Socio-Demographic Factors Associated with Medication Adherence Among People Living with HIV in Kumasi Metropolis, Ghana.

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**SOCIO-DEMOGRAPHIC FACTORS ASSOCIATED WITH MEDICATION
ADHERENCE AMONG PEOPLE LIVING WITH HIV IN KUMASI METROPOLIS,
GHANA.**

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Abstract

Background

Medication adherence plays a great role in the survival of people living with HIV globally. In Ghana, there is a considerable decline in the prevalence rate of HIV/AIDS, however, the number of people on antiretroviral therapy keeps adding up. We assessed the socio-demographic factors associated with medication adherence among people living with HIV in Kumasi Metropolis, Ghana.

Method

A quantitative study using descriptive, and analytical cross-sectional study design was carried out among 420 people living with HIV (PLHIV) accessing healthcare at Kumasi South Regional Hospital. A structured questionnaire was used to gather information on medication adherence and socio-demographic factors influencing medication adherence. Analyses of the data were done using Excel version 2013 and Stata version 14.2. The descriptive data were presented using frequencies and percentages. Univariate and multivariate analyses were performed to establish the association between socio-demographic factors and adherence to medication among people living with HIV. Statistical significance for all testing was set as $p < 0.05$.

Results

About 69 out of 100 PLHIV accessing healthcare at Kumasi South Regional Hospital adhered to their medication. Socio-demographic factors such as age and monthly disposable income were established to be influencing medication adherence among PLHIV. For instance, PLHIV aged more than 41 (aOR=12.67; CI= 1.36-118.11) were more likely to adhere to medication as

compared to those aged 18-23. Also, PLHIV who earned less than GH¢500 (aOR=2.18; CI= 1.05-4.50) were more likely to adhere to medication as compared to those who earned more than GH¢1,000.

Conclusion

Majority of PLHIV adhered to their medication. Therefore, policy makers such as Ghana AIDS Commission, Ministry of Health, Ghana Health Service, and National AIDS Control Programme should consider factors such as socio-demographic factors when designing and implementing programmes on medication adherence among PLHIV.

Keywords: Antiretroviral therapy, HIV/AIDS, Medication adherence, People living with HIV, Public health

Background

Medication adherence plays a great role in the survival of people living with HIV (PLHIV) globally as HIV/AIDS continues to be an issue of public health importance. HIV/AIDS was discovered in 1981 which has claimed a lot of lives to date¹. In 2013, it was estimated that HIV affected about 78 million people with about 39 million dying of the disease since it was discovered². It was also estimated that about 71% of the 34.7 million PLHIV globally reside in sub-Saharan Africa³. 1.8 million people were newly diagnosed in 2017 out of the 36.9 million PLHIV^{1,4} with about 53% in sub-Saharan Africa. There is a higher prevalence rate of HIV within the sub-Saharan Africa region than the global average of 0.8%⁵. In Ghana, ever since HIV was identified in 1986³, there has been a considerable decline in the prevalence rate, however, the number of people on antiretroviral therapy (ART) keeps adding up⁶. Sixty-two percent out of 270,000 PLHIV are females and thirty-eight percent are males in Ghana³. According to the 2014 Ghana Demographic and Health Survey, HIV prevalence in Ghana was 2.0%, having decreased marginally from 2.2% in 2006⁷.

Since, medication adherence has been the focus of many researchers, HIV/AIDS is becoming a manageable chronic condition. The National AIDS Control Programme (NACP) of Ghana has introduced maximization of adherence to medication among some of the strategies in the fight against the disease⁸. The definition of the word 'adherence' is very complex which includes adherence to nutritional requirements, scheduled visits (time), and dosage (medication)⁹. Medication adherence is defined as taking all medication at the appropriate time with the appropriate dosage as prescribed by a healthcare provider^{10,11}. The arrival of ART has improved rates of mortality and morbidity internationally¹². ART is introduced immediately after a person is infected with the disease¹³. Evidence has shown that ART contributes to the delay of the

progression of HIV infection to AIDS which eventually slows the spread of the disease across communities^{14,15}. Medication adherence is paramount for effective management of HIV when it is at 100%¹⁶. A study by Bezabhe et al.¹⁷ showed that PLHIV on ART should be instructed to attain $\geq 95\%$ adherence to medication. In addition to the maximal viral suppression when medication adherence is $\geq 95\%$ ^{18,19}, there is a reduction in the rate of opportunistic infections²⁰. Non-adherence to medication is associated with the development of HIV drug resistance strains, recurrent hospitalization and eventually death^{13,20,21,22,23}.

