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THE NON-UTILISATION OF CONVENTIONAL HEALTH FACILITIES AND FACTORS LEADING TO HERBAL MEDICINE USE IN SOUTH WEST NIGERIA

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ABSTRACT

Objectives

To examine the prevalence, determinants and the knowledge about use of herbal medicine and reasons for non-hospital utilisation within Ekiti state south west Nigeria.

Design

Cross-sectional study

Setting

Paper based face to face survey

Participants

A representative sample (n=1600) of adults (18 years or above) currently living in Ekiti state south west Nigeria for at least two years, at the time of study.

Results

The majority of the respondents (85% n=1265) have used herbal medicines in last two years. Across economic classes, the highest use (88.3%) was amongst the middle income class (p<0.001). This suggests that poverty was not a major factor in the use of herbal medicines considering the income inequality. The use was commonest among respondents with a primary level of education (91.4%, p=0.001); and use among 100% (p=0.009) of respondents practicing African traditional religion; farmers and those 70 years of age and above. Our study also reveals most males (p<0.001) used herbal medicines (89.9%) than females (78.6%). The effectiveness of herbal medicines was a major reason (39.6%) followed by affordability (31.9%) on why they were used. Though the majority of the respondents (90%) in this study know the difference between certified and uncertified herbal medicines, uncertified ones were the most commonly used (37.3%) in the population.

Conclusion

Although there is a cultural history of herbal medicine use within the study population, their choices of use were mostly based on the effectiveness while other determinants such as income were not found to be a major factor. In addition, uncertified forms were chosen over certified HMs, even though a large majority of respondents were aware of the differences and its likely consequences. This study thus highlights the need for further investment in public health awareness and conventional health care system.

STRENGTHS AND LIMITATIONS OF THE STUDY

- A mixed method used in this research catered for the peculiarity of the study population, hence increasing inclusivity.
- Most towns were visited during the day when some farmers may have been absent leading to a low number of participants from this group.
- This study found that the timing of questionnaire administration is an important consideration to make.
- There were more incomplete entries in the self-administered questionnaires compared to the interview administered ones.

BACKGROUND

The provision of health care falls mainly into the orthodox and non- orthodox systems. The non-conventional health care system includes Complementary and Alternative Medicine of which herbal medicine is an important component[1]. Herbal medicines are defined as materials or preparations obtained from one or more plants; raw or processed parts[2], containing substances with therapeutic characteristics and other benefits to human health. A large percentage of the world's population depend on herbal medicines in both developing (80%)[3, 4] and developed countries[5, 6].

Recent studies have reported the high use of herbal medicines in Nigeria[7-11]. A study conducted in one of the local government areas (Ekiti state) reported 74.3% of the respondents used herbal medicine in the treatment of malaria[7]. In another study, in urban Lagos Nigeria, 66.8% (n=388 respondents) used herbal medicine for management of various ailments[11]. However, the prevalence of herbal medicines use within the larger population in Ekiti state remains unknown, although it's use is generally believed to be widespread. Vendors of various herbal medicines are almost now ubiquitous in Nigeria, trading in traffic gridlocks, highways, bus stops/ stations, festivals and even in some conventional health facilities. Herbal medicines used are either locally made, refined, imported, certified or uncertified by the government. The National Agency for Food and Drug Administration and Control (NAFDAC) in Nigeria is the government agency responsible for the certification, registration and regulation of herbal medicines. Extemporaneous herbal medicines (herbs or mixture of herbs given on a one-to one basis) are not included in the class of herbal medicines[12]. However some of these products have now been commercialised raising concerns

about safety as much as the uncertified herbal medicine types, therefore these need to be included in the NAFDAC registration and regulation process.

Patronage of conventional health facilities is an important aspect of health care delivery system in most communities. The conventional and traditional medical system provides health care services in Ekiti state, coordinated by the State Ministry of Health[13]. The increased use of herbal medicines has been attributed to challenges relating to the availability and affordability of conventional medicine. Furthermore, of the sixteen local government areas in Ekiti state, only two areas (Irepodun/Ifelodun and Ekiti East) have higher number of their population utilising their health facilities optimally[14]. The use of herbal medicine is likely a combination of different factors within the study population, therefore this study investigated the prevalence and determinant of herbal medicines use and the reasons for non-utilisation of conventional health facilities in Ekiti state, Nigeria.

METHODS

Study design

This study was conducted in Ekiti state, southwest Nigeria with a population of 2,384,212[15], which include over 127 large and small towns[16]. A semi-structured survey was conducted to examine herbal medicine use. Participants were 18 years and above and those who lived in Ekiti State at the time of study or have lived in the state for at least 2 years.

The minimum sample size required for this study was 1067 participants, assuming 50% of the population use herbal medicine[17] as calculated using equation 1:

Equation 1:

$$n = \frac{z^2 \times pq}{d^2}$$

Where n = required minimum sample size in the study

z = Z-score or standard deviation

p = proportion of people who use herbal medicine in the study area

q = 1-p

d = the acceptable error level

The calculation of the sample size was based on acceptable error level of 3% (0.03) and a confidence interval of 95% corresponding to a Z-score of 1.96. These are within social science research recommended values for standard deviation and error levels[18]. The proportion of people using herbal medicine in Ekiti state is unknown therefore maximum heterogeneity was assumed (i.e. a 50/50 split in users and non-user) with p=0.5.

Sampling Method

The study participants were selected using a multistage sampling technique. The first stage involved stratifying Ekiti state into the existing sixteen local government areas (LGA). This followed random sampling to select two towns in each local government (total of 32 towns - second stage). Then residential quarters in each town were selected randomly, making a total of 160 residential quarters (third stage). Systemic random sampling was used in the fourth stage in selecting 10 household from each of the selected residential quarters and one participant from each household made up the final sample population of 1600. Hence a cross sectional study was administered to 1600 participants which was above the required minimum sample size as determined earlier and were representative of the Ekiti state population[15]. A flow diagram of the sampling method is shown is supplementary information.

Administration and measurement of research instrument

The questionnaire used in this study was adapted from previous studies on the use of herbal medicines[9, 10, 19] and validated in a pilot study. They were interviewer-administered or self-administered depending on the ability or choice of the participant. Each self-administered questionnaire was completed in about 10 minutes and the interview-administered in about 20 minutes. The questionnaire was used to obtain both qualitative and quantitative data with open and closed-ended questions respectively. Interpretation of the questionnaire in the local dialect was offered when required.

The close-ended questions were used to collect the socio-demographic data of the participants which included their age range, gender, level of education, religion, occupation and annual income. These were also used to assess the knowledge, perception of safety and effectiveness and use of herbal medicines. The open-ended questions were employed to identify reasons for herbal medicine preference and non-orthodox preference. These also included adverse effects experienced and how they were managed.

Data analysis

Manual representational thematic analysis was used to analyse textual data obtained from open-ended questions. Afterwards, inferential and descriptive statistical analysis was carried out using SPSS (version 20.0). Comparison of socio-demographic factors and the use or non-use of herbal medicine was carried out using inferential statistics. A Pearson Chi-square test was used to examine the impact of independent variables (e.g. age, gender, religion, level of education, occupation, annual income) on various responses (such use of HM and perception of safety) in the study and $p \leq 0.05$ at 95 % confidence interval was considered to be statistically significant.

Ethics

Ethics approval was obtained from the Faculty of Science and Technology, Anglia Ruskin University and Ekiti State Ministry of Health in Ekiti State. Participants were provided with the participant information sheet and the content explained in English or local dialect. Informed consent was obtained from the participants who volunteered to be part of the study.

Public patient involvement in research

The public have participated in this study by completing the survey. The pilot study was carried out to determine its feasibility on a larger scale. It was observed that some of the questions on herbal medicines use were ambiguous. As a result, the questions were rephrased to focus on the use of herbal medicines within the last two years. Research questions were developed from prior knowledge and experience of the researchers. Participants were not asked to assess the burden of the intervention and time required to participate in the research. Multistage sampling method was used for participant's recruitment.

RESULTS

A total of 984 questionnaires were self-administered while 616 questionnaires were interview based. 1265 respondents formed the final sample size for the study due to exclusion of 335 respondent's entry. 263 self-administered and 72 interview based questionnaires were excluded due to being incomplete.

Socio-demographic characteristics of respondents

There were more male respondents (56.4%) than female respondents (43.6%) in the study. Majority of the respondents (43.2%) were within the age group of 30-49 years, Christians (69.5%) and self-employed (39.6%). In addition, the majority of the respondents (82%) were within the low income group as shown in Table 1.

Table 1: Socio-demographic background of the respondents

	Frequency	%
Age (years)		
18-29	322	25.5
30-49	547	43.2
50-69	358	28.3
70 and above	38	3.0
Gender		
Male	713	56.4
Female	552	43.6
Level of Education		
No formal education	191	15.1
Primary	245	19.4
Secondary	340	26.9
Tertiary	489	38.7
Religion		
Christianity	879	69.5
Islam	346	27.4
African traditional	40	3.2
Occupation		
Student	84	6.6
Civil servant	491	38.8
Farmer	76	6.0
Self employed	501	39.6
Others	113	8.9
Annual Income		
Low (≤ ₦600,000)	1037	82.0
Middle (₦600,000 to ₦2.4M)	179	14.2
High (≥₦2.4M)	49	3.9

Knowledge and use of herbal medicines

Considering their knowledge and use of herbal medicines (HM), 90% of the respondents knew the difference between certified and uncertified HM while 85% had used them in the last two years, 53% using them more than ten times (Table 2). However over half of the respondents (57%) believed it is unsafe to take uncertified HM although 37% continued to take them while 32% took both certified and uncertified HM.

