Adherence to Antiretroviral therapy among Clients Utilizing a Primary Health Care Facility Kadoma Zimbabwe (2016)

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Abstract

Introduction: The advent of antiretroviral therapy has turned Human Immunodeficiency Virus (HIV) infection into a manageable chronic condition. Maintaining ART adherence above 95% remains the benchmark for effective viral suppression. An evaluation of adherence to ART by pill count at Rimuka Integrated HIV and TB site revealed an adherence rate of 65%. We investigated factors associated with ART adherence among clients seeking care at the same facility.

Method: This study design was a cross sectional study. A pretested interviewer-administered questionnaire was used for data collection. We captured and analysed the data using Epi Info 7™ statistical package. The package was used to generate, frequencies, means, and odds ratios. The strength of the association was described using odds ratios and 95% confidence interval.

Results: We recruited 553 respondents. Three hundred and ninety-seven (71.79%) were females. and 156 (28.21%) were males. Eighty eight percent of the respondents had adherence rate above 95% by a composite measure. The proportion of clients taking drug holidays was low at 3.7%. In multivariate analysis, being gainfully employed aOR=1.8; getting individual health education on review visits aOR=1.5; missing ART in 4 weeks preceding the study aOR= 0.46 and being catholic aOR=0.5 remained significant factors in multivariate analysis.

Conclusion: Being gainfully employed, getting individual health education are predicators of ART adherence using a composite scale. Being catholic and reporting missing any dose of ART in the previous 4 weeks were predictors of non-adherence using a composite scale. Individual health education and increasing incomes among those on ART was recommended for improved adherence.

Keywords: Adherence, ART, HIV, Kadoma.

Introduction

Globally 36.7 million people were living with HIV in 2016. Among these, 19.5 million are on anti-retroviral therapy (ART)[1]. ART are medicine that affect viral replication and the advent of antiretroviral therapy has turned HIV infection into a manageable chronic condition like hypertension or diabetes. However, the effectiveness of ART is dependent on adherence rates of above 95%.[2]

Furthermore, for ART to be effective, the clients' need to take the medication in the right dosage, at the right time as well as follow any dietary instructions.[3] Conversely, a reduction in adherence below 95% will lead to virological failure, virological rebound or drug resistance. For a five percent reduction in adherence, there is a fivefold increase in virological indices.[4] It has been reported that adherence decreases over time, nevertheless, it is essential that high levels of adherence are maintained for life by clients on ART.[2]

Adherence is however, not the only determinant of ART failure or success. Other factors include genetic differences in drug metabolism, severe baseline immune suppression, prior drug resistance and concurrent opportunistic infections. Nevertheless, adherence to ART is one of the few potentially alterable factors determining outcomes for patients with HIV. Nonetheless, it is well known that health care providers, in general, are unskilled at assessing and improving medication adherence.[1] If clients on ART are not adherent, this may erode the gains accruing from increased accessibility to ART. Non-adherence will result in development of resistant HIV strains, virological failure and / or poor immune

reconstitution.[5] Adherence goes beyond taking one's prescription but encompasses the extent to which a person's behavior – taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider.[3]

Several methods are available to monitor adherence among HIV clients on ART. The methods include health centre based pill counts. However, this has a disadvantage that some clients dump pills so that they are perceived to be adherent.[6] Self-reports are also used but other researchers have reported that this has the tendency of over reporting the extent of the adherence.[7] Other methods that can be used include pill identification test (PIT), and visual analogue scale (VAS). Medicine Electronic monitoring systems or biomarkers have also been used.[8] Direct ways of measuring adherence include directly observed treatment or biological monitoring. These are not feasible due the lifetime nature of HIV and the cost of biological monitoring.

As at October 2016, there were 7500 clients on the Anti-Retroviral Therapy register at Kadoma City. A further 2020 patients were getting HIV services from the government general hospital and an unknown number utilised private health facilities. A study by Muringazuva *et. al.* (2015) reported an ART adherence rate of 87% by self-report. A pill count on a subset of clients revealed an even lower adherence rate of 65%.[9] Both are below the recommended ART adherence rate of 95%. It is against this background, that this study was conducted to investigate factors associated with ART adherence among clients registered at Rimuka Integrated HIV and TB site.

