, 5</sup>

Of late mobile health technology (mHealth) has emerged as a tool to support healthcare delivery including improving adherence. There are 12 common Health and ICT applications. This broadly covers client education including behavior change, sensor & point of care diagnostics, registries / vital events tracking, data collection /reporting, health records, electronic decision support, provider to provider communication, provider work planning, provider training and education, human resources management, supply chain management and financing transactions and incentives that are used in the health sector.<sup>6,7</sup>

The ubiquity of cell phones has provided opportunities for utilization of such applications in health care.<sup>8</sup> The cell phone penetration rate has been increasing the world-over. By end 2015, there were more than 7 billion mobile cellular subscriptions, corresponding to a

penetration rate of 97%, up from 738 million in 2000.<sup>9</sup> Africa has provided an environment where utilization of cell phones is ever increasing.<sup>10</sup> The cell phone penetration rate in Zimbabwe as of December 2015 was 95.4%.<sup>11</sup> A number of studies in the US, Papua New Guinea, Cameroon, and Kenya have provided varying evidence on the utility of SMS to improve adherence to ART.<sup>12-17</sup>

There is, however, high-quality evidence that a brief weekly SMS improves adherence and virological outcomes.<sup>15,17</sup> Daily messages have been shown to have no effect on adherence.<sup>16</sup> There is also very low to moderate quality evidence that messages at other intervals improve adherence.<sup>18</sup> Whilst evidence may be available in other parts of the world, that use of *mHealth* improves adherence, adherence remains a challenge in some low-income settings including Kadoma. A 2015 study on adherence to ART in Kadoma City reported an adherence rate of 87% based on self-reports. Based on pill counts among a subset of respondents, the adherence was reportedly 65%.<sup>19</sup> It is against this background that we investigated the acceptability and factors associated with willingness to receive SMS as an ART medication reminder to improve adherence to ART.

## Methodology

### Study design

We carried out a clinic-based cross-sectional study at Rimuka Integrated TB and HIV Care Centre (Rimuka ITHC) at Kadoma (Zimbabwe). We collected the data as part of the Kadoma Mobile Phone study (KAMPS). KAMPS is a randomized control trial whose objective is to investigate the efficacy of cellphone based SMS in improving adherence to ART. We collected the data between September 2016 and October 2016.

### Study site

Rimuka ITHC is a primary health care facility that caters for TB/HIV collaborative activities at Kadoma. It offers comprehensive HIV services that include voluntary counseling and testing, pre-ART counseling, ART initiation & follow up and CD4+ testing. As of October 2016, 7300 clients were registered at the center.

### Study subjects and sample size

The study population was clients registered for HIV care at Rimuka. Inclusion criteria were age above 18, and, willing to provide written informed consent. Eligible respondents were also supposed to have been on ART for at least four weeks prior to the commencement of the study, usual residents of Kadoma City who did not have intentions of moving. The severely ill were not eligible to take part in the study. Random sampling was used to select 522 respondents.

### Study variables

The outcome variable in the study was “willingness to receive a text message ART reminder” measured as a dichotomous yes/no variable. From literature review, we developed the independent variables for the questionnaire.<sup>20-28</sup> These were used to develop a conceptual framework comprising of:

- **Psychosocial factors**- Social support, family support, support by significant others, perceived satisfaction with the social support
- **Socio-demographics**- age, sex, religion, educational status, marital status, employment, monthly income, home ownership, religion
- **Pattern of cellphone use**- owning a cell phone, use cell phone alarm reminders, carry mobile phone always, don't answer unknown numbers, perceived privacy in using cell phone, confidentiality
- **Environmental Factors**-transportation access, travel time, transportation facility, transport cost, cost income, frequency of visits
- **Behavioral factors**-HIV status disclosure, substance abuse.

## Data collection and analysis

We collected data using an interview-administered questionnaire that was pretested at the same center. However, we excluded from the main study all those who participated in the pre-test. We prepared the questionnaire in English and translated into Shona then back into English. We contacted a one-day training to explain the purpose of the study, standardize the questioning approach, and etiquette for the data collectors. Eight health workers administered the questionnaire. The investigator and clinic manager did supervision of the data collectors. We checked all questionnaires for completeness on submission.

