

The background of the cover is a detailed, colorful illustration of various microorganisms. It features several large, rod-shaped bacteria with textured surfaces, some with flagella. Interspersed among them are numerous spherical viruses, some with prominent, spiky outer shells. The color palette is dominated by warm tones of orange, yellow, and red, with some cooler blue and purple accents, creating a vibrant and scientific atmosphere.

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*Full Length Research Paper*

# Blood pressure pattern and hypertension related risk factors in an urban community in Southwest Nigeria: The Mokola hypertension initiative project, Ibadan, Nigeria

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There is rising incidence of hypertension especially among children and young adults in Nigeria. Hypertension in childhood could be harbinger for adult hypertension. This study looked at the prevalence of hypertension in children and adults in an urban community. A cross sectional survey was conducted among 5,733 respondents aged 3 to 78 years residents in Mokola Ibadan, South Western Nigeria selected using a multistage cluster sampling method. Demographic and anthropometric characteristics were collected and Chi square test and logistic regression were used to determine significant determinants and predictors of hypertension at  $p < 0.05$ . Prevalence of hypertension was 27.3% in adults and 12.8% in children < 18 years. Isolated systolic hypertension (ISH) was found in 10.3% of adults and 4.4% of children while isolated diastolic hypertension (IDH) was found in 4.7% of adults and 5.3% of children. Odds of ISH were significantly 2 times greater among female compared with male children. Among adults, the odds of hypertension and ISH were 1.32 and 2 times, respectively more among the males compared to females. Obese children were about 2 times (OR = 1.50 95%CI: 1.03 to 2.20) and overweight and obese adults were 3 times (OR = 3.20; 95%CI: 2.15 to 4.75) and 4 times (OR = 3.5 (95%CI: 2.40 -5.22), respectively more likely to be hypertensive. Adults, male, ever smoked, ever used alcohol and employed were significantly more likely to be hypertensive. Predictors of hypertension in children were obesity [AOR = 1.44 (95%CI 0.98, 2.10)] and among adults were, middle age 35-55 years [AOR = 3.80 (95%CI 2.73, 5.29)] and elderly age 55+ years [AOR = 7.37 (95%CI 4.90, 11.10)], overweight [AOR= 2.55 (95%CI 1.39, 4.71)] and obese [AOR = .02 (95%CI 1.65, 5.52)]. High prevalence of hypertension among children and adults as well as linear increase with age in this community underscores the need for life course approach to control hypertension.

**Key words:** Hypertension, blood pressure, adults and children, risk factors, urban community.

## INTRODUCTION

High blood pressure (BP) or hypertension is the most common non-communicable disease and a significant

risk factor for renal disease and cardiovascular diseases such as heart attacks, stroke, and left ventricular

hypertrophy globally (Lim et al., 2012). Sufferers of hypertension are usually unaware that they have the condition, thus many present with the complications or sudden death, and is therefore referred to as a 'silent killer' (Ekore et al., 2009; Ataklte et al., 2015; Adeloye et al., 2015).

According to the World Health Organization (WHO), the prevalence of hypertension is highest in the African Region at 46% of adults aged 25 years and above while the lowest was found in the American region (WHO, 2011). The incidence of hypertension and cardiovascular mortality has been increasing in sub-Saharan Africa over the past few decades (Ataklte et al., 2015) and is expected to nearly double by the year 2030 (Damasceno et al., 2009). In a systematic review of articles published on hypertension between 2000 and 2013 in sub-Saharan Africa, Ataklte et al. reported a pooled hypertension prevalence of 30% in adults and a range from 14.7 to 69.9% depending on the site and age.

In Nigeria, the prevalence of hypertension has been on the increase affecting a significant number of highly productive populations. A review of prevalence among adults from 1990 to 2009 showed combined prevalence of 22% and range from a minimum of 12.4% to a maximum of 34.8% (Ekwunife and Aguwa, 2011). It was estimated that there were about 20.8 million cases of hypertension in Nigeria among people aged at least 20 years, with a prevalence of 28.0% and projected increase to 39.1 million cases with a prevalence of 30.8% by 2030 (Adeloye et al., 2015). A review with wider coverage (1968 -2015) found overall crude prevalence of hypertension to range from 2.1 to 47.2% in adults and from 0.1 to 17.5% in children depending on the study site, target population, type of measurement and cut-off value used for defining hypertension (Akinlua, 2015). Hypertension and its complications constitute approximately 25% of emergency medical admissions in urban hospitals in Nigeria (Ekere et al., 2005).