Methodology

Study design

This was a Health Centre based cross sectional study. The data were collected from September 2016 to October 2016 as part of the Kadoma Mobile Phone Study.[10]

Study site

Rimuka Integrated HIV and Tuberculosis site is one of the five primary health care facilities under Kadoma City. However, in Kadoma City, Rimuka Integrated HIV and Tuberculosis site, is the only centre that caters for Tuberculosis and HIV collaborative activities. The centre offers comprehensive HIV and Tuberculosis services that include, client centred HIV testing, counselling and ART initiation monitoring and care. In the aspects of tuberculosis control, tuberculosis screening, diagnostic and treatment services using directly observed treatment short course strategy (DOTS) is offered.

Study subjects and sample size

The study population was clients registered for HIV care at Rimuka. Inclusion criteria were age above 18 years, and, willing to provide written informed consent. Eligible respondents were supposed to have been on ART for at least four weeks prior to the commencement of the study. Respondents were also supposed to be usual residents of Kadoma City and had no intentions of relocating. The severely ill were not eligible to take part in the study. Assuming 95% confidence interval, ART adherence rate of 65% by pill count by Muringazuva *et.al* (2015) and an absolute precision of 5%, a size of 349 participants was calculated. [9,11]

Study variables

The outcome variable in the study was "adherence to ART" measured as a dichotomous "yes/no" variable. We used a multi-method ART adherence tool. It comprised of four components that had been previously validated[6]. This approach has been adopted based upon the WHO recommendation states that multi-method approach that combines feasible self-reporting and reasonable objective measures is the current state-of-the-art in measurement of adherence behaviour.[3]

The four aspects of the multimethod adherence measurement tool included:
1. Self-report
2. Visual analogue scale (VAS)
3. Pill identification test (PIT)
4. Pill count

The fundamental premise in the multi methods adherence measurement tool we used was that the regimen, rather than the individual medicines, is the unit for assessing adherence. Selective adherence to the medications in the combination regimen means that the intended benefits of combination therapy (pharmacological synergy) are not achieved, and this may precipitate resistance.[6]

In the self-report component, the data collector guided the respondents through a series of questions to which they responded with either a "yes" or "no". An adherent client was expected to respond "no"' to all questions. This helps validates responses since ordinarily clients tend to respond "yes" to any questions posed to them by a health care professional to please them. Based upon this observation, the questions were designed so that an adherent client gave a 'no' response. The four questions were: -

a) Do you sometimes find it difficult to remember to take your medication? This question aimed to test whether there are established dosing cues in the client's daily routine.

b) When you feel better, do you sometimes take a break from your medication? The rational of the question was that Clients may stop taking their medication when their presenting health problem has been resolved.

c) Thinking back over the past four days, have you missed any of your doses? –Four-day recall period was validated in other researches. [12, 13,14]

d) Sometimes if you feel worse when you take the medicine, do you stop taking it? The premise of this question was that if the presenting health problem has not produced symptoms or the problems have been resolved, and there are bothersome side effects from the medicine, clients find it difficult to rationalize continued adherence.[15]

Assessing adherence by self report

In assessment of adherence by self-report, the number of "No" answers to four questions were counted. If all four answers are "no", then the respondent was classified as being highly adherent. However, if there is one "yes" answer, then the respondent was classified as being moderately adherent. Whereas, if there are two or more "yes" answers, the respondent was classified as having low adherence. Studies have shown that self-reports correlates well with both viral load and clinical outcomes[16-18].

Visual analogue scale

A visual analogue scale (VAS) was included in the multimethod adherence measurement tool to verify the verbal responses. In this method, clients are asked to rate their adherence to medication over the past four weeks. The client then indicates on a graduated scale where they believe their adherence has been during this period. The graduated scale is from 1 to 10. If a respondent point to 7, the resultant adherence rate was recorded as 70%. Those who had 95% or more were classified highly adherent. Those with adherence rates between 75%-94% were classified moderately adherent and those with less than 74% were classified low adherent. VAS has been used extensively and validated in the measurement of adherence[19].