	Frequency	%
Knowledge of certified and uncertified HM		
Have knowledge	1139	90.0
Don't have knowledge	126	10.0
Use of HM in the last 2 years		
Used	1075	85.0
Non-use	190	15.0
Class of HM used		
Uncertified	401	37.3
Both	343	31.9
Certified	331	30.8
Frequency of HM use in last 2 years		
Once- twice	142	13.2
3-10 times	363	33.8
Over 10 times	570	53.0

Table 2: Knowledge and use of herbal medicines

Preference for herbal medicines use and hospital utilisation

The effectiveness was the reason (39.6%) respondents preferred herbal medicines and for those who did not use herbal medicine, risk to health was the major reason (61%). 45.2% of users blamed poor service delivery for non-hospital utilisation (Table 3).

Table 3: Reasons for HM use/non-use and non-hospital utilisation

	Frequency	%
Reasons for HM use		
Effectiveness	538	39.6
Affordability	434	31.9
Availability	292	21.5
Natural product	96	7.1
Reasons for non-HM use		
Risk to health	116	61.1
Personal preference	49	25.8
Poor knowledge of HM composition	25	13.2
Reasons for non-hospital utilisation		
Poor service delivery	534	45.2
High hospital cost	396	33.5
Unorthodox belief	141	11.9
Do visit the hospital	110	9.3

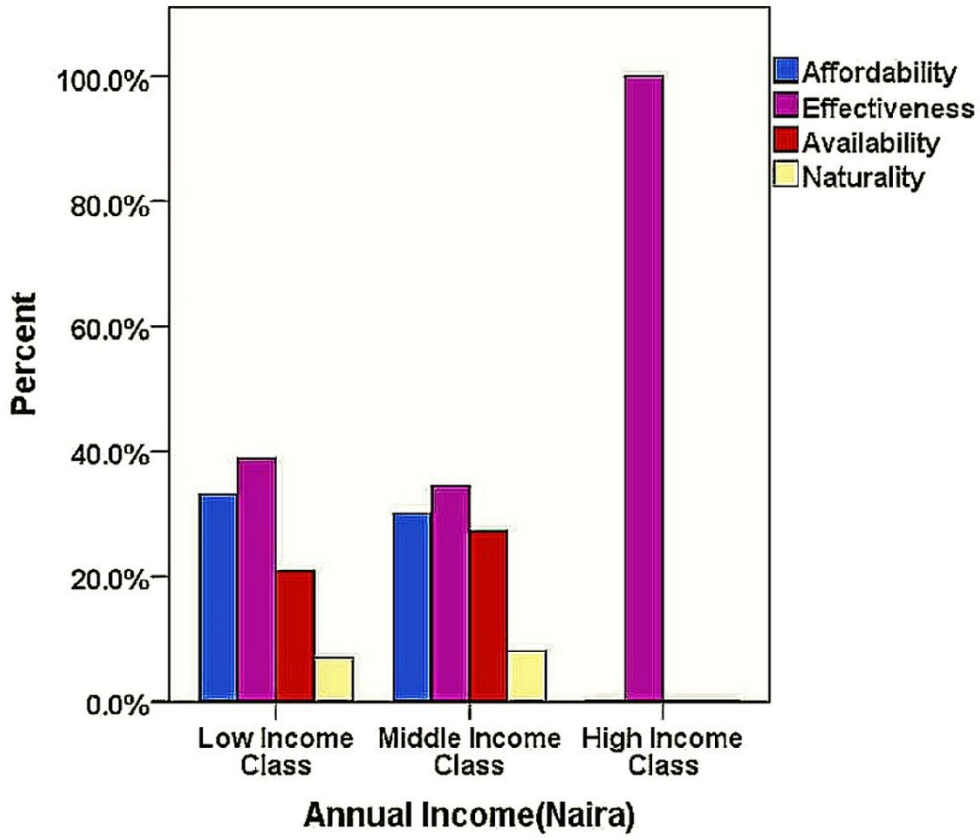

Figure 1: Chart showing reasons for herbal medicine use across economic background of respondents

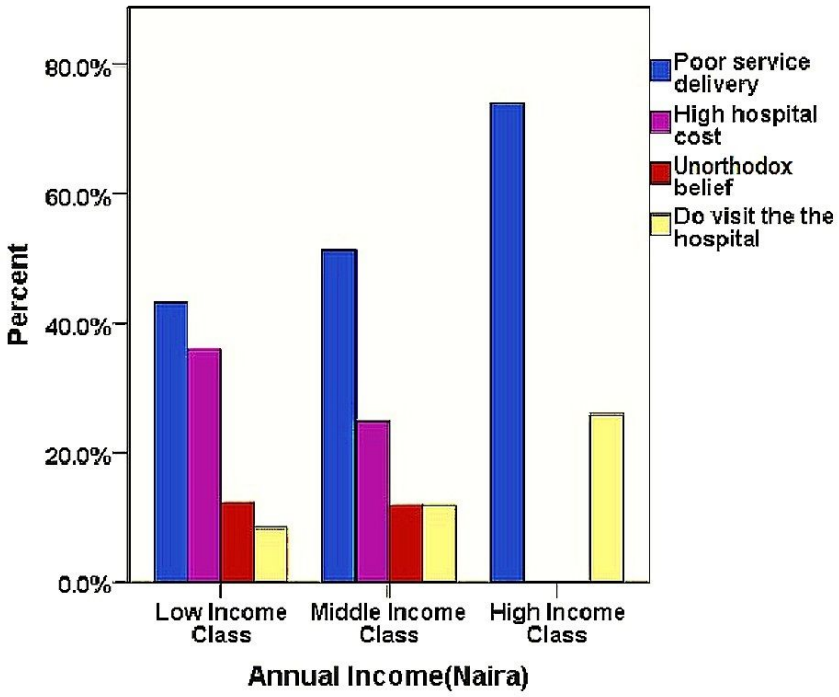

Figure 2: Chart showing reasons for non-hospital utilisation across economic background of the respondent

According to Figure 1, across all income classes, effectiveness of HM was the most attributed reason for their use. Likewise, poor service delivery was the most stated reason for non-utilisation of conventional health facilities (Figure 2).

Perception of safety and effectiveness

To explore perception of safety and effectiveness of herbal medicines, our survey results showed that the majority of the respondents (83.6%) perceived that HM are effective, while more than half (57.3%) believed they are unsafe (Table 4).

Table 4: Perception of HM safety and effectiveness and their adverse effect management

	Frequency	%
Perception of effectiveness		
Effective	899	83.6
Ineffective	176	16.4
Perception of safety		
Safe	464	42.7
Unsafe	623	57.3
Observed adverse effect		
None	566	52.7
Abdominal discomfort	150	14.0
Nausea and vomiting	201	18.7
Headache	82	7.6
Stooling	62	5.8
Generalised body weakness	14	1.3
Management of adverse effect		
Rest and becomes self-limiting	219	42.5
Visit the hospital	129	25.0
Take orthodox medicine	111	21.6
Take another HM	56	10.9

Most of the respondents (52.7%) who have used HM in the last two years did not experience any adverse effects while some others experienced abdominal discomfort (14%), nausea and vomiting (18.7%), headache (7.6%), stooling (5.8%) and generalised body weakness (1.3%). These adverse effects were managed differently; the majority (42.5%) took adequate rest while the effects self-limit, visited the hospital (25%), took orthodox medicine (21.6%) or took another HM (10.9%) see Table 4.

The data has been analysed using Pearson Chi square test to explore if there is a significant association among different factors studied such as age, sex, level of education, religion, annual income and occupation and the use of HM. Table 5 shows results indicating significant association between, age, sex, religion, annual income and occupation with HM using 95% confidence interval.

Table 5: Significance of background characteristics on usage of herbal medicines

Characteristics	Use of HM	Non-use of HM	Total (100%)	p value
Age (years)				
18-29	274 (85.1%)	48 (14.9%)	322	p=0.005*
30-49	474 (86.7%)	73 (13.3%)	547	χ^2=12.996
50-69	289 (80.7%)	69 (19.3%)	358	*df*=3
70 and >70	38 (100.0%)	0 (0.0%)	38	
Total	1075 (85.0%)	190 (15.0%)	1265	
Gender				
Male	641 (89.9%)	72 (10.1%)	713	p<0.001*
Female	434 (78.6%)	118 (21.4%)	552	χ^2=31.008
Total	1075 (85.0%)	190 (15.0%)	1265	*df* =1
Level of Education				
No formal education	169 (88.5%)	22 (11.5%)	191	p=0.001*
Primary	224 (91.4%)	21 (8.6%)	245	χ^2=16.670
Secondary	287 (84.4%)	53 (15.6%)	340	*df* = 3
Tertiary	395 (80.8%)	94 (19.2%)	489	
Total	1075 (85.0%)	190 (15.0%)	1265	
Religion				
Christianity	751 (85.4%)	128 (14.6%)	879	p=0.009*
Islam	284 (82.1%)	62 (17.9%)	346	χ^2=9.493
African traditional	40 (100.0%)	0 (0.0%)	40	*df*=2
Total	1075 (85.0%)	190(15.0%)	1265	
Annual Income				
Low income [a]	890 (85.8%)	147 (14.2%)	1037	p<0.001*
Middle income [b]	158 (88.3%)	21 (11.7%)	179	χ^2 =36.366
High income [c]	27 (55.1%)	22 (44.9%)	49	*df*=2
Total	1075 (85.0%)	190 (15.0%)	1265	
Occupation				
Student	69 (82.1%)	15 (17.9%)	84	p<0.001*
Civil servant	395(80.4%)	96 (19.6%)	491	χ^2=26.701
Farmer	76 (100.0%)	0 (0.0%)	76	*df*=4
Business	431(86.0%)	70 (14.0%)	501	
Others	104 (92.0%)	9 (8.0%)	113	
Total	1075 (85.0%)	190 (15.0%)	1265	

* significant association [a] (≤ ₦600,000) [b] (₦601,000 to ₦2.4M) [c] (≥₦2.4M)

DISCUSSION

The majority of the respondents (90%) in this research knew the difference between government certified and uncertified herbal medicines. The high level of knowledge about certified and uncertified HM may have been due to the success of various campaigns and public awareness programmes run by the National Agency for Food and Drug Administration Control in 2007 about fake and counterfeit drugs in Nigeria[20]. Participant's awareness is thus reflected in this study which is an indicator of the effectiveness of the government effort at sensitizing the public.