Multiple factors have been demonstrated to be associated with the development of hypertension and its complications. These are grouped into modifiable and non-modifiable factors. However, the modifiable factors such as environmental and lifestyle factors rather than non-modifiable factors (genetics and sex) are mainly associated with hypertension. Hypertension has a stronger association and causal link with five particular behaviours: Tobacco use, excessive use of alcohol, physical inactivity, unhealthy diet (high salt intake and, insufficient fruit and vegetable consumption) and obesity which are consequences of urbanisation in developing countries (van de Vijver et al., 2013).

Many prevalence studies have been conducted on adult hypertension in Nigeria but only few has been conducted among children and fewer looked at hypertension across all ages in a setting. Hypertension has hitherto not been seen as a problem in children but in adults. However, there is growing evidence of increasing prevalence in children (Bugaje et al., 2005; Samuels, 2012; Okoh and Alikor, 2013) with many adult hypertension beginning during childhood. In addition, hypertension in young people is largely undiagnosed and untreated especially in low-middle income countries (Samuels, 2012). Thus, the American Society for Hypertension (ASH) called for universal screening of all children aged  $\geq 3$  years (American Society of hypertension, 2004).

Hypertension prevalence data are crucial for understanding the magnitude of the problem, identifying groups at high risk for cardiovascular disease and evaluating the effects of interventions in policy and practice. To plan effective life course approach to prevention, the magnitude of the problem across all ages needs to be ascertained.

This study was therefore carried out to determine the blood pressure pattern, prevalence of hypertension and the risk factors among persons  $\geq 3$  years in Mokola community in Ibadan, Nigeria.

## MATERIALS AND METHODS

### General characteristics of the population

A cross-sectional population based prevalence study was carried out in Mokola, in Ibadan North Local Government areas (IBNLGA) of Oyo State. The community is urban and multi-ethnic with preponderance of Yoruba people. It is situated in the center of Ibadan metropolis. The inhabitants are mostly low to middle income class families. The community is well laid out and combines some of the features of an urban-slum as described by the United Nations Human Settlements Programme (United Nations, 2005). The people are mainly self-employed traders with a few working in the public service. There is a large popular food market in the community which serves many people in the city. Mokola is one of the 12 wards (ward IX) in Ibadan North Local Government Area (IBNLGA) and has an estimated population of 25,676 (males - 12,717; females - 12,959). Health care is provided mainly by private health establishments as there is no primary health care facility in the community but about 10 private clinics/hospital. The community is close to the University College Hospital, the premier tertiary hospital in Nigeria.

### Sample size

Sample size for the study was calculated using prior estimates of 44.3% prevalence of hypertension found among adults in urban

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**Table 1.** Classification of blood pressure for adults and children.

Blood pressure Classification	Adults		Children		
	SBP mmHg		DBP mmHg	SBP Percentile	DBP Percentile
Normal	<140	and	<90	<90 <sup>th</sup>	and <90 <sup>th</sup>
Pre hypertension	130-139	or	85-89	>90 <sup>th</sup> - <95 <sup>th</sup>	or >90 <sup>th</sup> - ≤95 <sup>th</sup>
Hypertension	≥140	or	≥90	≥95 <sup>th</sup>	and/or ≥95 <sup>th</sup>
Stage 1 Hypertension	140–159	or	90–99	≥95 <sup>th</sup> - ≤99 <sup>th</sup>	and/or Plus 5 mmHg ≥95 <sup>th</sup> - ≤99 <sup>th</sup>
Stage 2 Hypertension	≥160	or	≥100	> 99 <sup>th</sup>	and/or Plus 5 mmHg > 99 <sup>th</sup>
ISH	>160	and	<90		
IDH	<160	and	>90		

SBP, Systolic blood pressure; DBP, Diastolic blood pressure; ISH, Isolated systolic hypertension; IDH, Isolated diastolic hypertension.  
Source: Whitworth, 2003; Chobanian et al., 2003; CDC, 2005).