Pill identification test

The Pill Identification Test (PIT) can be used to determine if a person is able to recognize the drugs being taken and presumably is adhering to the prescribed regimen[6, 20]. In the pill identification test the data collector initially familiarized themselves with the last prescription that was dispensed to the respondent. The respondent was then shown a photograph of the same brand of the tablet, capsule, or bottle for liquid preparations that the client had been given on the last prescription visit. The respondent was then asked to identify their previous prescription and describe:

- The number of tablets, capsules, and medicine measures that he or she consumes at each dosing interval.
- The exact time when he or she takes the dose
- Additional instructions the client follows when taking the medication such as remembering to have a meal before taking the dose

A respondent was classified as being adherent if they correctly cited the dose, the time to take the medication and any further instructions. If the respondent knew the dose and time only, they were

moderately adherent whilst those who knew the dose only or looked confused were classified as being lowly adherent.

Pill count

For the pill count method, the returned medication was counted and the percentage adherence was calculated. The denominator was the number of tablets that the client was expected to take by the day of the pill count. In 2007, Lee *et.al*. Demonstrated in a randomised controlled trial in the United States that that the pill count as a measure of adherence in far superior to 24-hour recall and pharmacy refill method[21]

$$\text{Percentage Adherence} = \frac{\text{No. of Tablets dispensed on last Visit} - \text{tablets available on day of counting}}{\text{Tablets Expected to be taken by the date of Counting}} \times 100$$

The respondents were not supposed to have obtained an emergency prescription, and should have used only medication from the container. Those with a pill count adherence rate of more than 95% were considered highly adherent, whilst, those with adherence rate of between 75%-94% were moderately adherent and those with less than 74% were considered to be low adherent.[6, 22]

Composite measure of adherence

The overall adherence was categorised using table 1. If all results appeared in the same column for examples all "nos" for self-reported adherence, VAS, "95% or more", "Dose time and instructions", and the "pill count" was 95% or more, then, the client was considered highly adherent, else the client was considered non- adherent.[6]

Data collection and analysis

We collected data using a pretested interview-administered questionnaire. We prepared the questionnaire in English and translated it 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 supervised the data collectors. We checked all questionnaires for completeness on submission.

We captured and analysed the data using Epi Info 7[TM] Centres for Disease Control (CDC 2007) 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.[23]

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.

Results

We recruited 553 respondents into the study. Three hundred and ninety-seven (71.79%) were females and 156 (28.21%) were males. The median age of the respondents was 42 years (Q_1=35 Q_3=49). Four hundred and seventeen (75.4%) of the respondents had attained at least an ordinary level education. The median income of the respondents was US$80 ($Q_1$=$40: Q_3=$175). Median duration since HIV diagnosis was 58 months (Q_1= 33 months: Q_3=87 months) and median duration on ART was 41 months (Q_1= 27 months: Q_3=70 months). The composite adherence classification by sex is presented in table 2. Among the respondents, with compete data to compile the composite measure, 301 (88%) had a high adherence classification whilst, 6 (2%) had a low adherence classification.

Medication

Five hundred and nineteen (93.85%)) of the respondent were on Tenolam E. Seventeen (3.07%) were on second line therapy of Atazavir and Ritonavir. The other respondents were on a combination of separate medication like Duomune, Duovir, Effavirennz, Nevirapine, Abacavir and Lamivudine.

Adherence rate by various measures

The adherence rates by various components of the composite adherence measures stratified by sex are presented in figure 2. Ninety-six percent of the respondents (n=530) had more than 95% adherence measured by the self-report method. Adherence measurement by pill count had the lowest proportion of respondents with more than 95% adherence at 82.86%.

Pill counts adherence bands

Thirty-six (8%) of the respondents had adherence rates below 75%. Three hundred and thirty had adherence rates of between 95% and 100%. However, 37 (8%) of the respondents had adherence rates above 100%. The adherence rates bands by pill count method are shown in figure 3.