However, we found that the use of HM is still high in the study population with 85% of the respondents having used them in the last two years (Table 2). Similar studies in general HM use conducted in Lagos and the UK reported 66.8% and 64.2% of their respondents had used HM[11, 21]. Social, cultural, socioeconomic and political factors have been reported to influence the use of HM in developed countries[22, 23], whereas this might not be the case in developing country such as Nigeria. It has been reported that approximately 80% of Nigerians still consult the traditional healers for various health care provisions[24], which may explain the high use of HM in this study.

The effectiveness of HM (83.6%) was a major factor in their use which is in line with previous findings[25, 26]. Affordability was the second most mentioned factor (31.9%) followed by availability (21.5%). These factors influencing HM use in this study has also been reported previously[4]. In addition, the authors reported other factors such as preference for natural therapies and alternative medicines, dissatisfaction with orthodox pharmaceuticals, high cost and side effects of orthodox medicine, distrust of physician's abilities and self-medication habit[4]. Anecdotal information from friends, religious influence and spiritual consciousness has also been known to influence the use of HM[27-29]. Only 7.1% of the respondents in this study attributed their HM use to its natural and organic properties, the misconception of the natural properties being non - toxic and free of adverse effect is a common belief in both developed and developing countries[30]. A comparative assessment of herbal and orthodox medicines in Nigeria showed that the HM were preferred to orthodox medicines in terms of efficacy, affordability, availability, safety and level of advertisement[31].

The dissatisfaction with orthodox health care was also highlighted in this study. Majority of the respondents (45.2%) attributed poor service delivery in the hospital to non-hospital utilisation followed by high hospital cost (33.5%) (Table 3). The poor services experienced included long hospital waiting time, hostile and rude attitude of health workers, poor infrastructure and lack of communication. The nature of illness, availability of money, patient's age, religious or personal belief, level of education and severity of illness amongst other factors have been reported to influence the choice between orthodox and the traditional health system.

Nonetheless, challenges associated with the orthodox health system in Ekiti state such as affordability of service cost, quality of service rendered, closeness to home, staff attitude, environment cleanliness, availability of required drugs and services have also informed patient's patronage to the use of HM[32]. In addition, approximately 70% of orthodox drugs in circulation in Nigeria are either adulterated or fake highlighting the need for thorough analysis of such products and licensing provisions.

Hence findings from this study suggest lack of improvement in the health care service delivery over time, which is also evidenced by other publications highlighting similar issues[33]. The effectiveness of HM and hospital poor service delivery are the reasons most highlighted in this study favouring HM use which is across the whole socioeconomic class of the respondents (Figure 1 and 2). Thus regardless of the economic situation of the respondents a good service delivery in the orthodox health system is highly desirable.

A significant difference in the number of males using HM (89.9%) was observed when compared to females (78.6%) ($p<0.001$, $\chi^2=31.008$ and $df=3$) (Table 5). Our finding is not consistent with published literature from developed countries where females had higher use of HM than males with 12.7% of females compared to 1.1% of males[34] and 8.3 % females compared to 2.9% males[35] with a similar trend reported in other studies[36,37]. A previous Nigerian study however found no significant difference between being female and use of HM[38]. Although it has been reported that women take less risk than men[39], women tend to seek help from the orthodox health care when compared to men[40-42]. Therefore, we recommend authorities to be mindful of targeting men in public health awareness in relation to the safety of HM.

The level of education was another factor that contributed to the use of HM in this study. There was significant relationship between respondent's level of education and use of HM ($p=0.001$, $\chi^2=16.670$, $df=3$), as respondents with primary level of education had the highest use of HM and least use within respondents with tertiary level of education. HM use was also highest among respondents within the middle annual income class while the least use was among the high annual income group ($p=<0.001$*, $\chi^2=36.366$, $df=2$). This finding contradicts a previous study where the author has reported poverty and dissatisfaction with orthodox medicine as the reason for HM use[43]. In line with the author, our study showed dissatisfaction with orthodox medical care as a reason for non-hospital utilisation (Table 3) but poverty was not a factor[43]. Affordability which was the second most highlighted reason for use of HM (31.9%) and high hospital cost which was the second most highlighted reason for non-hospital utilisation (33.5%) may not equate poverty. Though 82% of the respondents were within the low income class, 69% of health care financing is still "out of pocket" by patients in Nigeria[44]. Health insurance accounts for only 2% of all health care financing in Nigeria[43].

Therefore financing out of pocket health care is an extra burden on a population with 82% already within the low income group. This brings to bare the importance of the

United Nations Sustainable Development Goal 3; which is to strive towards achieving Universal Health Coverage by 2030 by all member states[45].

Conversely, low level of education and income power has been reported to influence choice of HM use in previous studies[9, 46, 47]. The studies associated low income with use of HM, which is different from what was found in this study. Highest use of HM was among the middle-income group (Table 5). However studies in developed countries have reported non-significant relationship between income and HM use but significant relationship between higher level of education and HM use[19, 48]. These variations may be due to interplay between factors such as respondent's socioeconomic characteristics and peculiarities of the study environment. Hence the findings in this study reflect such interplay where the middle-income class used more HM and a significant relationship between level of education and HM use.

Additionally, there was a significant association between the age of the respondents and use of HM in this study (p=0.005, χ^2=12.996, *df*=3). Respondents 70 years and above have all (100%) used HM in the last 2 years, followed by the age group 30-49 years of which 86.7% of them have also used HM within the period. A publication amongst the general population on HM use reported significant relationship between age and use of HM[46] while another reported no significant difference[9]. This study showed that the use of HM increases with the age of the respondents, although age group 50-69 years did not follow this pattern. The occupation of the respondents was also significantly associated with HM use p=0.001, χ^2=75.504 *df*=8. This can be linked to the annual income of the respondents which had significant association in this study. The type of occupation largely determines the accruable income.

There was 100% use of HM in the last 2 years among respondents who practised African traditional religion, 85.4% use among Christians and 82.1% use among Muslims. There was a significant relationship between religious affiliation of the respondents and HM use (p=0.009, χ^2=9.493, *df*=2) (Table 5). The use of HM as an integral part of African tradition religion is documented and African traditional religionist being the custodian of the African traditional medicine[49]. Although some studies reported no significant association between religion and HM use[25, 50, 51] other studies have reported otherwise[52, 53]. Furthermore research has shown that religious beliefs and spiritual practices of patients have powerful influence in making decision about treatment choice, coping with chronic diseases and end of life care decisions[54, 55]. Therefore, this study highlights the influence religion has on the use of HM; it is apparently a correlation between their religious belief and their choice of health care.

This study employed mixed method which catered for the peculiarity of the study population hence increasing inclusivity. Also the study has helped to reveal the prevalence and determinant of HM use and non-hospital utilisation within the study population. These are new findings within the Ekiti State which will help in public health planning. There were few limitations of this study. First, there were more incomplete

entries in the self-administered questionnaires compared to the interview administered ones, which reduced the number of eventual participants in the study. Second, most of the towns were visited during the day, at which farmers would have been away from the residential areas. This led to a low number of participants from this group compared to other occupations in this study. However, the eventual sample size was still representative of the study population. Also there were possibilities for recall bias due to respondents need to remember answers related to the previous 2 years, but the methodology used in this study are acceptable and robust for contemporary research in public health.

CONCLUSIONS

Findings from this study showed majority of the study population have used herbal medicines in the last 2 years regardless of the economic class. Majority of the respondent in the study know the difference between certified and uncertified herbal medicines, but uncertified herbal medicines were most commonly used. This study highlights the need for further investment in public health enlightenment and health care system. This is important considering the findings from this study on reasons for non-hospital unitisation corroborating the health infrastructural/service deficit which has been reported to influence the use of herbal medicines in developing countries. However the choices are limited; a choice between an acclaimed effective herbal medicine and an orthodox health system offering unsatisfactory service. While affordability was also an important reason people used herbal medicines in this study, high hospital cost was also a reason people did not patronise orthodox medical service. It is a choice between an affordable herbal medicine and an expensive orthodox medical service especially in the absence of adequate health insurance coverage. This study has shown that there is a significant association between annual incomes, education, gender, age, religion, occupation with the use of herbal medicines. Although there is a cultural history of herbal medicines use within the study population, socioeconomic and socio-demographic factors were determinants of its use in light of a prevalent income inequality and absence of adequate health insurance coverage.