Although several studies have been conducted in Asia²⁴, sub-Saharan Africa^{24,25} and in specific countries, China²⁶ and Botswana²⁷ with regards to medication adherence among PLHIV, results indicate that, there have been variations in medication adherence. This suggests that there are various national and regional disparities as far as adherence is concerned. Therefore, findings of those studies conducted may not be applicable in the context of Ashanti region, Ghana. Previous studies on adherence to medication in Ghana accounted adherence to medication rate at 67% in 2015³, 73% in 2018²⁸, 62.2% in 2013²⁹, 51.4% in 2014³⁰ and 75% in 2017³¹. These studies were conducted in Western region, Central region, Upper West region, Volta region and Eastern region of Ghana respectively. However, these rates hide many geographical disparities due to cultural specificities which may differ across geographical zones of the country. Evidence from the previous studies reviewed indicates that none of such studies has been conducted in Kumasi Metropolis in the Ashanti Region, the most populated region in Ghana. It is against this background that this study sought to assess the socio-demographic factors associated with medication adherence among PLHIV accessing healthcare at Kumasi South Regional Hospital. The outcome of the study will serve as a lesson for the hospital, the Region, and the Country as a whole.

110

111 **Methods**

112 **Study design and setting**

113 This study employed a quantitative study using analytical and descriptive cross-sectional study
114 design. With a cross-sectional study design, the researcher measures the outcome and the exposure
115 in the study participants at the same time³² . Data was collected from the month of October to
116 December, 2020. A structured questionnaire was used to collect data. Questionnaires were
117 administered by trained health workers to collect information on medication adherence and socio-
118 demographic factors influencing adherence to medication among PLHIV. The questions on
119 medication adherence were asked in the local dialect (Twi) which was then translated into English.
120 Prior to the commencement of the study, about twenty (20) questionnaires were piloted at Suntreso
121 Government Hospital to determine the validity and reliability of the data collection tool.

122 This study was conducted at Kumasi South Hospital, the regional hospital in the Ashanti Region
123 of Ghana. This regional hospital is one of the hospitals in the region that provides antiretroviral
124 therapy to PLHIV in Ghana. The hospital is at the center of the region, it is raised 250 and 300
125 meters above sea level and it is settled between longitude 1.30⁰ West and latitude 6.35⁰ North and
126 6.40⁰ South⁷ . Kumasi South Regional Hospital was constructed in 1976, as an urban health center
127 and was later changed to be the Kumasi South Regional Hospital. In 2002, the hospital was uprated
128 to the status of a regional hospital. The regional hospital, a national health insurance scheme
129 accredited facility has 140-bed capacity. Kumasi South Regional Hospital is located in Chirapatre,
130 within the Kumasi Metropolis. About 30.3% of the population in Kumasi Metropolis is in Asokwa
131 where Kumasi South Hospital is located⁷ .

Kumasi South Hospital is surrounded by seventeen health facilities, among these facilities; CHAG and government own one facility each and the remaining are privately owned. In 2017, HIV/AIDS-related condition was recorded among top ten OPD morbidities. The hospital provides STI, VCT, and ART services for PLHIV.

Population and sampling

The study population was PLHIV accessing healthcare at Kumasi South Hospital, Ghana. The total population of PLHIV accessing healthcare at Kumasi South Hospital as at the time of the study was 4,235. A sample size of 420 PLHIV on ART completed the survey that gave a response rate of 100% (420/420). A simple random sampling method using the lottery method was employed to sample the respondents. With the lottery method, numbers 0 and 1 were written on each sheet of paper totaling 840, and folded into a polythene bag. Based on the average daily attendance at the clinic, eligible participants were allowed to randomly pick one of the folded papers in the polythene bag during the period of data collection. Eligible participants who picked a sheet of paper with 1 written on the sheet were selected to take part in the study. This act was repeated continuously until the required sample size was attained.