Missing review / resupply appointments

One hundred and eighteen respondents (21.3%) indicated missing a review/resupply appointment since ART initiation. The main reason for missing appointment was *"having travelled"* (52/118) 44%; followed by *"forgetting the appointment"* (26/118) 22%. Fourteen out of the 118(11.9%) indicated that they missed appointments *"due to lack of money for consultation"*. The reasons for missing appointments are presented in figure 4.

Missing medication and drug holidays

When asked about missing medication, twenty-eight (5%) of the respondents indicated they had missed at least a dose in the 4 weeks preceding the study. Twelve out of the 550 (2.18%) respondents reported difficulties in remembering to take medication. Two of the 395 females (0.5%) and 4 of the 156 males (2.56%) reported missing at least one dose in the 4 days preceding the study. The difference in proportions across sexes was statistically significant (p=0.035) Two out of the 551 (0.36%)respondents reported stopping taking medication when feeling worse compared to 5 (0.91%) who reported same when feeling better. Drug holidays were reported by 8/395 (2.03%) females compared to 5/156 (3.21%) males. The difference in proportion across sex who took drug holiday was not statistically significant (*p=0.41*). The reasons for missing medication included being too busy (1.6%); away from home (1.2%); or oversleeping 1%. Other reasons included change in daily routine or feeling ill,

Bivariate analysis

Social demographic factors associated with adherence

In bivariate analysis on the relation between socio demographic factors and adherence (measured on a composite scale) we found positive association between belong to most religious group except belonging to apostolic sects (OR=0.91; p=0.67), being catholic (OR= 0.46; p=0.001) and belonging to traditional religious (OR= 0.46; p=0.06), these were negatively associated with adherence measured on a composite measure. Being employed (OR=2; p=0.008), belonging to a support group (OR=2.1; p=0.04) and residing in an area that was within 30 minutes' walk to the health centre (OR=1.9; p= 0.01) were positively associated with adherence. All these were statistically significant at 95% confidence interval. Those who reported budgetary changes due to being on ART were less likely to be adherent (OR-0.8; p=0.58)

Health system related factors and adherence

The relationship between health systems related factors and adherence to ART are present in table 3. In bivariate analysis of provider patient relation and adherence, there were positive associations between reporting being satisfied with appointment (OR=1.03; *p=0.95*); collecting medicine on their own (OR=1.07: *p=0.79*); getting individual health education and being adherent to ART (OR=1.5; *p=0.11*)

However all these were not statistically significant. Ever missing appointments, not getting medication at one time, and a history of travelling were negatively associated with adherence using a composite measurement scale.

Association between treatment regimen and adherence

The association between therapies related issues and adherence is presented in table 4. There was a negative association between reporting missing ART in a week preceding the study (OR=0.3 p=0.004); reporting missing ART at one times after initiation (OR=0.6 p=0.29); feeling that drug is toxic or harmful (OR=0.59 p=0.71) and adherence measured on a composite scale

Multivariable analysis

The variables that remained statistically significant at 95% CI in a stepwise backward logistic regression model included being gainfully employed (aOR=1.8; *p=0.0007*); getting individual health education on review visits (aOR=1.5; p= *0.0034*); missing ART in the 4 weeks preceding the study (aOR= 0.46 *p= 0.04*) and being catholic (aOR=0.5; *p= 0.003*)

Discussion (Still needs attention)

This was a health centre based study were a composite measure of adherence was used. In this study, 12% of the respondents had either moderate or low adherence. An adherence classification below high category maybe an indicator of poor adherence and a predictor of virological failure[1.4]. Action needs to be taken to improve the adherence rate to above 95%. Zimbabwe employs the public health approach to ART. The ART regimens are limited and the country therefore cannot afford to have clients defaulting and failing second line ART. Therefore, there is need to monitor those on second line therapy as they are likely to be non-adherent.