Lagos by the Nigerian Heart Foundation in 2003 and 0.6% prevalence among adolescents (10-19 years) in Zaria (2005). The sample size required for the study was calculated using these estimates at 2% tolerable error and 95% confidence. In addition design effect of 1.5 and 2 for the adult sample estimates and that of the children, respectively was used to address clustering. The minimum sample size was 3,548 for adults (≥18years) and 1,145 for children (0-18 years).

The multistage cluster sampling method was used to select the sample for this study. The community was divided into four quadrants delineated by a criss- cross of roads and a random sample of two quadrants was selected using balloting method. All the houses in the selected quadrants constituted the sampling units. Thus, all the houses in the selected quadrants were visited and all consenting adults and caregivers of children 3 to 18 years were interviewed by 12 trained nurses with additional training and standardisation on the protocol. Pregnant women and persons who self-reported history of renal diseases or the symptom and signs identified by research nurse were excluded from the study.

#### Data collection

A semi-structured questionnaire (in English and Yoruba languages depending on the one preferred by respondents) was used to collect information on demographic characteristics, history of alcohol intake, cigarette smoking, regular exercise, history of hypertension, diabetes mellitus, and the family history of hypertension and diabetes mellitus. Urinalysis was carried out to detect protein and/or sugar using dipstick test strips Combur test<sup>®</sup>, Ideal Health Care, India. Regular exercise was defined as regular physical activity that is planned, structured and repetitive for the purpose of conditioning any part of the body aimed at improving health and maintaining physical fitness such as jogging, brisk walking, cycling, dancing, swimming, gardening, or household chore. However intensity of activity was not explored.

#### Blood pressure measurement

Blood pressure was measured using mercury Accoson sphygmomanometer. The measurements were taken in the sitting position with exposed outstretched right arm on a table after resting for at least 5 min, using appropriate cuff size for age. Blood pressure was measured thrice for each person in the same visit with at least five minutes interval between measurements. The

average of the last two measurements was then estimated as the blood pressure level of the subject (William et al., 2009). When fewer than three measurements were recorded, the mean of the recorded measurements was used. For those with a raised BP, two additional BP measurements were made at least a week apart.

#### Anthropometric measurement

Height and weight of the respondents were measured. The BMI was calculated as weight in kilograms divided by the square of the height in meters wt (kg)/ht (m)<sup>2</sup>. BMI criteria of the International Obesity task Force (IOTF) were used to define obesity. The IOTF classification system provides extended BMI cut-off points by age and sex for overweight, obesity and severe obesity among children aged 2 to 18 years (Cole et al., 2000). Subjects with a BMI >30 kg/m<sup>2</sup> were categorized as obese or severely obese according to the extended BMI cut-points. In this study, they would only be referred to as obese subjects. However, underweight was not classified. Hence, children were categorised as normal weight, overweight and obese.

#### Definition of hypertension

In this study, hypertension was defined as average of two measurements of systolic and/or diastolic BP that is ≥140/90 mm Hg in any adult or self-reported treatment of hypertension with antihypertensive medication taken in the past 2 weeks (Whitworth, 2003) and in children, ≥95 percentile for gender, age and height in children using the standard BP charts developed by the National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents, United States of America (Chobanian et al., 2003). The total hypertensive population was divided into 3 subsets namely: Combined systolic and diastolic hypertension (SDH), isolated systolic hypertension (ISH) and isolated diastolic HTN (IDH). In children, the 95th percentile relative to age and sex was used as cut-off to pick isolated systolic and diastolic measurements as appropriate (Table 1b). The values obtained from our study are shown in Table 1.

#### Data analysis

Data was collated and analyzed using IBM Statistical Package for



**Table 1b.** Classification of isolated systolic and diastolic blood pressure for children.

Children percentile Classification	95 <sup>th</sup> Percentile		
	mmHg		
Age group (years)	SBP		DBP
<b>3-5</b>			
ISH	≥116	and	<76
IDH	<116	and	≥76
<b>6-9</b>			
ISH	≥122	and	<78
IDH	<122	and	≥78
<b>10-12</b>			
ISH	≥126	and	<82
IDH	<126	and	≥82
<b>13-15</b>			
ISH	≥136	and	<86
IDH	<136	and	≥86
<b>16-17</b>			
ISH	≥142	and	<92
IDH	<142	and	≥92

SBP, systolic blood pressure; DBP, diastolic blood pressure; ISH, Isolated systolic hypertension; IDH, Isolated diastolic hypertension.