We captured and analyzed the data using Epi Info 7<sup>TM</sup> Centers for Disease Control (CDC2007) statistical package. We used descriptive statistics to describe the study population. The package was used to generate, frequencies, means, and odds ratios (OR). The strength of the association was described using Odds Ratio (OR) and 95% confidence interval (95% C.I.). We used a stepwise backward logistic regression model to identify independent factors. Factors that had  $p$  values less than 0.25 in bivariate analysis were included in the logistic regression model.<sup>29</sup>

## Ethical considerations

We obtained written informed consent from all participants. Participants were free to terminate the interview at any time. We obtained permission to proceed from Kadoma City Council. Ethical approval was granted by Joint Research and Ethic Committee at Parerenyatwa Hospital Zimbabwe.

## Results

### Demography

We interviewed 522 respondents. Among these 156 (28%) were males and 396 (72%) were females. The median age of males was 42 years ( $q_1=37$ ;  $q_3=49$ ) and 42 years ( $q_1=34$ ;  $q_3=49$ ) for females. The median duration on ART was 46 months ( $q_1=26$ ;  $q_3=49$ ) for males and 46 months ( $q_1=31$ ;  $q_3=49$ ) for females. Among the respondents 512 (92.75%) owned a cell phone. The preferred language for SMS communication was Shona 359 (72%) followed by English 132 (27 %). Among those who owned a cell phone, 378 (75.73%) preferred a text message as a means of communication. Ninety-seven (18.95%) of the respondents who owned cellphones, reported losing or having the phone damaged 12 months prior to the study. Four hundred and ninety-nine respondents (97.4%) thought a text message could be useful in adherence to ART. However, 496 (97.06%) among those with cellphones were willing to be reminded by SMS to take their ART medication. Demographic characteristics stratified by sex are presented in Table 1.

### Socio-demography bivariate analysis

Females were 1.24 times more likely to report a willingness to receive SMS reminders compared to men ( $p=0.77$ ). Age above 40 years ( $OR=1.3$ ;  $p=0.54$ ); being on ART for less than 12 months ( $OR=1.7$ ;  $p=0.6$ ); being in a union ( $OR=3$ ;  $p=0.06$ ) and being in a polygamous relationship ( $OR=1.8$ ;  $p=0.59$ ) were positively associated with willingness to receive SMS reminders. Those who were employed ( $OR= 1.5$ ;  $p=0.39$ ) were more likely to report a willingness to receive SMS reminders. However, those whose household income was above US\$100 ( $OR=0.8$ ;  $p=0.18$ ) were less likely to report a willingness to receive SMS. Those who stayed with a spouse, ( $OR=2.4$ ;  $p=0.18$ ), children ( $OR=1.22$ ;  $p=0.79$ ) and a relative ( $OR = 1.96$ ;  $p>0.05$ ) were likely to report willingness to receive SMS reminders. On the other hand, those who stayed with parents ( $OR=0.3$ ;  $p=0.11$ ), took alcohol ( $OR=0.64$ ;  $p=0.5$ ) and were smokers ( $OR=0.36$ ;  $p=0.2$ ) were less likely to report a willingness to receive SMS reminders.

### **Environmental factors bivariate analysis**

Environmental factors positively associated with willingness to receive SMS reminders included; transport cost to health centre below US\$1.00 (OR=1.8;  $p=0.59$ ), duration of travel to health centre < 30 minutes (OR=2.2;  $p=0.13$ ), reportedly losing income due to coming to health centre for reviews (OR=1.5;  $p=0.39$ ), collecting medicine on their own all the time (OR=1.24;  $p=0.69$ ), being satisfied with appointment schedule (OR=1.7;  $p=0.6$ ) and walking to health centre as the mode of transport (OR=3  $p=0.06$ ). Those who reported a change in household expenditure due to being on ART (OR=0.8;  $p=0.18$ ), being away from home as a cause for missing a dose (OR=0.2;  $p=0.2$ ), were less likely to report a willingness to receive SMS reminders for adherence. None of the environmental factors was statistically significant.

### **Provider-patient relationship bivariate analysis**

We found respondents who thought they were treated with respect at the ART Centre (OR=3.3;  $p=0.28$ ), given a chance to ask questions (OR=7.7;  $p=0.1$ ), were satisfied with health workers at the Centre (OR=3.1;  $p=0.04$ ), satisfied with confidentiality at the centre (OR=2.3;  $p=0.4$ ), fully convinced that were infected and need ART (OR=18;  $p=0.05$ ), those who thought ART was of benefit to them (OR=6.1;  $p=0.06$ ) and were satisfied with health changes since they commenced ART (OR=2.5;  $p=0.3$ ) were more likely to report willingness to receive SMS reminders for adherence. Those who had missed ART for at least 3 days in the 3 months preceding the study (OR=0.3;  $p=0.37$ ), had missed ART 4 weeks prior to the study (OR=0.81;  $p=0.5$ ), had ever missed an appointment since initiation (OR=0.7;  $p=0.5$ ) were less likely to report willing to receive an SMS reminder for adherence. However, only being satisfied with health workers at the center (OR=3.1;  $p=0.04$ ) was statistically significant.