As far back as 2003, Marelich *et. al.* reported that there was a growing recognition that a great deal of adherence hinges on the positive interaction between patients and their health care providers[24].We found positive associations between being satisfied with appointments, collecting medicines on own, getting individual health education and adherence to ART. On the other hand, there were negative associations between, history of missing appointments, having travelled and not getting a medicine supply from the health centre and adherence. ART treatment, requires active involvement of clients on any treatment decisions. Clients need to be adequately informed about their treatment schedule and the importance of adherence. This calls for good rapport between the two parties. Less than perfect patient-provider interaction has been documented to have an adverse effect on adherence[25]. Establishing a supportive relationship between Health Care Providers (HCPs) who were knowledgeable, available, caring, empathetic, '*helpful and approachable'* and patients was reported by Ross (2011) as very important in enabling patients to achieve high levels of adherence to ART[26].

The reasons cited in this study for missing appointments in the study *i.e.* being away from home (50%), forgetting (50%), being too busy (50%), stigma (70%), feeling sick (80%) and changes in work routine (60%). are similar with those reported by Talam *et. al.* (2008) in a study carried out in Kenya[27]. Review dates or appointment should be set and agreed on with the clients. This may reduce the number of missed appointments and improves adherence to ART. Similar to other reports, we found, travelling and forgetting mentioned as the most frequent reasons for missing appointments[28]. A cognitive intervention to remind clients of appointment dates may therefore, be helpful. Clients should also be encouraged to plan journeys when it does not coincide with their appointment dates.

In this study, we found that those who reported ever missing an appointment or a dose since initiation were more likely to be non-adherent. This is consistent with what was reported by Ndiaye *et. al.* (2013) in a study among adolescents in Botswana[29]. Reporting missing ART in a week preceding the study or any other time since initiation were negatively associated with adhering to ART. This maybe because once a client starts missing ART it may develop into a habit.

Anant in a study in India reported that 28.66% respondent missed ART. This is far higher than the 6% of the respondents in our study who reported missing ART at one time. It is reported in the same study by Anant that 17% of the respondents did not take their medication whilst travelling. Our findings are consistent with these findings. Being away from home has also be reported in other studies as a

factor associated with non-adherence[30]. This maybe that if a person has travelled they may not be comfortable taking ART in front of new people. Alternatively, this could have been a short visit and they would have left their medicine at home in the hope that they would be back in time for their medication. In other studies, the three main reasons for missing medication were being away from home, being busy with other things and/or simply forgetting [33-36].

Nkomo *et. al.* reported that side effects of ART can contribute to non-adherence[31]. In our study, we found that those who reported side effects or thought the medicine were toxic less likely to be adherent. However, with adequate support, the clients may appreciate that the benefits of ART outweigh some side effects. Clients must be empowered to communicate early to health workers, when they have side effects so that these may be addressed appropriately. Specific requirements and peculiar circumstances of clients need to be given due consideration.

Of concern was that we found over adherent clients by pill count. Adherence rates above 100% are an indication that a client is taking more than the required doses at a time. Alternatively, this may indicate pill dumping. Sharing of medication may also lead to adherence rates above 100% by pill count. Such practise may lead to treatment failure[4, 32]. There is need for further investigation of this phenomenon and its effect on virological outcomes.

In this study, we found a positive association between being above 40 years; being gainfully employed and adherence. This is consistent with finding of Anant *et.al.* (2012)[30]. Employed people have more disposable incomes for transport and/or any fees that may be required. They are also in a better position to purchase medication or sundries if not available at the health centres. In this study, we found that those who had support from family, or community were likely to be adherent. Besides Anant *et. al.* (2012), Seller P *et. al.* (2006) and Shab *et. al.* (2007) also reported that self-perceived family support was a predictor of adherence[30.38, 39].

Being a member of a support group was also associated with adherence. HIV clients draw psychosocial support from peers and joining a support group attest to acceptance of one's status. This is consistent with the finding of Nkomo (2004) in South Africa as well as the study findings of Marukutira (2012) in Botswana [31, 35, 39]Living near the treatment centre was also positively associated with being adherent. This may be attributed to minimum transport and opportunity costs when the clients go for review. Transport being a determinant of adherence was reported by Wasti *et.al.* (2012) in a study in Nepal[37].

Conclusion

There are clients with composite adherence measure below high (95%). Such Clients need to be continually monitored and appropriate interventions should be put in place to encourage them to attain adherence rates above 95%.