Source: Chobanian et al. 2003; CDC (2005).

Social Sciences (SPSS)<sup>®</sup> version 20. The data was summarised using descriptive statistics such as means, standard deviation, range, proportions and percentages. Chi square test was used to determine the significance of association of hypertension with known risk factors measured. Logistic regression model of variables significant at bivariate analysis was used to determine the independent predictors of hypertension. Level of significance was set at 5 and 95% confidence intervals (CI) were calculated for Odds Ratio (OR).

#### Ethical consideration

This study was carried out in strict adherence to the Helsinki Declaration principles of 1975, as revised in 2000 (available at [http://www.wma.net/e/policy/17-c\\_e.html](http://www.wma.net/e/policy/17-c_e.html)). Individual verbal informed consent was obtained from adults and parents of children. Assent was obtained from the children. Those discovered to have abnormal results were followed up with free consultations and free counselling by the consultant physician in the team (MAO); but they bought their medications. Those who required further investigation and specialist attention were duly referred to the University College Hospital, Ibadan. Confidentiality was maintained all through data collection and analysis. The respondents' identification was protected as only codes were used as identifier.

## RESULTS

A total of 5540 persons consisting of 3780 adults 18 years and above (68.2%) and 1760 children (3-17years) had complete data which were analysed for this study. Table 2 shows the socio-demographic characteristics of

respondents by broad age group into: Children ( $\leq 10$  years) constituting 17%, adolescents (11-17 years) -15% and adults ( $\geq 18$  years) - 68%. Overall, there was a slightly female preponderance (51.4%) and this was more pronounced among children. A high proportion of the respondents was not married (59.3%) and less than 2% were either divorced or separated. Only 6.4% of the respondents had no formal education and this was least among respondents aged 11 to 17 years. A similar pattern was observed among respondents with tertiary education with majority of them 18 years and above. About two thirds (68.4%) of the respondents aged 18 years and above were in employment with just above one quarter (27.9%) of them being unemployed. Less than 2% of children aged 10 years and below reported that they were employed. A sizeable percentage (72.4%) of the respondents was Christians.

Table 3 shows the summary statistics of blood pressure and the proportion of respondents who were hypertensive. Among the adults, the mean systolic and diastolic blood pressure was 130.1 (20.6) mmHg and 79.8 (12.6) mmHg, respectively. The mean systolic and diastolic blood pressure was 110.8 (12.4) mmHg and 68.3 (9.7) mmHg, respectively among the children. The mean diastolic and systolic pressures increased with age (Figures 1 and 2). As shown in Figure 2 there are some extreme values of diastolic and systolic blood pressure among the adults. The overall number of respondents presenting with systolic and diastolic BP greater than 140 and 90 mmHg

**Table 2.** Socio-demographic characteristics of the respondents.

Variable	Age-group (Years)			Total (N=5540) n (%)
	≤10 (N=950) n (%)	11-17 (N=810) n (%)	18+ (N=3780) n (%)	
<b>Gender</b>				
Male	447(47.1)	383(47.3)	1865(49.3)	2695(48.6)
Female	503(52.9)	427(52.7)	1915(50.7)	2845(51.4)
<b>Education</b>				
None	48(5.1)	11(1.4)	294(7.8)	353(6.4)
Primary	859(90.4)	192(23.7)	471(12.5)	1522(27.5)
Secondary	27(2.8)	589(72.7)	1794(47.5)	2410(43.5)
Post-secondary	0(0.0)	6(0.7)	801(21.2)	807 (14.6)
University	0(0.0)	6(0.7)	348(9.2)	354 (6.4)
Not known	16(1.7.0)	6(0.7)	72(1.9)	94 (1.7)
<b>Marital Status</b>				
Married	8(0.8)	13(1.6)	2088(55.2)	2109 (38.1)
Single	927(97.6)	785(96.9)	1572(41.6)	3284 (59.3)
Separated/Divorce/ widowed	0(0.0)	1(0.1)	96(2.5)	97 (1.8)
Not known	15(1.5)	11(1.4)	24(0.6)	50 (0.9)
<b>Employment</b>				
Employed	16(1.7)	334.1)	2587(68.4)	2636(47.6)
Unemployed	894(94.1)	738(91.1)	1056(27.9)	2688(48.5)
Not known	40(4.2)	39(4.8)	137(3.6)	216(3.9)
<b>Religion</b>				
Christian	678(71.4)	580(71.6)	2753(72.8)	4011(72.4)
Islam	246(25.9)	216(26.7)	965(25.5)	1427(25.8)
Others	26(2.7)	14(1.7)	62(1.6)	102(1.8)