### **Behavioral factors bivariate analysis**

Feeling comfortable to take ART in front of others (OR=1.6;  $p=0.37$ ); use of a reminder mechanism (OR=2.4;  $p=0.16$ ); having disclosed HIV status to someone, (OR=6.5;  $p=0.17$ ), disclosure to spouse (OR= 3.68;  $p=0.03$ ); disclosure to parents (OR=2.6;  $p=0.07$ ), disclosure to children (OR=1.6;  $p=0.36$ ) and disclosure to church mates (OR=1.1  $p>0.05$ ) were positively associated with reporting willingness to receive SMS reminders for adherence. Other factors that had positive associations were, reporting a feeling of confidence in the ability to take medication (OR=6.5;  $p=0.5$ ), having another person to remind to take medicine (OR=2.1;  $p=0.17$ ), the 'medicine buddy' knowing what the medicine is for (OR=2.9;  $p=0.8$ ); confidence that client will take medicine daily (OR=3.3;  $p=0.23$ ) and confidence that one would take the medication at the right time (OR=3.8;  $p=0.18$ ). On the other hand, having disclosed to an employer (OR=0.4;  $p=0.45$ ) and having disclosed to a friend (OR=0.9;  $p=0.88$ ) were negatively associated with willingness to receive SMS reminders. Those who had doubts about HIV in general (OR=0.05;  $p<0.05$ ), or doubted their ability to take ART (OR=0.5;  $p>0.05$ ) were less likely to report a willingness to be reminded to take ART using SMS reminders. Having a sense of support from family (OR=1.5;  $p=0.6$ ) and a sense of support from significant others (OR=3.06  $p=0.05$ ) was positively associated with willingness to receive SMS reminders. Being satisfied with the support of family (OR=4.5  $p=0.13$ ) and being satisfied with the support from significant other (OR=7;  $p=0.4$ ) were also positively associated with willingness to receive SMS reminders.

### **Patterns of cell phone use on bivariate analysis**

There was a positive association between, thinking that an SMS is useful for adherence (OR=241;  $p<0.05$ ), ability to read and send SMS from the phone (OR=6.78;  $p=0.01$ ), having text message as preferred communication means (OR=22.8;  $p<0.05$ ) using cell phone as a medication reminder (OR=6.9;  $p<0.05$ ) and willingness to receive SMS reminder for adherence. All these were statistically significant. Those who shared cellphone (OR=0.68;  $p=0.4$ ) or put their cell phone where other people had access (OR=0.8;  $p>0.05$ ), whose phone

had a lock code ( $OR=0.57$ ;  $p=0.5$ ) were less likely to be willing to receive SMS reminders for adherence. However, these were not statistically significant at 95% confidence level.

### Independent factors

In backward stepwise logistic regression, those who thought ART benefits them (a  $OR=0.2$   $p=0.04$ ), had disclosed HIV status to family (a  $OR=5.37$ ;  $p=0.04$ ), indicated schedules appointments are 3 months (a  $OR=6.59$ ;  $p=0.04$ ), thinking text messages are helpful in adherence to ART (a  $OR=185.7$ ;  $p<0.05$ ), and used a cellphone as a medication reminder (a  $OR=4.8$ ;  $p=0.03$ ) remained statistically significant. The variables with a p value less than 0.25 are presented in Table 3.