Pill dumping may be occurring among same respondents as revealed by adherence rates of above 100%. Such clients pose a threat to ART programming as they can promote development of drug resistance. Clients on second line need to be continually monitored as they have issues already. The proportion of clients taking drug holidays was low and the program should continue discouraging drug holidays.

Whilst the factors may have been not statistically significant, in bivariate analysis, missing ART in the 4 weeks preceding the study; reporting missing ART at any one time after initiation; being reportedly too busy, being away from home and the feeling that ART maybe toxic or harmful were negatively associated with adherence using a composite scale.

Being gainfully employed, getting individual health education were predicators of ART adherence using a composite scale. Missing ART in the previous 4 weeks were predictors of non-adherence using a composite scale. We recommend that Health care providers should consult clients on the review schedules so that the number of missed appointments are minimized. Clients should be encouraged to collect medication on their own so that there is more interaction with health care providers.

Health education at health centres should be individually tailored so that it responds to the individual needs of the client. The package should include use of alarms and/or treatment buddies to remind clients in case they are busy. Clients going away from home temporarily within the same locality or traveling out of town should carry contingency stocks of their medication. Self-efficacy should be developed

among clients to take medication in front of anyone, Clients should also be encouraged to disclose their status.
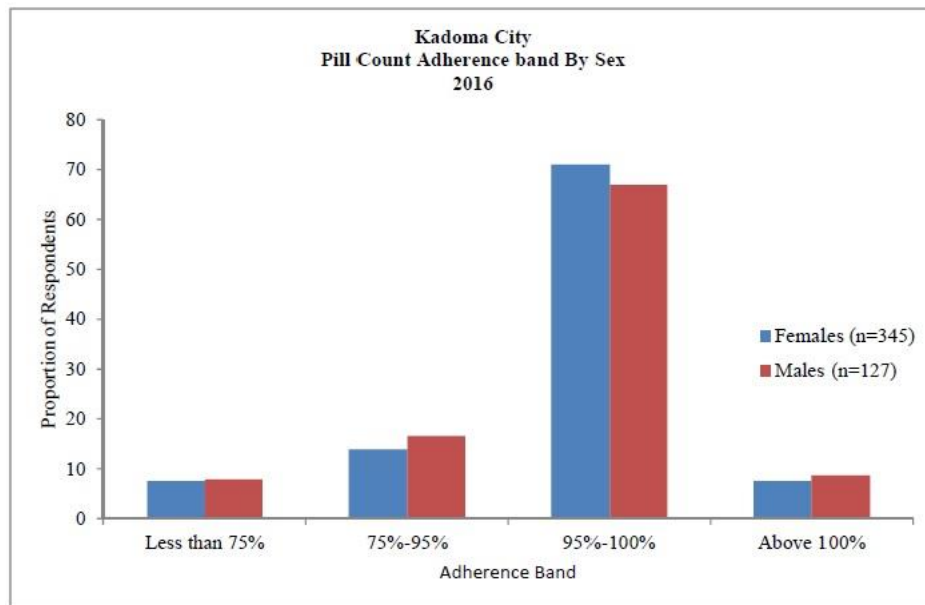
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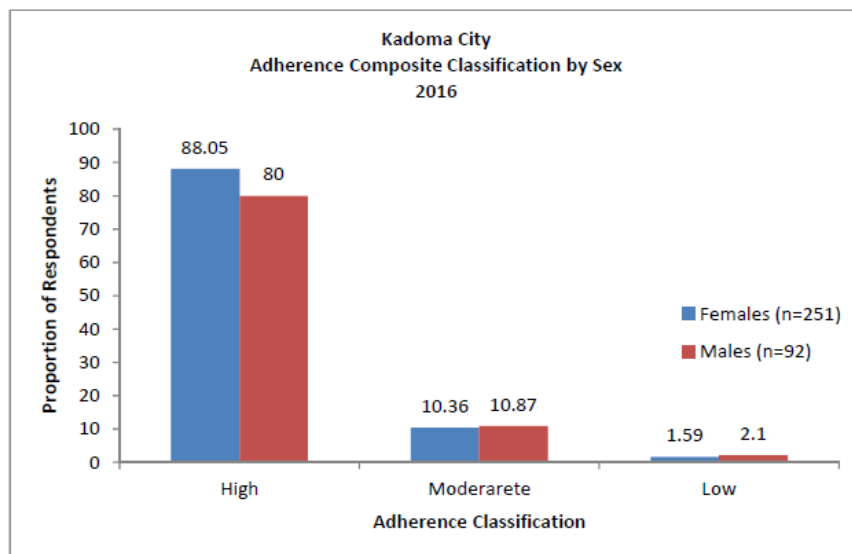
Figure 1. Kadoma city composite adherence by sex
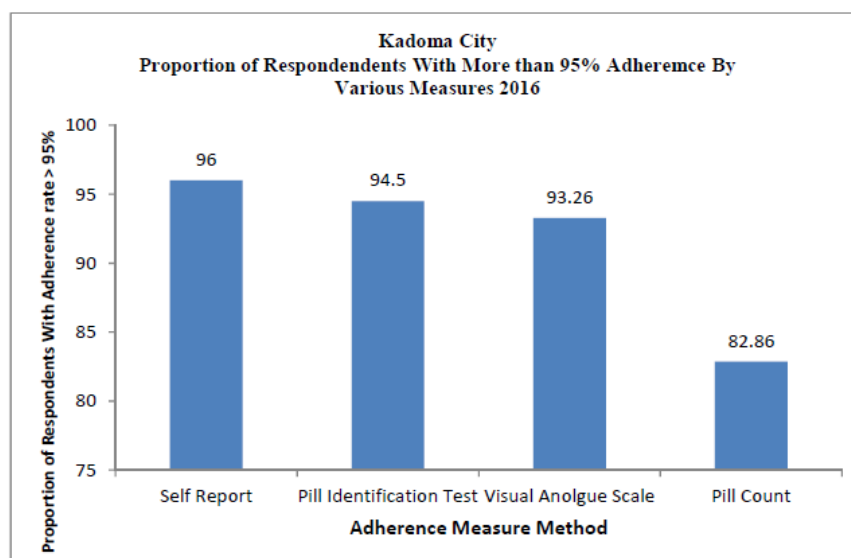
Figure 2. Proportion of respondents with above 95% adherence by various adherence methods