Contributorship statement

Olujimi Aina designed and implemented the work, carried out data analysis and interpretation; drafted manuscript and is accountable for the accuracy and integrity of the work.

Lata Gautam designed and supervised the work, carried out interpretation and drafted and revised the manuscript for final approval and is accountable for the accuracy and integrity of the work.
Padam Simkhada advised on public health aspect of the research and carried out interpretation and revision of the manuscript.
Sarah Hall supervised the work, carried out interpretation and drafted and revised the manuscript for final approval and is accountable for the accuracy and integrity of the work.

Competing interests
Authors declare there is no conflict of interest.

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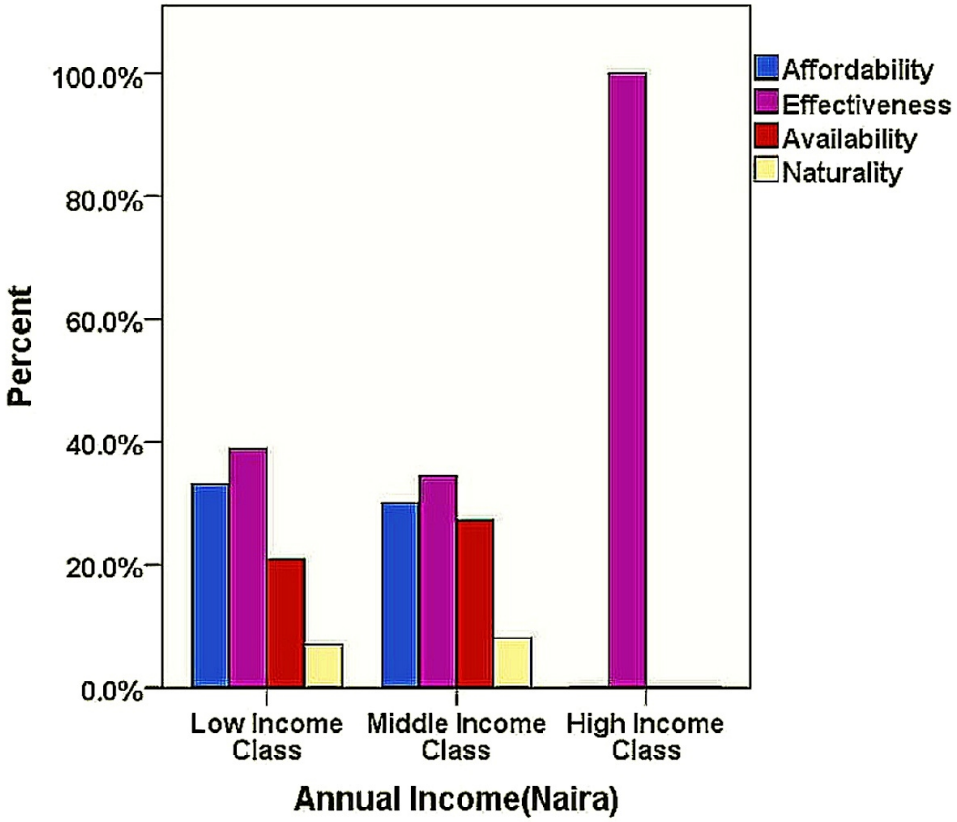

Chart showing reasons for herbal medicine use across economic background of respondents

104x92mm (300 x 300 DPI)

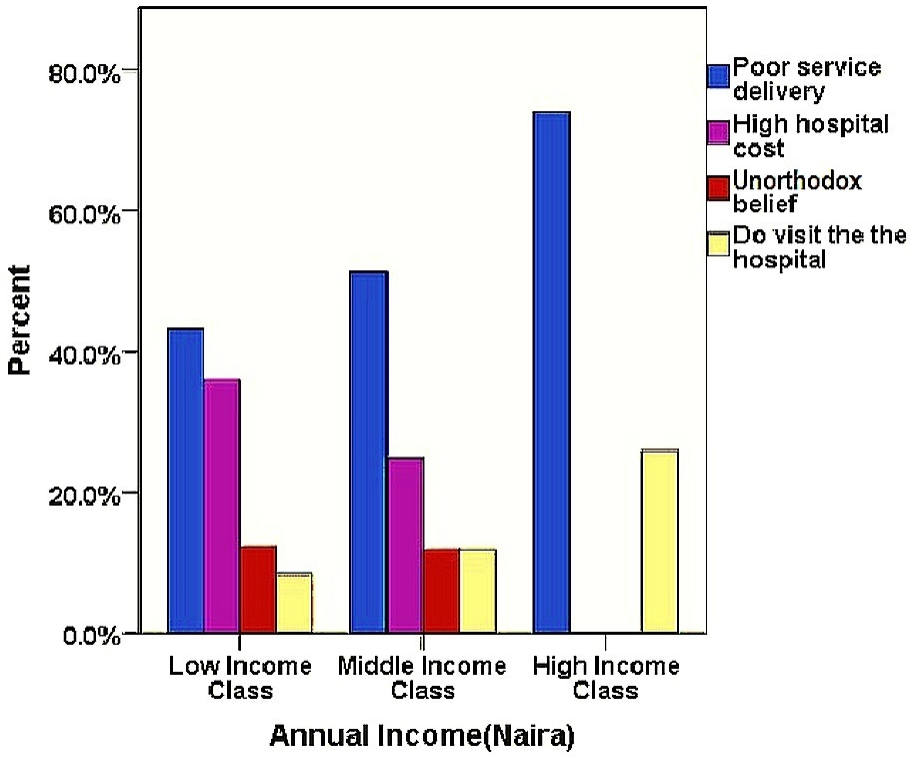

Chart showing reasons for non-hospital utilisation across economic background of the respondent

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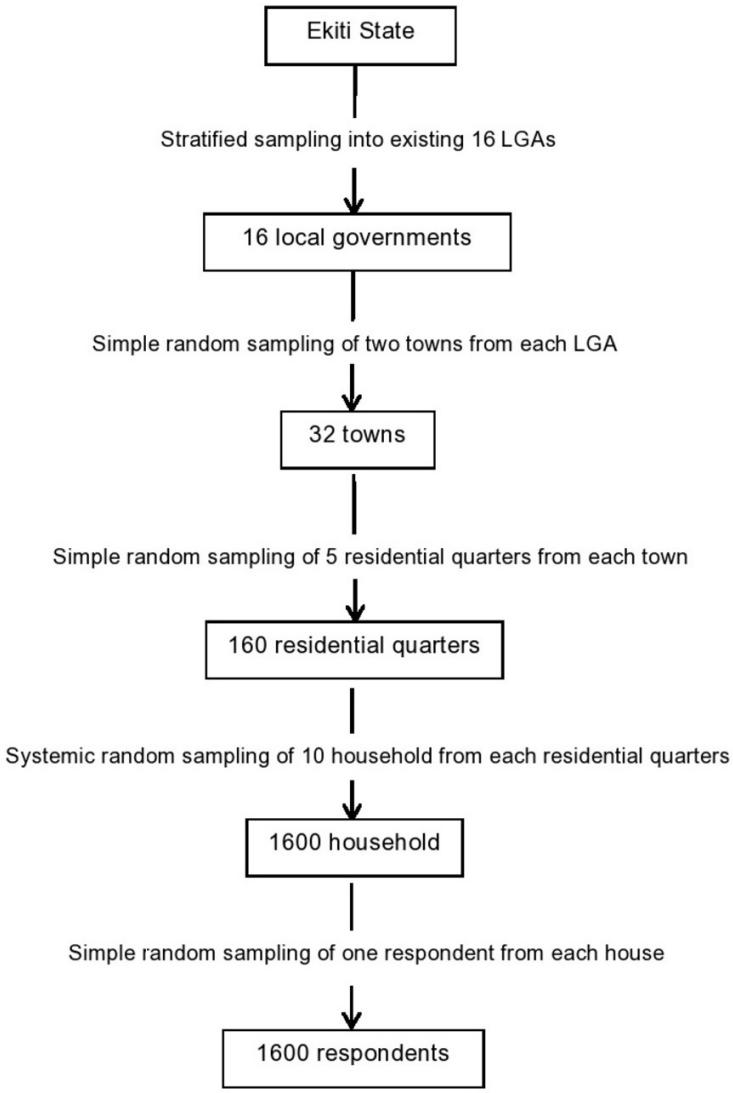

84x119mm (300 x 300 DPI)

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	2
Objectives	3	State specific objectives, including any prespecified hypotheses	1
Methods			
Study design	4	Present key elements of study design early in the paper	3
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5
Bias	9	Describe any efforts to address potential sources of bias	*5*
Study size	10	Explain how the study size was arrived at	4
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	5
		(*b*) Describe any methods used to examine subgroups and interactions	5
		(*c*) Explain how missing data were addressed	6
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	6
		(*e*) Describe any sensitivity analyses	NA
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	5-6
		(b) Give reasons for non-participation at each stage	5-6
		(c) Consider use of a flow diagram	Supplementary material
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	6
		(b) Indicate number of participants with missing data for each variable of interest	5
Outcome data	15*	Report numbers of outcome events or summary measures	NA
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10 (statistics)
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10
Discussion			
Key results	18	Summarise key results with reference to study objectives	11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	13-14
Generalisability	21	Discuss the generalisability (external validity) of the study results	13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	NA

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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PREVALENCE, DETERMINANTS AND KNOWLEDGE ABOUT HERBAL MEDICINE AND NON-HOSPITAL UTILIZATION IN SOUTH WEST NIGERIA: A CROSS SECTIONAL STUDY

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PREVALENCE, DETERMINANTS AND KNOWLEDGE ABOUT HERBAL MEDICINE AND NON-HOSPITAL UTILIZATION IN SOUTH WEST NIGERIA: A CROSS SECTIONAL STUDY

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ABSTRACT

Objectives

To examine the prevalence, determinants, safety perceptions, effectiveness and knowledge of herbal medicines and reasons for non-hospital utilisation

Design

Cross-sectional study

Setting

Ekiti state, south west Nigeria

Participants

A representative sample (n=1600) of adults (18 years or above) currently living in Ekiti state, south west Nigeria for at least two years, at the time of study.