### Discussion

In this study, we found a higher cell phone ownership percentage of 92.75% among clients on ART. Similar cell phone coverages were reported in studies carried out by Xiaoab in China (88%), Kabede in Ethiopia (84%), and Person in the USA reported (77%).<sup>22,28,30</sup> However, these were all lower than the cell phone coverage among clients at Rimuka whose coverage was 92.75%. The majority of respondents in this study 318 (75%) preferred text as routine communication; similar findings were reported Kabede *et al.* (2015) who reported a text preference of 70%. We found 483 (84%) of the respondents, already using cellphones as reminders for medication. This is similar to 79% usage of cellphones as medicine reminders reported by Tamaryn *et al.* (2010) in a study done in South Africa.<sup>20</sup> Theft or damage to phones may derail any SMS interventions; in this study 97(18%) of respondents reported phone theft or damage in the 12 months preceding the study. This was lower than 28% reported by Tamaryn *et al.* (2010) in South Africa and 51% reported by Kabede *et al.* (2015) in Ethiopia.<sup>20, 28</sup>

We found that males were less likely to be willing to receive SMS reminders ( $OR=0.8$ ;  $p=0.77$ ). This was consistent with Xiaoab *et al.* (2013) in China and Leite et al (2014) in America.<sup>22,24</sup> This may be explained in part by the late health seeking behavior of males. We found that as age increased above 40 years respondents were willing to receive SMS reminders ( $OR=1.3$ ;  $p=0.54$ ), those in a union ( $OR=3$ ;  $p=0.06$ ) were also likely to report a willingness to receive SMS reminders. Those with education attainment above ordinary level (Form 4) ( $OR=2.2$ ;  $p=0.13$ ) were more likely to report a willingness to receive SMS reminders. These findings are consistent with what was reported by Xiaoab *et al.* (2013) and Bologun *et al.* (2012).<sup>22,25</sup> Being in a union, advancing age and having attained education above the fourth form are all signs of maturity. It follows that such respondents are expected to be responsible in life and are motivated by any intervention that may prolong their lives. Contrary to our findings Madhvani *et al.* (2015) and Kabede *et al.* (2015) reported that younger ages were more likely to accept receiving SMS reminders.<sup>4,28</sup> We also found that those who took alcohol were less likely to be willing to receive SMS reminders ( $OR=0.64$ ;  $p=0.5$ ). This is consistent with the finding of Xiaoab *et al.* (2013).<sup>22</sup>

We found that there was a positive association between duration of travel to health center less than 30 minutes ( $OR=2.2$ ;  $p=0.13$ ), and disclosing HIV status to someone ( $OR=6.5$ ;  $p=0.17$ ). We would like to think that our respondents did not have transport barriers; this implies that our findings are contrary to what was reported by Piette *et al.* (2010); in Honduras, who reported that clients who had transport barriers were more likely to report a willingness to receive SMS reminders.<sup>23</sup> There may be a need to investigate why those who miss ART due to being away from home ( $OR=0.2$   $p=0.2$ ), are less likely to report willingness as this may be due to perceived stigma by respondents.

All respondents in this study indicated that they were satisfied with the service at the Health Centre. This is near twice the 42.4% satisfaction rate with HIV services reported by Tran BX (2012) in Vietnam.<sup>38</sup> Client satisfaction is a determinant of treatment uptake, adherence and retention, and an important health systems outcome.<sup>34,35,36</sup> Therefore, dissatisfaction with antiretroviral services could threaten attainment of anti-retroviral

treatment objectives.<sup>37</sup> The provider needs to gain the confidence and trust of the client. If trust is established, the client will be in a better position to listen and follow the advice of the provider ultimately this may translate into behavior change. The respondents who had ever missed appointments since initiation (OR=0.7;  $p=0.5$ ), were less likely to report willingness to receive SMS reminders and this is inconsistent with Piette *et. al.* (2010) who reported that ‘patients who had missed appointments were significantly more likely to report willingness to receive SMS reminders for medication.’<sup>23</sup>

Whilst, we found that those who had disclosed their HIV status to employers were less likely to report a willingness to receive SMS reminders (OR=0.4;  $p=0.45$ ). We also found out that disclosure to a friend was negatively associated with willingness to receive SMS reminders. Under normal circumstances, one would expect employers and friends to provide a supportive environment to promote positive living including behavioral intervention. Disclosure to family (OR=2.6;  $p=0.07$ ), parents (OR=1.7;  $p=0.32$ ), children (OR=1.6;  $p=0.36$ ), or church mates (OR=1.1;  $p>0.05$ ) was positively associated with willingness to receive SMS reminders. Disclosure is an important entry point for psychosocial support; however, it is often hindered by internal and perceived stigma as well as enacted stigma. Disclosure can be considered a proxy measure for stigma and discrimination.<sup>31</sup> We found a positive association between the perceived efficacy of taking ART medication daily (OR=3.3;  $p=0.23$ ), taking the medication at the right time (OR=3.8;  $p=0.18$ ) and willingness to receive SMS reminders for ART. Self-efficacy for treatment adherence has been identified as an important correlate of medication adherence in the treatment of HIV and other medical conditions.<sup>32</sup>