were about 15 and 11% respectively. The affected adults were referred to the private clinic of one of the investigators for further investigation and treated. The mean diastolic and systolic pressures were higher in females than males among those ≤10years ( $p=0.29$ ) and about same among the adolescents ( $p=0.58$ ). Among the adults the diastolic pressure was marginally higher among males than females, while it was only in the age group 18 to 35 years that men had higher systolic and diastolic blood pressure than females ( $p<0.0001$ ) (Table 3).

The prevalence of hypertension was 27.3% in adults and 12.8% in children < 18 years. Isolated systolic hypertension was found in 10.3% of adults and 4.4% of children while isolated diastolic hypertension was found in 4.7% of adults and 5.3% of children, respectively. Among the children, there was no significant difference in the proportion of males and females with hypertension (OR 1.29 (0.98, 1.72) and isolated systolic hypertension (OR 1.20 (0.76, 1.90)). However, the odds of isolated diastolic hypertension were significantly two times greater in females than in males (OR 1.75 (1.13, 2.71)). Contrarily, among the adults, the odds of hypertension and isolated systolic hypertension were 1.32 and 2 times,

respectively more among the males compared to females. No significant difference was demonstrated for isolated diastolic hypertension between sexes among adults (OR 0.76 (0.56, 1.03)).

### Prevalence of risk factors for hypertension

Table 4 shows that obesity was present in 13.1% children and 23.2% adults. Among adults, 8.4% ever smoked compared to less than 1% among children. But alcohol use was reported by 27% of adults and 1% of children 11 to 17 years. The proportion of adults engaged in regular exercise (42%) was higher than among children being 20% in those less than 10 years and 30% for 11 to 17 years. Less than 1 and 2% children and adults had sugar while 3 and 2% had protein, detected in their urine, respectively. About 4% of adults reported they were currently on anti-HTN drugs prior to study. At bivariate analysis, no significant difference was demonstrated in the use of alcohol and smoking among children ≤ 10 years and adolescents (11-17 years). However, among the adults, the proportion of those who smoke cigarette ( $p<0.0001$ ) and used alcohol ( $p<0.0001$ ) increased with

**Table 3.** Prevalence of hypertension in children and adult respondents by sex.

Parameter	Children						OR (95% CI) (M/F) Reference category = F	
	<=10 years		11 -17 years		Total (N=1760)			
	Male (N=447) n (%)	Female (N=503) n (%)	Male (N=383) n (%)	Female (N=427) n (%)				
HTN	66 (14.8)	95 (18.9)	28 (7.3)	37 (8.7)	226(12.8)	1.29(0.98-1.72)		
ISHTN	25 (5.6)	29 (5.8)	8 (2.1)	15 (3.5)	77(4.4)	1.20(0.76-1.90)		
IDHTN	21 (4.7)	44 (8.7)	11(2.9)	17 (4.0)	93(5.3)	1.75(1.13-2.71)*		
	<b>Mean(SD)</b>							
Systolic BP	106.4(12.0)	107.2(12.3)	115.0(11.9)	115.4(10.6)	110.8(12.4)			
Test-statistics	t= -1.056, p=0.291		t = -0.554, p=0.580					
Diastolic BP	66.2(10.1)	67.1(10.2)	69.7(9.2)	70.8(8.5)	68.3(9.8)			
Test-Statistics	t= -1.341, p=0.184		t= -1.791, p=0.074					
Parameter	Adults						OR (95% CI) (M/F)	
	18-35years		36-55 years		56 years+			
	Male (N=1149) n (%)	Female (N=1117) n (%)	Male (N=498) n (%)	Female (N=539) n (%)	Male (N=218) n (%)	Female N=259 n (%)		
HTN	236(20.5)	97(8.7)	187(37.6)	208(38.6)	136(62.4)	167(65.5)	1031(27.3)	0.76(0.66-0.88)*
ISHTN	149(13.0)	27(2.4)	39(7.8)	42(7.8)	59(27.1)	73(28.2)	389(10.3)	0.53(0.42-0.65)*
IDHTN	41(3.6)	41(3.7)	49(9.8)	36(6.7)	10(4.6)	2(0.8)	179(4.7)	0.76(0.56-1.03)
	<b>Mean(SD)</b>							
Systolic BP	128.6(12.4)	118.8(13.1)	134.1(19.3)	134.1(24.2)	149.6(26.4)	151.9(28.4)	130.0(20.5)	
Test-Statistics	t =18.137, p=0.000		t= -0.031, p=0.976		t= -0.929, p=0.353			
Diastolic BP	77.1(9.4)	74.5(9.9)	85.5(13.1)	85.1(14.3)	87.3(14.0)	85.8(14.4)	79.8(12.6)	
Test-Statistics	t=6.161, p=0.000		t=0.425, 0.671		t=0.250,p=1.152			