Figure 3. Pill count adherence band by sex kadoma 2016
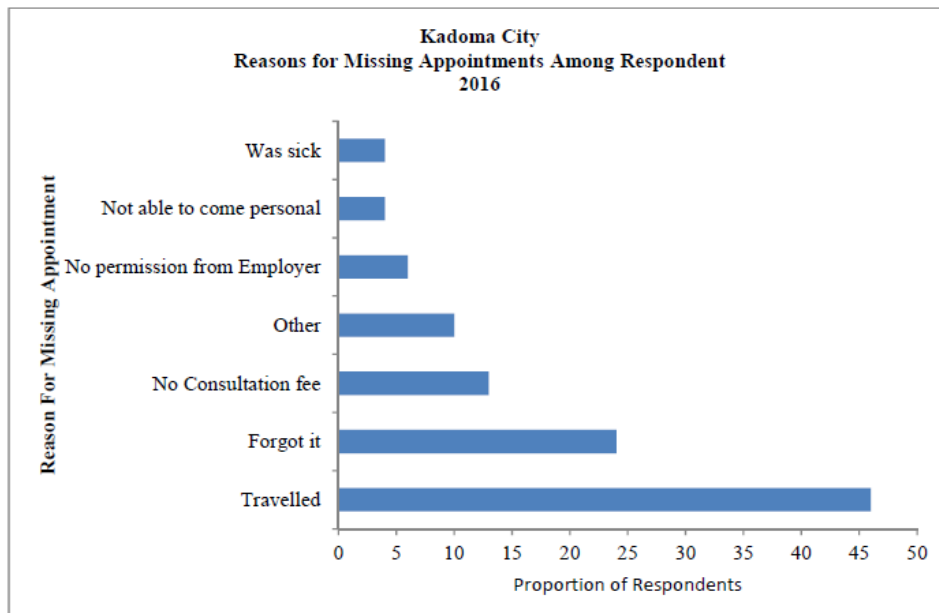
Figure 4. Reasons for missing appointment by sex kadoma 2016