Definition of variables

Outcome variable

The outcome variable for the study was medication adherence among PLHIV. This variable was derived from asking respondents “Did [NAME] adhere to medication?”. Responses to this question were ‘Yes’ and ‘No’. The response was coded as ‘No’ =0 and ‘Yes’=1.

153

154 ***Independent variables***

155 The study included nine (9) independent variables in our estimations. The variables were age,
156 gender, marital status, ethnicity, employment status, level of education, place of residence,
157 religious affiliation, and disposable monthly income. None of these variables was selected a priori,
158 instead, the selection was based on conclusions drawn from previous studies on medication
159 adherence as well as their theoretical and conceptual bearings on HIV/AIDS^{26,28} .

160

161 **Statistical analyses**

162 We employed both descriptive and inferential analytical approaches. Questionnaires were checked
163 for completeness and internal errors during data collection. Questionnaires were numbered, sorted,
164 and kept in files. Analyses of the data were done using Excel version 2013 and Stata version 14.2.
165 The descriptive data were presented using frequencies and percentages where necessary.
166 Univariate and multivariate analyses were performed to establish any socio-demographic factors
167 of PLHIV influencing medication adherence. Statistical significance for all testing was set as
168 $p < 0.05$. The analysis was done in three steps. Firstly, medication adherence among PLHIV in
169 Ghana was graphically computed. The second step was the computation of the socio-demographic
170 information of PLHIV in Ghana. Next, a binary logistic regression analysis was carried out to
171 assess the level of medication adherence (dependent variable) among PLHIV in Ghana and socio-
172 demographic factors (independent variables) of PLHIV (see Table 2). Socio-demographic factors
173 of PLHIV that showed statistical significance in the univariate regression analysis were further
174 analysed using multivariate logistic regression.

Results

Figure 1 shows the medication adherence among PLHIV in Ghana. The level of medication adherence among PLHIV accessing healthcare at Kumasi South Hospital in Ghana was 69.05%.

Figure 1: Medication adherence among PLHIV

Socio-demographic information of PLHIV in Kumasi Metropolis, Ghana

Table 1 displays the socio-demographic information of PLHIV. Majority of PLHIV (79.76%) were females while the remaining (20.24%) were males. Also, most of the PLHIV (64.05%) were above the age of 41 with a mean age of 45 years ranging from 18 to 80 years. A higher proportion of PLHIV with JHS/Middle education (62.38%) adhered to medication. Furthermore, the Akan (72.62%), PLHIV residing in urban centers (67.62%), Christians (86.19%), those who were

187 working (81.19%), and those who had less than GHC500 as their disposable income at the end of
 188 the month (75.24%) had the highest proportion of medication adherence.

189 **Table 1. Socio-demographic information of PLHIV**

Variable	Categories	Frequency(n=420)	Percent (%)
Age	18 – 23	6	1.43%
	24 – 29	31	7.38%
	30 – 35	51	12.14%
	36 – 41	63	15.00%
	Above 41	269	64.05%
Gender	Male	85	20.24%
	Female	335	79.76%
Marital Status	Married	177	42.14%
	Single	115	27.38%
	Divorced	54	12.86%
	Widowed	74	17.62%
Ethnicity	Akan	305	72.62%
	Ewe	23	5.48%
	Ga	7	1.67%
	North	85	20.24%
Employment status	Yes	341	81.19%
	No	79	18.81%
Level of education	None	85	20.24%
	Primary	45	10.71%
	JHS/Middle	262	62.38
	Tertiary	28	6.67%
Place of residence	Urban	284	67.62%
	Rural	136	32.38%

Religious Affiliation	Christianity	362	86.19%
	Islamic	47	11.19%
	Traditional	11	2.62%
Disposable income	< 500	316	75.24%
	500 – 1000	62	14.76%
	>1000	42	10.00%

Socio-demographic factors associated with medication adherence among PLHIV in Kumasi Metropolis, Ghana

Table 2 presents the socio-demographic factors associated with medication adherence among PLHIV in Ghana. With the univariate and multivariate regression analysis, the results showed that socio-demographic factors such as age and disposable monthly income were identified to be influencing medication adherence among PLHIV as detailed in Table 2. For instance, respondents who received less than GHC500 (aOR=2.16; CI= 1.05 – 4.50) were more likely to adhere to their medication compared with those who received more than GHC1,000 as their monthly disposable income. Also, PLHIV aged above 41 years (aOR=12.67; CI= 1.36 – 118.11) were more likely were to adhere to their medication compared to those between the ages of 18 – 23.