Results

The majority of the respondents (85% n=1265) have used herbal medicines in last two years. Across economic classes use, middle income (88.3%) was highest (p<0.001), suggesting poverty is not a major factor, even with income inequality. Their use was commonest among respondents with a primary level of education (91.4%, p=0.001); and 100% use (p=0.009) of respondents practicing African traditional religion; farmers and those 70 years or above. Our study also reveals more males (p<0.001) used herbal medicines (89.9%) than females (78.6%) and effectiveness was a major reason for use (39.6%) followed by affordability (31.9%). Although the majority of the respondents (90%) knew the difference between certified and uncertified herbal medicines, uncertified ones were the most commonly used (37.3%) in the population.

Conclusion

Although there is a cultural history of herbal medicine use within the study population, the choice of use was based on their effectiveness. Therefore a scientifically valid analysis of this claim within the study population may help achieve a cheaper and affordable health care alternative which will be safe. This is important, considering that uncertified herbal medicines were chosen over certified ones, even though a large majority of respondents were aware of differences and likely consequences. This study highlights the need for further investment by government, individual and cooperate stakeholders in herbal medicine research and improvement of conventional health care system. This is in addition to public health awareness on the danger of use of uncertified herbal products.

STRENGTHS AND LIMITATIONS OF THE STUDY

- Qualitative and quantitative data used in this research catered for the peculiarity of the study population, hence increasing inclusivity.
- Most towns were visited during the day when some farmers may have been absent leading to a low number of participants from this group.
- This study found that the timing of questionnaire administration is an important consideration to make.
- There were more incomplete entries in the self-administered questionnaires compared to the interview administered ones.

BACKGROUND

The provision of health care falls mainly into the orthodox and non- orthodox systems. The non-conventional health care system includes Complementary and Alternative Medicine of which herbal medicine (HM) is an important component[1]. Herbal medicines are defined as materials or preparations obtained from one or more plants; raw or processed parts[2], containing substances with therapeutic characteristics and other benefits to human health. A large percentage of the world's population depend on herbal medicines in both developing (80%)[3, 4] and developed countries[5, 6].

The use of herbal medicine is pivotal to the practise of the African Traditional Medicine (ATM), and it was the major medical system available to millions of people in urban and rural communities of Africa, until the advent of Europeans[7, 8]. It is a non-conventional system of disease management that employs various processes of consultation with herbalists, priests, media and diverse traditional deities together with herbal use[9]. The practice of ATM also extended to culturally homogeneous ethnic groups in Yoruba land called the "Ekitis"[10] who form the present Ekiti state. Culturally, the larger Yoruba ethnic group had the Babalawo and Onisegun as traditional medical practitioner, and specialists in herbs respectively as healthcare providers[11] whose existence and practice are still contemporary.

Although, until recently HM in Africa was generally not thoroughly researched and only loosely regulated[12] with the lack of proper documentation of the workings of the ATM and its practice not helping[13]. Some of these factors caused the peri-colonial conflict between new orthodox systems and the already established ATM, largely due to the belief by the colonialist that the later was superstitious[14] and therefore declared illegal[15]. The perpetuation of this perception and the lack of proper documentation,

research, and regulation; may still militate against an improved synergy between stakeholders, researchers and collaboration between herbal medicine and orthodox medicine. This also includes the general public who are caught between both choices for numerous reasons.

However, recent studies have reported the high use of herbal medicines in Nigeria[16-20]. A study conducted in one of the local government areas (Ekiti state) reported 74.3% of the respondents used herbal medicine in the treatment of malaria[16]. In another study, in urban Lagos Nigeria, 66.8% (n=388 respondents) used herbal medicine for management of various ailments[20]. However, these studies are more specific to setting and disease, hence a need for a general population study and non-disease specific study as reported here. Moreover, the knowledge and prevalence of herbal medicines use within the larger population in Ekiti state remains unknown, researched or documented; although it's use is generally believed to be widespread.

Vendors of various herbal medicines are almost now ubiquitous in Nigeria, trading in traffic gridlocks, highways, bus stops/ stations, festivals and even in some conventional health facilities but the determinants of its use has not been wholly examined. Herbal medicines used are either locally made, refined, imported, certified or uncertified by the government. The National Agency for Food and Drug Administration and Control (NAFDAC) in Nigeria is the government agency responsible for the certification, registration and regulation of herbal medicines. Extemporaneous herbal medicines (herbs or mixture of herbs given on a one-to one basis) are not included in the class of herbal medicines[21]. However some of these products have now been commercialised raising concerns about safety as much as the uncertified herbal medicine types, therefore these need to be included in the NAFDAC registration and regulation process.

Patronage of conventional health facilities is an important aspect of health care delivery system in most communities. The conventional and traditional medical system provides health care services in Ekiti state, coordinated by the State Ministry of Health[22]. The increased use of herbal medicines has been attributed to challenges relating to the availability and affordability of conventional medicine. This may be true considering that 40.1% of the total population of Nigeria are poor and live on less than 137,430 naira ($352) annually[23].

In Ekiti state, of the sixteen local government areas only two areas (Irepodun/Ifelodun and Ekiti East) have higher number of their population utilising their health facilities optimally[24]. However, with the highest poverty head count being 87.7% in Sokoto Northwest Nigeria and 4.5% in Lagos South west Nigeria, Ekiti state has a poverty head count of 28%[23].

Therefore, use of herbal medicine is likely a combination of different factors within the study population, hence this study investigated the knowledge, prevalence and determinant of herbal medicines use and the reasons for non-utilisation of

conventional health facilities in Ekiti state, Nigeria. The result from this study should help in policy formulation by the government and stakeholders towards improved healthcare access, areas of further research and collaboration. This will be in addition to identification of areas for public health intervention and targeting, which will improve the health outcome of the population.

METHODS

Study design

This was a cross-sectional study conducted in Ekiti state, south west Nigeria with a population of 2,384,212[25], which include over 127 large and small towns[26]. A semi-structured survey was conducted to examine herbal medicine use. Participants were 18 years and above and those who lived in Ekiti State at the time of study or have lived in the state for at least 2 years.

The Cochran formula was used for determination of the minimum sample size required in this study. It allows for calculation of best possible size with preferred precision and confidence level. It is particularly suitable large study populations and calculates the sample size based on a proportion of people who use HM[27].

Hence, the minimum sample size required for this study was 1067 participants assuming 50% of the population use herbal medicine[27] as calculated using equation 1:

Equation 1:

$$n = \frac{z^2 \times pq}{d^2}$$

Where n = required minimum sample size in the study

z = Z-score or standard deviation

p = proportion of people who use herbal medicine in the study area

q = 1-p

d = the acceptable error level

The calculation of the sample size was based on acceptable error level of 3% (0.03) and a confidence interval of 95% corresponding to a Z-score of 1.96. These are within social science research recommended values for standard deviation and error levels[28]. The proportion of people using herbal medicine in Ekiti state is unknown

therefore maximum heterogeneity was assumed (i.e. a 50/50 split in users and non-user) with p=0.5.

Sampling Method

The study participants were selected using a multistage sampling technique. The first stage involved stratifying Ekiti state into the existing sixteen local government areas (LGA). This followed random sampling to select two towns in each local government (total of 32 towns - second stage). Then residential quarters in each town were selected randomly, making a total of 160 residential quarters (third stage). Systemic random sampling was used in the fourth stage in selecting 10 household from each of the selected residential quarters and one participant from each household made up the final sample population of 1600. Hence a cross sectional study was administered to 1600 participants which was above the required minimum sample size as determined earlier and were representative of the Ekiti state population[25]. A flow diagram of the sampling method is shown is supplementary information.

Administration and measurement of research instrument

The questionnaire used in this study was adapted from previous studies on the use of herbal medicines[18, 19, 29] and validated in a pilot study. They were interviewer-administered or self-administered depending on the ability or choice of the participant. A total of 10 field enumerators with previous experience were employed from the public and trained to help with data collection. Each self-administered questionnaire was completed in about 10 minutes and the interview-administered in about 20 minutes. The questionnaire was used to obtain both qualitative and quantitative data with open and closed-ended questions respectively. Interpretation of the questionnaire in the local dialect was offered when required.

The close-ended questions were used to collect the socio-demographic data of the participants which included their age range, gender, level of education, religion, occupation and annual income. Close-ended questions were also asked to examine knowledge (asked if participants knew what HM was or not, and certification status), their perception of its effectiveness and safety, then the frequency of use among participants to assess prevalence of herbal medicines use. The open-ended questions were employed to identify reasons for herbal medicine preference and non-orthodox preference. These also included adverse effects experienced and how they were managed.