In this study, we report a positive association between a perception that SMS is useful (OR=241;  $p<0.05$ ) and willingness to receive SMS reminders for ART. We found that those who shared cellphones (OR=0.68;  $p=0.4$ ) or had reported that others could see their messages (OR=0.7;  $p=0.79$ ) were less likely to report a willingness to receive SMS reminders. This indicates the need for confidentiality in any SMS intervention. Confidentiality of the SMS reminder is important as some clients have internal stigma. If others see the message, it may result in acted stigma. All these are pertinent issues that HIV control programs should take into consideration at the design stage. Mbuagbaw *et. al.* (2012), reported withdrawal of participants in the CAMPS study due to compromise in confidentiality.<sup>16</sup> Curioso *et. al.* (2009) reported that keeping the medication reminders confidential was the most important concern that many clients on ART expressed. Clients did not want “sensitive” words like ‘HIV’, ‘antiretroviral’, or any other word related to HIV included in the SMS text.<sup>38</sup>

## Conclusion

Patients on ART attending Rimuka Integrated TB and HIV clinic are willing to receive SMS messages as medical reminders. The local language (Shona) is the most preferred language for the SMS. Confidentiality of the messages is an issue among the respondents, hence, those who share phones or whose messages are likely to be read by others are less likely to report a willingness to receive SMS reminders. Independent factors for willingness to receive SMS reminders included prior use of cell-phone as medication reminder; thinking a text message could be helpful in adherence to ART; having disclosed HIV status to family; having appointments scheduled at 3-month intervals.

**Table 1.** Socio Demographics of Respondents Kadoma 2016

Variable	Male (156) n= (%)	Female (396) n= (%)	<i>p value</i>
Median Age	42 ( $q_1=37$ ; $q_3=49$ )	42 ( $q_1=34$ ; $q_3=49$ )	
Marital status: Married	114 (73.08)	168 (42.53)	<0.05
Divorces	10 (6.41)	38 (9.62)	<0.05
Separated	-	18 (4.56)	<0.05
Single	5 (3.21)	29 (7.34)	<0.05

Widowed	17 (10.9)	142 (35.95)	<0.05
Religion: Apostolic	29 (18.95)	94 (23.86)	0.19
Catholic	34 (22.22)	49 (12.44)	<0.05
Muslim	5 (3.27)	9 (2.29)	0.528
None	15 (9.8)	11(2.79)	<0.05
Pentecostal	35 (22.8)	158 (40.1)	<0.05
Protestant	23 (15.03)	63 (15.99)	0.72
Traditional	12 (7.84)	8(2.03)	<0.05
Other	0	2 (0.5)	0.3
Educational attainment:	3 (1.9)	29 (7.34)	<0.05
None			
Primary Education	28(17.95)	82(20.76)	0.46
Secondary Education	120(76.92)	276(69.87)	0.08
Tertiary Education	5 (3.21)	8 (2.03)	0.40
Employment status:	43 (27.74)	40 (10.34)	<0.05
Formally Employed			
Self Employed	73 (42.10)	149 (38.50)	0.04
Not Employed	73 (47.10)	198 (51.16)	0.49
Median Time (months) since diagnosis	46(q <sub>1</sub> =26; q <sub>3</sub> =74)	62 (q <sub>1</sub> =36; q <sub>3</sub> =94)	
Duration on ART (months)	35(q <sub>1</sub> =30; q <sub>3</sub> =60.5)	46 (q <sub>1</sub> =31; q <sub>3</sub> =7)	
Who owns the house:	10(6.4)	35(8.95)	0.34
Council rented			
Owner	35(22.58)	94(24.04)	0.74
Employer	4(2.58)	9(2.3)	0.83
Family	48(30.9)	113(28.9)	0.52
Private rented	2(1.29)	0	0.04
Subtenant	24(15.48)	72(18.41)	0.40
Other	2(1.29)	0	0.04
Who do you stay with:	0	56(14.15)	<0.05
Relative			
Unstable	13(8.33)	1(0.25)	<0.05
Parents	11(7.05)	36(9.11)	0.34
Children	63(40.35)	217(59.94)	<0.05
Spouse	105(67.31)	147(37.22)	<0.05
Alone	20(12.82)	48(12.15)	0.98