Table 2 Socio-demographic factors associated with medication adherence among PLHIV

Variables	Crude Odds Ratio	95% Confidence Interval	p-value	Adjusted Odds Ratio	95% Confidence Interval	p-value
Gender	1.10	0.83	1.44	0.52		
Male	Ref			Ref		

	Female				1.15	0.65	2.04	0.63
Age		1.3	1.61	0.01*				
1.09								
	18 – 23	Ref			Ref			
	24 – 29				6.76	0.67	67.95	0.10
	30 – 35				7.80	0.79	76.61	0.08
	36 – 41				9.16	0.94	89.14	0.06
	> 41				12.67	1.36	118.11	0.03*
Marital Status		0.92	0.77	1.09	0.34			
	Married				1.46	0.70	3.04	0.31
	Single				1.04	0.48	2.27	0.92
	Divorced	Ref			Ref			
	Widowed				0.89	0.40	1.97	0.77
Level of education			0.76	1.10	0.33			
0.91								
	None	Ref			Ref			
	Primary				0.93	0.40	2.17	0.87
	JHS/Middle				0.84	0.47	1.52	0.57
	Tertiary				0.47	0.18	1.26	0.13
Religion		1.48	0.76	2.88	0.25			
	Christianity				1.37	0.37	5.08	0.64
	Islamic				1.10	0.44	9.15	0.37
	Traditional	Ref			Ref			
Place of residence		0.97	0.61	1.54	0.89			
	Urban				1.01	0.62	1.62	0.98
	Rural	Ref			Ref			
Tribe		1.02	0.84	1.25	0.83			
	Akan				0.75	0.13	4.45	0.75
	Ewe				0.32	0.45	2.28	0.26
	Ga	Ref			Ref			
	North				0.80	0.13	5.11	0.82
Employment status		1.34	0.77	2.32	0.30			
	Yes				1.34	0.74	2.43	0.33
	No	Ref			Ref			
Income		1.58	1.01	2.46	0.04*			
	< 500				2.18	1.05	4.50	0.04*
	500 – 1000				2.31	0.96	2.33	0.06
	> 1000	Ref			Ref			

*p < 0.05; OR significant at 95% CI; OR (95% CI), unadjusted odds ratio from simple logistic regression with accompanying 95% confidence interval; aOR adjusted odds ratio determined using multiple regression.

211

212 **Discussion**

213 In this current study, we investigated the association between socio-demographic factors and
214 medication adherence among PLHIV in Kumasi Metropolis, Ghana. The study found that
215 medication adherence among PLHIV was 69.05%. The level of medication adherence found in
216 this study is however higher than that of previous studies conducted in Volta region of Ghana³⁰ ,
217 Upper West region of Ghana²⁹ , Western region of Ghana⁵ that found 51.4%, 62.2%, and 67%
218 respectively. Also, previous studies conducted in Central region of Ghana²⁸ and Eastern region of
219 Ghana³¹ recorded higher rate of medication adherence to be 73% and 75% respectively.
220 Medication adherence rates in sub-Saharan Africa are quite inconstant and often pathetic and a
221 large number of patients are likely to progress to the AIDS stage when adherence is suboptimal³³
222 .

223 Understanding the socio-demographic factors of medication adherence among PLHIV could help
224 in the successful implementation of medication adherence intervention programmes²⁸. The study
225 showed that age and monthly disposable income were significantly associated with medication
226 adherence among PLHIV. Specifically, PLHIV aged above 41 years were found to be more likely
227 to adhere to medication in this study. This finding is consistent with previous studies in Nigeria^{34,35}
228 and India¹⁶ . Glass et al.³⁵ and Falang, Akubaba and Jimam³⁴ demonstrated an association between
229 medication adherence and improved outcomes increasing with age. The plausible reason for this
230 finding could be due to the fact that older people are more likely to have prior experience taking
231 medication for age-related diseases and the associated lifestyle adjustments required are often less
232 burdensome for older people^{16,36} .