Data analysis

Manual representational thematic analysis was used to analyse textual data obtained from open-ended questions and presented quantitatively. In some instances where participants gave multiple answers to an open-ended question, each were analysed as individual response. Hence the total of some responses in a category exceed the 1265 total number of respondents. Afterwards, inferential and descriptive statistical analysis was carried out using SPSS (version 20.0). Comparison of socio-demographic factors and the use or non-use of herbal medicine was carried out using inferential statistics. A Pearson Chi-square test was used to examine the impact of independent variables (e.g. age, gender, religion, level of education, occupation, annual income) on various responses (such use of HM and perception of safety) in the study and $p \leq 0.05$ at 95 % confidence interval was considered to be statistically significant. Multicollinearity between the independent variable and the use of HM was also tested, when the variance inflation factor (VIF) and tolerance are greater than 5 to 10 and lower than 0.1 to 0.2, respectively this indicates multicollinearity.

Ethics

Ethics approval was obtained from the Faculty of Science and Technology, Anglia Ruskin University and Ekiti State Ministry of Health in Ekiti State. Participants were provided with the participant information sheet and the content explained in English or local dialect. Informed consent was obtained from the participants who volunteered to be part of the study.

Public patient involvement in research

The public have participated in this study by completing the survey. The pilot study was carried out to determine its feasibility on a larger scale. It was observed that some of the questions on herbal medicines use were ambiguous. As a result, the questions were rephrased to focus on the use of herbal medicines within the last two years. Research questions were developed from prior knowledge and experience of the researchers. Participants were not asked to assess the burden of the intervention and time required to participate in the research. Multistage sampling method was used for participant's recruitment.

RESULTS

A total of 984 questionnaires were self-administered while 616 questionnaires were interview based. Among these, 1265 respondents formed the final sample size for the study due to exclusion of 335 respondent's entry. A total of 263 self-administered and 72 interview based questionnaires were excluded due to being incomplete.

Socio-demographic characteristics of respondents

There were more male respondents (56.4%) than female respondents (43.6%) in the study. Majority of the respondents (43.2%) were within the age group of 30-49 years, Christians (69.5%) and self-employed (39.6%). In addition, the majority of the respondents (82%) were within the low income group as shown in Table 1.

Table 1: Socio-demographic background of the respondents

	Frequency	%
Age (years)		
18-29	322	25.5
30-49	547	43.2
50-69	358	28.3
70 and above	38	3.0
Gender		
Male	713	56.4
Female	552	43.6
Level of Education		
No formal education	191	15.1
Primary	245	19.4
Secondary	340	26.9
Tertiary	489	38.7
Religion		
Christianity	879	69.5
Islam	346	27.4
African traditional	40	3.2
Occupation		
Student	84	6.6
Civil servant	491	38.8
Farmer	76	6.0
Self employed	501	39.6
Others	113	8.9
Annual Income		
Low (≤ ₦600,000)	1037	82.0
Middle (₦600,000 to ₦2.4M)	179	14.2
High (≥₦2.4M)	49	3.9

Knowledge and use of herbal medicines

Considering their knowledge and use of herbal medicines (HM), 90% of the respondents knew the difference between certified and uncertified HM while 85% had used them in the last two years, 53% using them more than ten times (Table 2). However over half of the respondents (57%) believed it is unsafe to take uncertified HM although 37% continued to take them while 32% took both certified and uncertified HM.

Table 2: Knowledge and use of herbal medicines

	Frequency	%
Knowledge of certified and uncertified HM		
Have knowledge	1139	90.0
Don't have knowledge	126	10.0
Use of HM in the last 2 years		
Used	1075	85.0
Non-use	190	15.0
Class of HM used		
Uncertified	401	37.3
Both	343	31.9
Certified	331	30.8
Frequency of HM use in last 2 years		
Once- twice	142	13.2
3-10 times	363	33.8
Over 10 times	570	53.0

Preference for herbal medicines use and hospital utilisation

The effectiveness was the reason (39.6%) respondents preferred herbal medicines and for those who did not use herbal medicine, risk to health was the major reason (61%). A 45.2% of users blamed poor service delivery for non-hospital utilisation (Table 3).

Table 3: Reasons for HM use/non-use and non-hospital utilisation

	Frequency	%
Reasons for HM use		
Effectiveness	538	39.6
Affordability	434	31.9
Availability	292	21.5
Natural product	96	7.1
Reasons for non-HM use		
Risk to health	116	61.1
Personal preference	49	25.8
Poor knowledge of HM composition	25	13.2
Reasons for non-hospital utilisation		
Poor service delivery	534	45.2
High hospital cost	396	33.5
Unorthodox belief	141	11.9
Do visit the hospital	110	9.3

Figure 1: Chart showing reasons for herbal medicine use across economic background of respondents

Figure 2: Chart showing reasons for non-hospital utilisation across economic background of the respondent

According to Figure 1, across all income classes, effectiveness of HM was the most attributed reason for their use. Likewise, poor service delivery was the most stated reason for non-utilisation of conventional health facilities (Figure 2).

Perception of safety and effectiveness

To explore perception of safety and effectiveness of herbal medicines, our survey results showed that the majority of the respondents (83.6%) perceived that HM are effective, while more than half (57.3%) believed they are unsafe (Table 4).

Table 4: Perception of HM safety and effectiveness and their adverse effect management

	Frequency	%
Perception of effectiveness		
Effective	899	83.6
Ineffective	176	16.4
Perception of safety		
Safe	464	42.7
Unsafe	623	57.3
Observed adverse effect		
None	566	52.7
Abdominal discomfort	150	14.0
Nausea and vomiting	201	18.7
Headache	82	7.6
Stooling	62	5.8
Generalised body weakness	14	1.3
Management of adverse effect		
Rest and becomes self-limiting	219	42.5
Visit the hospital	129	25.0
Take orthodox medicine	111	21.6
Take another HM	56	10.9

Most of the respondents (52.7%) who have used HM in the last two years did not experience any adverse effects while some others experienced abdominal discomfort (14%), nausea and vomiting (18.7%), headache (7.6%), stooling (5.8%) and generalised body weakness (1.3%). These adverse effects were managed differently; the majority (42.5%) took adequate rest while the effects self-limit, visited the hospital (25%), took orthodox medicine (21.6%) or took another HM (10.9%) see Table 4.

The data has been analysed using Pearson Chi square test to explore if there is a significant association among different factors studied such as age, sex, level of education, religion, annual income and occupation and the use of HM. As shown in Table 5, results indicate a significant association between, age, sex, religion, annual income and occupation with HM using 95% confidence interval.

Table 5: Significance of background characteristics on usage of herbal medicines

Characteristics	Use of HM	Non-use of HM	Total (100%)	p value
Age (years)				
18-29	274 (85.1%)	48 (14.9%)	322	p=0.005*
30-49	474 (86.7%)	73 (13.3%)	547	χ^2=12.996
50-69	289 (80.7%)	69 (19.3%)	358	*df*=3
70 and >70	38 (100.0%)	0 (0.0%)	38	
Total	1075 (85.0%)	190 (15.0%)	1265	
Gender				
Male	641 (89.9%)	72 (10.1%)	713	p<0.001*
Female	434 (78.6%)	118 (21.4%)	552	χ^2=31.008
Total	1075 (85.0%)	190 (15.0%)	1265	*df* =1
Level of Education				
No formal education	169 (88.5%)	22 (11.5%)	191	p=0.001*
Primary	224 (91.4%)	21 (8.6%)	245	χ^2=16.670
Secondary	287 (84.4%)	53 (15.6%)	340	*df* = 3
Tertiary	395 (80.8%)	94 (19.2%)	489	
Total	1075 (85.0%)	190 (15.0%)	1265	
Religion				
Christianity	751 (85.4%)	128 (14.6%)	879	p=0.009*
Islam	284 (82.1%)	62 (17.9%)	346	χ^2=9.493
African traditional	40 (100.0%)	0 (0.0%)	40	*df*=2
Total	1075 (85.0%)	190(15.0%)	1265	
Annual Income				
Low income [a]	890 (85.8%)	147 (14.2%)	1037	p<0.001*
Middle income [b]	158 (88.3%)	21 (11.7%)	179	χ^2 =36.366
High income [c]	27 (55.1%)	22 (44.9%)	49	*df*=2
Total	1075 (85.0%)	190 (15.0%)	1265	
Occupation				
Student	69 (82.1%)	15 (17.9%)	84	p<0.001*
Civil servant	395(80.4%)	96 (19.6%)	491	χ^2=26.701
Farmer	76 (100.0%)	0 (0.0%)	76	*df*=4
Business	431(86.0%)	70 (14.0%)	501	
Others	104 (92.0%)	9 (8.0%)	113	
Total	1075 (85.0%)	190 (15.0%)	1265	

* significant association [a] (≤ ₦600,000) [b] (₦601,000 to ₦2.4M) [c] (≥₦2.4M)

A test of data for the assumption of collinearity showed multicollinearity was not an issue (Age, Tolerance = 0.86, VIF = 1.16; Gender, Tolerance = 0.95, VIF = 1.05 ; Level of education, Tolerance = 0.73, VIF = 1.38 ; Religion, Tolerance = 0.89, VIF = 1.29; Occupation, Tolerance = 0.83, VIF = 1.21; Annual income, Tolerance = 0.85, VIF = 1.17)

DISCUSSION

Various studies have reported the use of HM in health subpopulation[30-33] and in different locations and settings[33-35]. General population use of HM similar to this study has been reported in South Africa[36], Benin[37], Uganda[38]) and Nigeria[18, 39-40]. But the prevalence of HM use in the general population is sparse in sub-saharan Africa. However prevalence study on use of wider Traditional complementary and alternative medicine (TCAM) reportedly varies from 4.6% in semi urban Ethiopia[41] to 94% in semi urban Nigeria[42]. The variability in prevalence could be a result of factors such as study design and method, socioeconomic variability of sample population, sample size and definition of terms in the study. Likewise the non-utilisation of conventional health system has been attributed to various reasons [40, 43, 44] however, the socioeconomic peculiarity of the study population may also cause differences in findings. Historical and cultural use of HM in Africa presume adequate knowledge of HM already exist but with the need for its regulation and certification, knowledge testing of the difference between certified and uncertified forms has therefore, become more imperative.