Table 1. Assessment of composite adherence

Adherence Measurement Tool	Overall Adherence Classification		
	High	**Moderate**	**Low**
Self-Report	No to all questions	Yes to 1 question	Yes, to2 or more questions
Visual Analogue Scale	95% or more	75%-94%	Less than 75%
Pill Identification test	Dose time and instructions	Dose and Time	Dose only or confused
Pill Count	95% or more	75%-94%	Less than 75% or Greater than 100%

Table 2. Bivariate analysis socio-demographic variables and adherence to art kadoma 2016

Variable		Adherence		*OR*	*95% CI*	*p-value*
		Yes	No			
Age above 50 years	Yes	72	39	1.09	0.7-1.68	0.69
	No	259	153			
Married	Yes	161	105	0.8	0.5-1.1	0.32
	No	163	89			
Religion: Apostolic	Yes	70	45	0.91	0.59-1.39	0.67
	No	254	149			
Catholic	Yes	37	42	0.46	0.28-0.75	0.001
	No	287	152			
Muslim	Yes	9	4	1.35	0.41-4.46	0.61
	No	315	190			
Protestant	Yes	57	23	1.58	0.94-2.6	0.08
	No	267	171			
Pentecostal	Yes	123	60	1.36	0.93-1.99	0.1
	No	201	134			
Tradition	Yes	8	11	0.42	0.16-1.06	0.06
	No	316	183			
Education above Ordinary Level	Yes	185	101	1.2	0.85-1.75	0.26
	No	139	93			
Employed	Yes	206	89	2.0	1.43-2.95	0.0008
	No	118	105			
Household Income above US$200	Yes	59	24	1.57	0.94-2.6	0.07
	No	265	170			
Member of a Support Group	Yes	31	9	2.1	1.01-4.7	0.04
	No	291	185			
Household budget changes due to being on ART	Yes	54	36	0.8	0.5-1.39	0.58
	No	270	158			
Time to HIV Treatment Centre<30 minutes	Yes	54	18	1.9	1.1-3.4	0.01
	No	270	176			
Transport Cost < US$1	Yes	14	5	1.7	0.6-4.8	0.3
	No	310	189			
Loss of income when coming for ART	Yes	22	16	0.81	0.41-1.56	0.53
	No	302	178			
Satisfied with way people values skills and abilities	Yes	321	190	2.2	0.49-10.1	0.27
	No	3	4			
Getting Financial support from family	Yes	33	13	1.5	0.80-3.0	0.17
	No	291	181			

Table 3. Health system related factors and adherence kadoma 2016

Variables		Adherence		OR	95%C.I.	p-value
		Yes	No			
Satisfied with appointment	Yes	310	185	1.03	0.41-2.5	0.94
	No	13	8			
Collects medicine on own	Yes	288	121	1.07	0.6-1.87	0.79
	No	36	23			
Ever missed appointment	Yes	64	41	0.91	0.59-1.42	0.705
	No	260	153			
Travelled	Yes	24	22	0.62	0.34-1.1	0.127

		No	300	172			
Instance you did not get medication		Yes	10	8	0.74	0.2-1.9	0.53
		No	314	186			
Get individual health education		Yes	288	163	1.5	0.90-2.5	0.11
		No	36	31			

Table 4. Therapy related skipping medication and adherence to ART

		Adherence		OR	95% C.I.	*p-value*
		Yes	No			
Reported missing ART in the week preceding the study	Yes	10	17	0.3	0.14-0.73	0.004
	No	314	177			
Reported missing ART at any one time after initiation.	Yes	26	23	0.6	0.35-1.1	0.14
	No	298	171			
Reason for Missing Medication: Too busy	Yes	4	5	0.47	0.12-1.78	0.28
	No	320	189			
Reason for Missing Medication: Away from Home	Yes	1	5	0.11	0.01-1.00	0.09
	No	323	189			
Reason for Missing Medication: Felt drug toxic /harmful	Yes	1	1	0.59	0.03-9.6	0.71
	No	323	193			

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