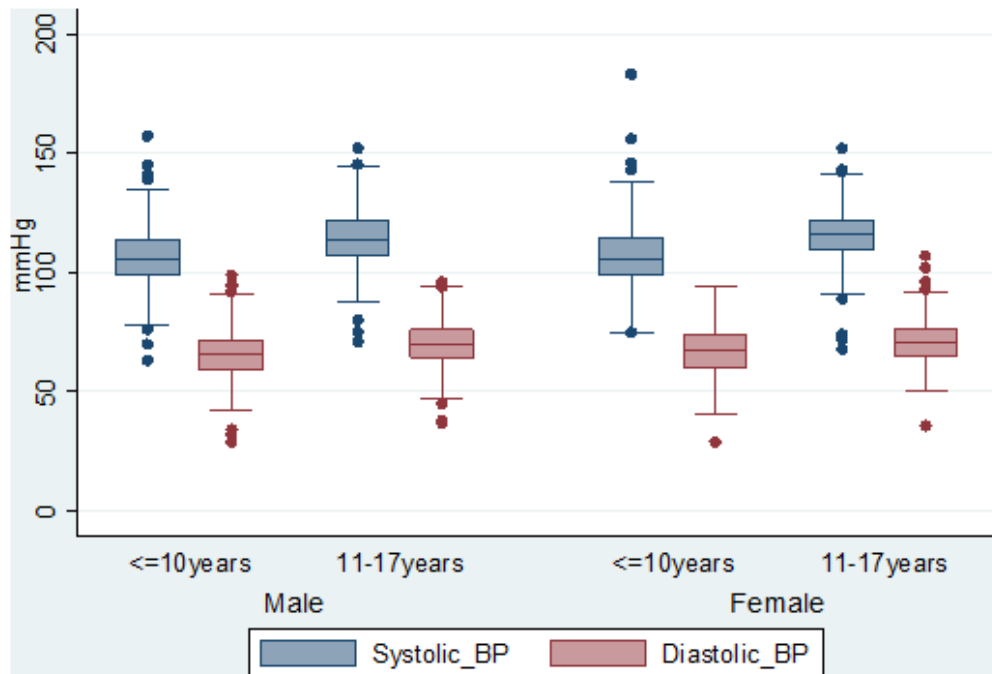
HTN, Hypertension, ISHTN, Isolated systolic hypertension; IDHTN, Isolated diastolic hypertension; \*Significant at  $p < 0.05$ .

significantly with age with those aged 56 years and above having the highest, respectively. More of the adolescents reported to have engaged in regular exercise than children  $\leq 10$  years ( $p < 0.0001$ ) while no significant difference was demonstrated among the adult age groups. Among