In this study the majority of the respondents (90%) knew the difference between government certified and uncertified herbal medicines. The high level of knowledge about certified and uncertified HM may have been due to the success of various campaigns and public awareness programmes run by the National Agency for Food and Drug Administration Control in 2007 about fake and counterfeit drugs in Nigeria[45] Participant's awareness is thus reflected in this study which is an indicator of the effectiveness of the government effort at sensitizing the public.

However, we found that the use of HM is still high in the study population with 85% of the respondents having used them in the last two years (Table 2). This high use has also been described in other African countries such as Ghana, Tanzania, Zambia Kenya, and about 80% use reported in South Africa[46]. Similar studies in general HM use conducted in Lagos and the UK reported 66.8% and 64.2% of their respondents had used HM[20, 47]. Social, cultural, socioeconomic and political factors have been reported to influence the use of HM in developed countries[47, 48], whereas this might not be the case in developing country such as Nigeria. It has been reported that approximately 80% of Nigerians still consult the traditional healers for various health care provisions[49], which may explain the high use of HM in this study.

The effectiveness of HM (83.6%) was a major factor in their use which is in line with previous findings[44, 50]. Affordability was the second most mentioned factor (31.9%) followed by availability (21.5%). These factors influencing HM use in this study has also been reported previously[4]. In addition, the authors reported other factors such as preference for natural therapies and alternative medicines, dissatisfaction with orthodox pharmaceuticals, high cost and side effects of orthodox medicine, distrust of physician's abilities and self-medication habit[4]. Anecdotal information from friends, religious influence and spiritual consciousness has also been known to influence the use of HM [51, 52]. Only 7.1% of the respondents in this study attributed their HM use to its natural and organic properties, the misconception of the natural properties being non - toxic and free of adverse effect is a common belief in both developed and developing countries[53]. A comparative assessment of herbal and orthodox medicines in Nigeria showed that the HM were preferred to orthodox medicines in terms of efficacy, affordability, availability, safety and level of advertisement[40].

The dissatisfaction with orthodox health care was also highlighted in this study. Majority of the respondents (45.2%) attributed poor service delivery in the hospital to non-hospital utilisation followed by high hospital cost (33.5%) (Table 3). The poor services experienced included long hospital waiting time, hostile and rude attitude of health workers, poor infrastructure and lack of communication. The nature of illness, availability of money, patient's age, religious or personal belief, level of education and severity of illness amongst other factors have been reported to influence the choice between orthodox and the traditional health system.

Nonetheless, challenges associated with the orthodox health system in Ekiti state such as affordability of service cost, quality of service rendered, closeness to home, staff attitude, environment cleanliness, availability of required drugs and services have also informed patient's patronage to the use of HM[54]. In addition, approximately 70% of orthodox drugs in circulation in Nigeria are either adulterated or fake highlighting the need for thorough analysis of such products and licensing provisions.

Hence findings from this study suggest lack of improvement in the health care service delivery over time, which is also evidenced by other publications highlighting similar issues[53]. The effectiveness of HM and hospital poor service delivery are the reasons most highlighted in this study favouring HM use which is across the whole socioeconomic class of the respondents (Figure 1 and 2). Thus regardless of the economic situation of the respondents a good service delivery in the orthodox health system is highly desirable.

A significant difference in the number of males using HM (89.9%) was observed when compared to females (78.6%) ($p<0.001$, $\chi^2=31.008$ and $df=3$) (Table 5). Our finding is not consistent with published literature from developed countries where females had higher use of HM than males with 12.7% of females compared to 1.1% of males[55] and 8.3 % females compared to 2.9% males[56] with a similar trend reported in other studies[57, 58]. A previous Nigerian study however found no significant difference

between being female and use of HM[59]. Although it has been reported that women take less risk than men[60], women tend to seek help from the orthodox health care when compared to men[60-63]. Therefore, we recommend authorities to be mindful of targeting men in public health awareness in relation to the safety of HM.

The level of education was another factor that contributed to the use of HM in this study. There was significant relationship between respondent's level of education and use of HM (p=0.001, χ^2=16.670, *df*=3), as respondents with primary level of education had the highest use of HM and least use within respondents with tertiary level of education. HM use was also highest among respondents within the middle annual income class while the least use was among the high annual income group (p=<0.001*, χ^2=36.366, *df*=2). This finding contradicts a previous study where the author has reported poverty and dissatisfaction with orthodox medicine as the reason for HM use[64]. In line with the author, our study showed dissatisfaction with orthodox medical care as a reason for non-hospital utilisation (Table 3) but poverty was not a factor[64]. Affordability which was the second most highlighted reason for use of HM (31.9%) and high hospital cost which was the second most highlighted reason for non-hospital utilisation (33.5%) may not equate poverty. Though 82% of the respondents were within the low income class, 69% of health care financing is still "out of pocket" by patients in Nigeria[65]. Health insurance accounts for only 2% of all health care financing in Nigeria[64].

Therefore financing out of pocket health care is an extra burden on a population with 82% already within the low income group. This brings to bare the importance of the United Nations Sustainable Development Goal 3; which is to strive towards achieving Universal Health Coverage by 2030 by all member states[66].

Conversely, low level of education and income power has been reported to influence choice of HM use in previous studies[18, 57, 67]. The studies associated low income with use of HM, which is different from what was found in this study. Highest use of HM was among the middle-income group (Table 5). However studies in developed countries have reported non-significant relationship between income and HM use but significant relationship between higher level of education and HM use[29, 68]. These variations may be due to interplay between factors such as respondent's socioeconomic characteristics and peculiarities of the study environment. Hence the findings in this study reflect such interplay where the middle-income class used more HM and a significant relationship between level of education and HM use.

Additionally, there was a significant association between the age of the respondents and use of HM in this study (p=0.005, χ^2=12.996, *df*=3). Respondents 70 years and above have all (100%) used HM in the last 2 years, followed by the age group 30-49 years of which 86.7% of them have also used HM within the period. A publication amongst the general population on HM use reported significant relationship between age and use of HM[57] while another reported no significant difference[18]. This study showed that the use of HM increases with the age of the respondents, although age

group 50-69 years did not follow this pattern. The occupation of the respondents was also significantly associated with HM use p=0.001, χ^2=75.504 *df*=8. This can be linked to the annual income of the respondents which had significant association in this study. The type of occupation largely determines the accruable income.

There was 100% use of HM in the last 2 years among respondents who practised African traditional religion, 85.4% use among Christians and 82.1% use among Muslims. There was a significant relationship between religious affiliation of the respondents and HM use (p=0.009, χ^2=9.493, *df*=2) (Table 5). The use of HM as an integral part of African tradition religion is documented and African traditional religionist being the custodian of the African traditional medicine[69]. Although some studies reported no significant association between religion and HM use[36, 39, 50] other studies have reported otherwise[70, 71]. Furthermore research has shown that religious beliefs and spiritual practices of patients have powerful influence in making decision about treatment choice, coping with chronic diseases and end of life care decisions[72, 73]. Therefore, this study highlights the influence religion has on the use of HM; it is apparently a correlation between their religious belief and their choice of health care. There is no multicollinearity between the socio-demographic characteristics and the use of HM therefore it reduces standard errors in related independent variables such as level of education, education and annual income.

This study employed qualitative and quantitative data which catered for the peculiarity of the study population hence increasing inclusivity. Also the study has helped to reveal the prevalence and determinant of HM use and non-hospital utilisation within the study population. These are new findings within the Ekiti state which will help in public health planning. There were few limitations of this study. First, there were more incomplete entries in the self-administered questionnaires compared to the interview administered ones, which reduced the number of eventual participants in the study. Second, most of the towns were visited during the day, at which farmers would have been away from the residential areas. This led to a low number of participants from this group compared to other occupations in this study. However, the eventual sample size was still representative of the study population. Also there were possibilities for recall bias due to respondents need to remember answers related to the previous 2 years, but the methodology used in this study are acceptable and robust for contemporary research in public health.

Further research may be needed to assess the use of HM in sub health and the general population to increase present knowledge on herbal medicine use and ways to integrate traditional and orthodox health care systems within the study population.

CONCLUSIONS

Findings from this study showed majority of the study population have used herbal medicines in the last 2 years regardless of the economic class. Majority of the respondent in the study know the difference between certified and uncertified herbal medicines, but uncertified herbal medicines were most commonly used. This study highlights the need for further investment in public health enlightenment and health care system. This is important considering the findings from this study on reasons for non-hospital unitisation corroborating the health infrastructural/service deficit which has been reported to influence the use of herbal medicines in developing countries. However the choices are limited; a choice between an acclaimed effective herbal medicine and an orthodox health system offering unsatisfactory service. While affordability was also an important reason people used herbal medicines in this study, high hospital cost was also a reason people did not patronise orthodox medical service. It is a choice between an affordable herbal medicine and an expensive orthodox medical service especially in the absence of adequate health insurance coverage. This study has shown that there is a significant association between annual incomes, education, gender, age, religion, occupation with the use of herbal medicines. Although there is a cultural history of herbal medicines use within the study population, socioeconomic and socio-demographic factors were determinants of its use in light of a prevalent income inequality and absence of adequate health insurance coverage.