**Table 2.** Patterns of Cellphone Use Kadoma 2016

Variable	Male (156) n= (%)	Female (396) n= (%)	<i>p value</i>
Processes a cellphone	147(94.23)	365 (92.17)	
Use Cellphone as medication Reminder	125 (85.63)	307 (84.11)	0.4
Willing to be reminded by SMS to take medication.	142(96.6)	353(97.5)	0.5
Preferred cellphone Communication:	30 (20.55)	64 (17.53)	0.5
Voice			
WhatsApp	8 (5.48)	22 (6.03)	0.38
Text	108 (73.97)	279(76.44)	0.78
How often do you have phone with you: Always	143 (97.28)	346(94.79)	0.1
Seldom	1 (0.68)	6(1.64)	0.4
Sometimes	3(2.04)	13(3.56)	0.3

Cellphone damaged or lost in last 12 months	26 (17.69)	71 (19.45)	0.72
Have alternate number	31 (21.23)	59(16.21)	0.15
Switch off phone during day	16 (10.96)	32 (8.82)	0.41
Times and places where phones are not allowed	36 (24.66)	125(34.25)	0.04
Stores phone where others have access	92 (62.59)	268(73.63)	0.05
Shares phones with others	58 (40.56)	134(36.81)	0.45
Phone has lock code /pattern	26(17.69)	64 (17.53)	0.88
Able to read or send text	136 (92.52)	335 (92.29)	0.44
Delete text deliberately without reading	9 (6.16)	28 (7.73)	0.58
Text likely to be seen by others:	17(11.56)	39(10.71)	0.71
Somewhat likely			
Somewhat unlikely	5(3.4)	7(1.92)	0.29
Very likely	85(57.82)	224(61.54)	0.65
Very unlikely	40(27.21)	94(25.52)	0.63
Use of internet on phone	32(21.77)	61(16.55)	0.14
Website visited Email	2(6.25)	0	0.02
Google	10(31.25)	4(6.67)	0.0028
Social network	19(59.35)	54(90.04)	0.65
Others	1(3.13)	2(3.33)	0.84
Willingness to be contacted by phone			
Perception of text message: Useful for adherence	142(96.6)	356(97.8)	0.68
Ruins privacy	1(50)	0	0.11
Other	1(50)	3(100)	0.88
Preferred SMS language: English	58 (40.85)	74 (20.90)	0
Shona	82 (57.75)	277 (78.25)	0.00012
Ndebele	1 (0.70)	3 (0.85)	0.88
Chewa	1 (0.70)	-	0.11

**Table 3** Bivariate and Multivariate Analysis Kadoma 2016

Variable		Willingness to Receive SMS Reminder		OR	95% C.I.	p-value	aOR	p-value
		Yes	No					
In a union (Coding marriage)	Yes	285	5	2.7	0.90-8.02	0.06		
	No	211	10					
Education above Form 4 (coding Education)	Yes	295	6	2.2	0.77-6.2	0.13		
	No	201	9					
Stays with spouse	Yes	234	4	2.4	0.77-7.8	0.18		
	No	263	11					
Stays with parents	Yes	39	3	0.3	0.09-1.2	0.11		
	No	457	13	4				
Fully convinced infected by HIV and needs ART	Yes	492	13	18	3.17-112.7	0.01	0.1	0.
	No	4	2				6	0
Use of Cellphone as medication reminder	Yes	425	7	6.9	2.4-19.7	0.00	4.8	0.
	No	70	8	3		03		0
Prefers Text	Yes	411	7	5.5	1.9-1500	0.00		3
	No							



Communication	No	85	8			03		
Can read and send text on phone	Yes	461	10	6.7	2.1-20.9	0.00		
	No	34	5	7		03		
Thought a text message could be helpful in adherence to ART	Yes	493	6	246	53-1143	0.00	185	<
	No	3	9			00	.7	0.
								5
Duration of travel to Health center < 30 minutes	Yes	334	6	3.0	1.08-8.8	0.02		
	No	162	9	9				
Given individual health education	Yes	433	11	2.4	0.77-8.08	0.12		
	No	63	4					
Disclosed HIV status to family	Yes	416	10	2.4	0.86-7.8	0.08	5.3	0.
	No	80	5				7	0
								4
Appointments scheduled at 3months	Yes	462	11	4.9	1.4-16.3	0.01	6.5	0.
	No	34	4				9	0
								4

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