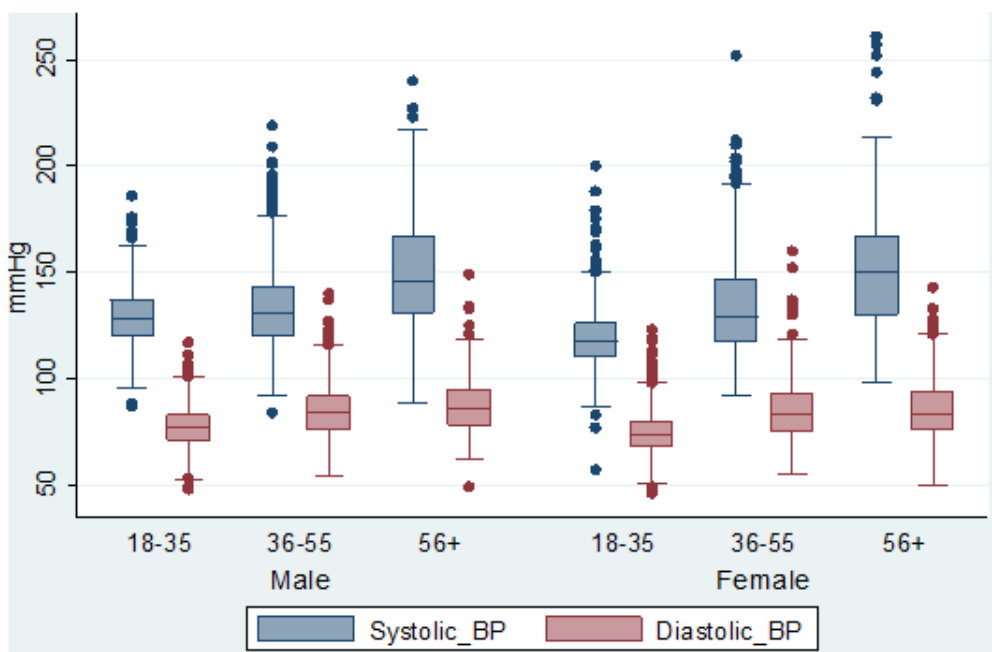
the children, more of the children  $\leq 10$  years were overweight and obese compared with adolescents ( $p < 0.0001$ ) whereas among the adults, the proportion overweight and obese increased significantly with age ( $p < 0.0001$ ). The use of stimulants also increased significantly with age

among the adults ( $p < 0.0001$ ) and children ( $p < 0.0001$ ).

Those who had protein and sugar in their urine increased significant with age among adults and it was only the proportion of those with protein that was significantly higher among the adolescents



**Figure 1.** Boxplot showing blood pressure of children (10-17years) by gender.



**Figure 2.** Boxplot showing pattern of blood pressure of adult (18 years and above) by gender.

compared with children  $\leq 10$  years. The proportion of those who were on anti-hypertensive medication prior to the study increased significantly with age ( $p < 0.0001$ ) (Table 4).