Contributorship statement

Olujimi Aina designed and implemented the work, carried out data analysis and interpretation; drafted manuscript and is accountable for the accuracy and integrity of the work.

Lata Gautam designed and supervised the work, carried out interpretation and drafted and revised the manuscript for final approval and is accountable for the accuracy and integrity of the work.

Padam Simkhada advised on public health aspect of the research and carried out interpretation and revision of the manuscript.

Sarah Hall supervised the work, carried out interpretation and drafted and revised the manuscript for final approval and is accountable for the accuracy and integrity of the work.

Competing interests

Authors declare there is no conflict of interest.

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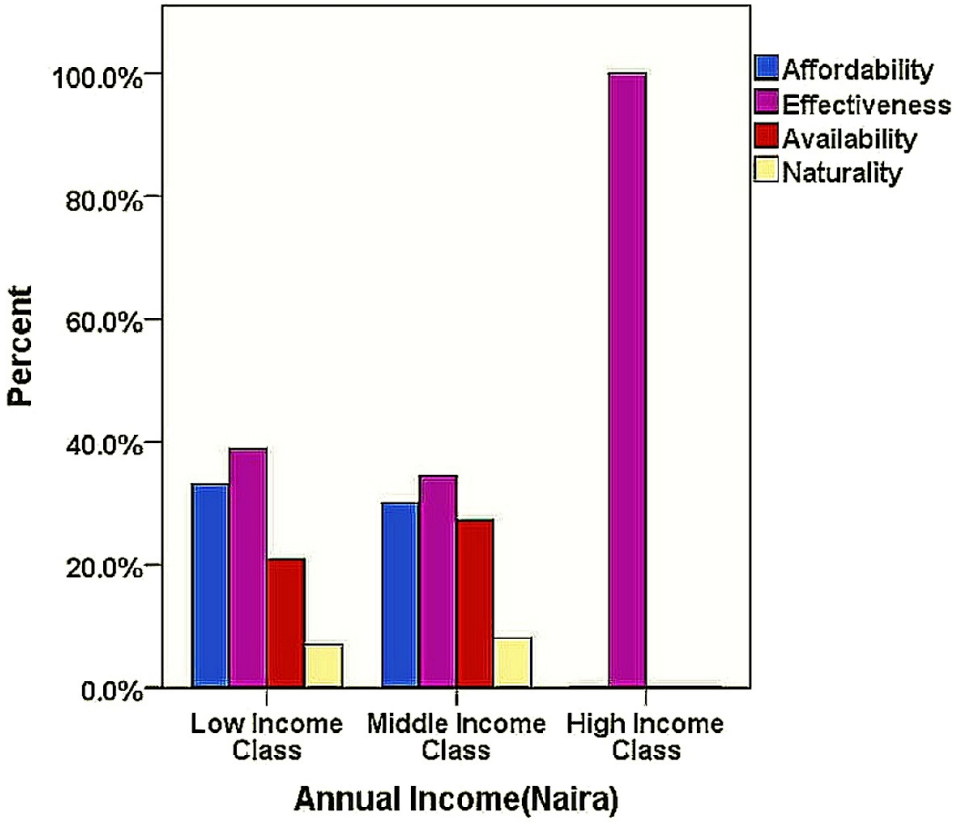

Chart showing reasons for herbal medicine use across economic background of respondents

104x92mm (300 x 300 DPI)

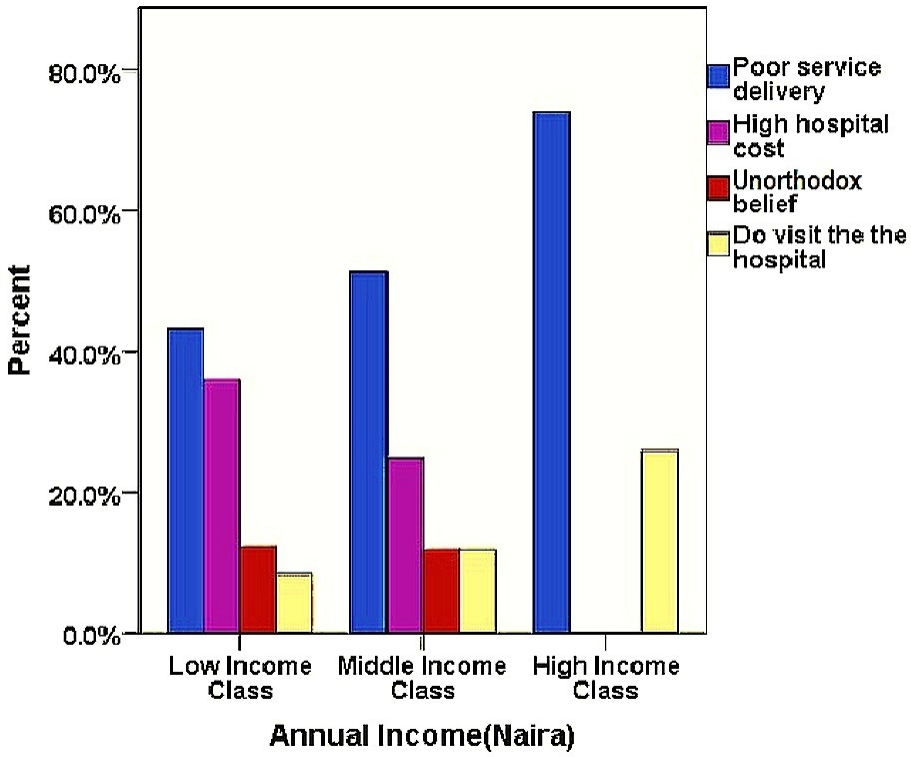

Chart showing reasons for non-hospital utilisation across economic background of the respondent

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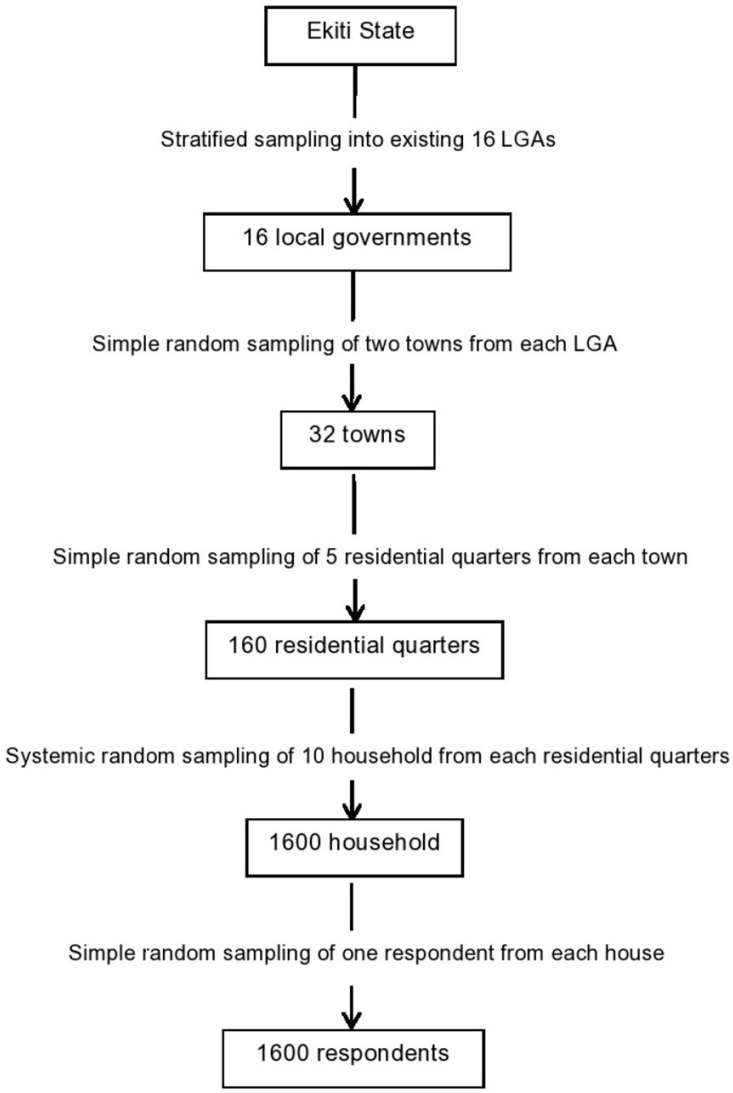

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	2
Objectives	3	State specific objectives, including any prespecified hypotheses	1
Methods			
Study design	4	Present key elements of study design early in the paper	3
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5
Bias	9	Describe any efforts to address potential sources of bias	*5*
Study size	10	Explain how the study size was arrived at	4
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	5
		(*b*) Describe any methods used to examine subgroups and interactions	5
		(*c*) Explain how missing data were addressed	6
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	6
		(*e*) Describe any sensitivity analyses	NA
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	5-6
		(b) Give reasons for non-participation at each stage	5-6
		(c) Consider use of a flow diagram	Supplementary material
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	6
		(b) Indicate number of participants with missing data for each variable of interest	5
Outcome data	15*	Report numbers of outcome events or summary measures	NA
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10 (statistics)
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10
Discussion			
Key results	18	Summarise key results with reference to study objectives	11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	13-14
Generalisability	21	Discuss the generalisability (external validity) of the study results	13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	NA

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.