The study also found that PLHIV who earned GHC500 as their monthly disposable income were more likely to adhere to medication to those who earn GHC1000. The finding disagrees with the finding of previous study in China²⁶. Yu et al.²⁶ demonstrated that PLHIV with high monthly income adhere to their medication as they may have the financial capacity to afford any cost related to their health. PLHIV with high monthly income may be more likely to be employed and they spend much time at work influencing negatively with the consistent use of medication. However, the plausible reason for this study finding could be that PLHIV with low monthly income may not be actively employed and they may be extra careful about their health and in so doing, they will do their best to adhere to medication as prescribed by healthcare providers to prolong their lives.

Strengths and limitations

It is important to explain the findings of the present study in respect to certain strengths and limitations of the study. The main strength of the study is its use of first-hand information from PLHIV in Ghana, which enables us to generalize the findings of the study to all PLHIV in Ghana. The methodology and data collection technique for the survey featured standard data collection methods, including the use of experienced researchers which resulted in a high response rate. Moreover, in the study, we used advanced statistical tools for the analysis. This ensured a vigorous analysis of the data. These strengths do not make the study immune to limitations. It must be acknowledged that the cross-sectional study design adopted prevents us from drawing causal relations between the variables studied. The study was also carried out in one hospital, however this is the regional hospital where most of the PLHIV access healthcare. This will one way or the other affect the generalization of the study in the country. The outcome variable was also measured with a single item.

256 **Conclusion**

257 The study has revealed that about (69) sixty-nine out of every (100) hundred PLHIV accessing
258 healthcare at Kumasi South Hospital in Kumasi Metropolis in the Ashanti Region of Ghana
259 adhered to their medication. Socio-demographic factors associated with medication adherence
260 were age, and disposable income. In further maximizing the medication adherence rate among
261 PLHIV in Ghana, policy makers such as Ghana AIDS Commission, Ministry of Health, Ghana
262 Health Service, and National AIDS Control Programme should consider factors such as socio-
263 demographic factors when designing and implementing programmes on medication adherence
264 among PLHIV. There is the need to conduct a qualitative study to gain deeper understanding of
265 how the identified factors affect medication adherence among PLHIV.

266 **List of abbreviations**

267	AIDS	Acquired Immune Deficiency Syndrome
268	ART	Antiretroviral Therapy
269	HIV	Human Immunodeficiency Virus
270	NACP	National AIDS Control Programme
271	PLHIV	People Living with HIV
272	STI	Sexually Transmitted Disease
273	UNAIDS	United Nations Joint Programme on HIV/AIDS
274	VCT	Voluntary Counselling and Testing for HIV

275 WHO World Health Organization

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381 **Declaration**

382 **Ethics approval and informed consent to participate**

383 Ethical clearance was first sought from the Committee on Human Research, Publications and
384 Ethics (CHRPE), Kwame Nkrumah University of Science and Technology as well as permission
385 was sought from the management of the regional hospital. All participants and subjects involved
386 were given an informed consent form after a verbal and written explanation of the methods, and
387 risks involved using an information sheet. Those who agreed to be part of this study were made
388 either to sign or thumbprint an informed consent form. Participants with none or primary
389 education, an informed consent was sought from their legal guardians of the participants. However,
390 all methods that was carried out in the study were in line with the relevant guidelines and
391 regulations of human experiment study.

392 **Consent for publication**

393 All participants were informed of the publication of the results of the study in peer-reviewed
394 journal.

395

396 **Availability of data and materials**

397 The datasets generated during the current study are not publicly available due to the confidentiality
398 of the participants' information but are available from the corresponding author on reasonable
399 request.

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Authors' contribution

CA, KAM, BOA, AS, AYM and AWT contributed to the conceptualization, the design of the study. CA, AWT, BOA, AS, and AYM contributed to the acquisition of the data, data analysis, and the interpretation of the data. CA and KAM drafted the manuscript and made all revisions. KAM, BOA and AS provided critical intellectual input in the manuscript drafting and revising process. All authors approved the final manuscript and take public responsibility for the content of the present work. All authors agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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424 **Competing interests**

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426 The authors declare that they have no competing interests.

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Figures

Figure 1

Medication adherence among PLHIV