**Association between selected risk factors and hypertension**

The association between selected risk factors and

**Table 4.** Prevalence of selected risk factors for hypertension by age group of respondents.

Variable	Children Age-group (Years)			Adult age-group (Years)			Overall total	
	≤10	11-17	Total	18-35	36-55	56 & above		Total
<b>Smoking status</b>								
Yes	7(0.77)	4(0.51)	11(0.65)	144(6.50)	110(10.92)	53(11.70)	307(8.35)	318(5.92)
No	907(99.23)	775(99.49)	1682(99.35)	2072(93.50)	897(89.08)	400(88.30)	3369(91.65)	5051(94.08)
Total	914	779	1693	2216	1007	453	3676	5369
Test-statistics	χ <sup>2</sup> =0.415, p=0.519			χ <sup>2</sup> =25.283, p=0.000				
<b>Alcohol intake</b>								
Yes	2(0.22)	8(1.02)	10(0.58)	524(23.81)	327(32.54)	137(29.91)	988(26.97)	998(18.57)
No	925(99.78)	776(98.98)	1701(99.42)	1677(76.19)	678(67.46)	321(70.09)	2676(73.03)	4377(81.43)
Total	927	784	1711	2201	1005	458	3664	5375
Test-statistics	Fisher's test=0.051			χ <sup>2</sup> =29.009, p=0.000				
<b>Regular exercise</b>								
Yes	186(19.96)	244(30.31)	430(24.76)	926(41.47)	457(44.63)	197(42.18)	1580(42.43)	2010(36.81)
No	746(80.04)	561(69.69)	1307(75.24)	1307(58.53)	567(55.37)	270(57.82)	2144(57.57)	3451(63.19)
Total	932	805	1737	2233	1024	467	3724	5461
Test-statistics	χ <sup>2</sup> =24.856, p=0.000			χ <sup>2</sup> =2.883, p=0.237				
<b>BMI</b>								
Underweight	N/A	N/A	N/A	175(7.72)	38(3.66)	20(4.19)	233(6.16)	233(4.21)
Normal	763(80.32)	620(76.54)	1383(78.58)	1412(62.31)	414(39.92)	174(36.48)	2000(52.91)	3383(61.06)
Overweight	45(30.61)	102(12.59)	147(8.35)	281(12.40)	272(26.23)	118(27.74)	671(17.75)	818(14.77)
Obese	142(61.74)	88(10.86)	230(13.07)	398(17.56)	313(30.18)	165(34.59)	876(23.17)	1106(19.96)
Total	950	810	1760	2266	1037	477	3780	5540
Test-statistics	χ <sup>2</sup> =38.675, p=0.000			χ <sup>2</sup> =288.953, p=0.000				
<b>Stimulant</b>								
Yes	15(1.63)	63(7.99)	78(4.56)	414(18.57)	390(38.27)	220(48.03)	1024(27.62)	1102(20.35)
No	906(98.37)	725(92.01)	1631(95.44)	1816(81.43)	629(61.73)	238(51.97)	2683(72.38)	4314(79.65)
Total	921	788	1709	2230	1019	458	3707	5416
Test-statistics	χ <sup>2</sup> =39.514, p=0.000			χ <sup>2</sup> =244.768, p=0.000				
<b>Sugar level</b>								
Yes	1(0.18)	3(0.56)	4(0.36)	7(0.53)	16(2.54)	12(4.21)	35(1.57)	39(1.17)
No	1(0.18)	3(0.56)	1093(99.64)	1305(99.47)	613(97.46)	273(95.79)	2191(98.43)	3284(98.83)
Total	557	540	1097	1312	629	285	2226	3323
Test-statistics	Fisher's test =0.367			χ <sup>2</sup> =25.801, p=0.000				

Table 4. Contd.

<b>Protein level</b>								
Yes	5(0.89)	27(5.04)	32(2.92)	26(1.99)	10(1.60)	14(4.84)	50(2.25)	82(2.47)
No	554(99.11)	509(94.96)	1063(97.08)	1280(98.01)	614(98.40)	275(95.16)	2169(97.75)	3232(97.53)
Total	559	536	1095	1306	624	289	2219	3314
Test-statistics	$\chi^2=16.554, p=0.000$				$\chi^2=10.417, p=0.005$			
<b>On HTN drug</b>								
Yes				3(0.18)	44(5.83)	59(16.16)	106(3.79)	106(3.79)
No	N/A	N/A	N/A	1676(99.82)	711(94.17)	306(83.84)	2693(96.21)	2693(96.21)
Total				1679	755	365	2799	2799
Test-statistics	$\chi^2=222.093, p=0.000$							

HTN, Hypertension; N/A, Not applicable (IOTF did not categorise underweight for children).

hypertension are shown in Table 5. Obesity was the only risk factor found to be significantly associated with hypertension in both children and adults in this study. Obese children (aged 11-17 years) had 2 times the odds of being hypertensive compared with normal weight children (OR= 1.50 95%CI: 1.03-2.20) while overweight and obese adults had 3 times (OR =3.20 95%CI: 2.15-4.75) and 4 times (OR =3.5 (95%CI: 2.40 -5.22) the odds of being hypertensive compared to normal weight adults. The other risk factor found to be significantly associated with hypertension among children was age whereby those aged 11 to 17 years had 60% decreased risk of being hypertensive compared with those  $\leq 10$  years old. Whereas, among adult other risk factors include being male (OR = 1.31 95%CI: 1.13 - 1.51), ever smoked (OR = 1.66 (1.30 - 2.1), ever used alcohol (OR = 1.40 95%CI: 1.20, 1.65) and employed (OR = 1.96 95%CI: 1.65 - 2.34). In the logistic regression analysis age remained significant predictor of hypertension among the children. Those aged 11 to 17 years demonstrated significant decreased risk of 57%

[AOR= 0.43 (95%CI 0.32, 0.58)] compared to those in age group  $\leq 10$  years. However, those obese still had 44% increased risk of hypertension compared with normal weight children but this association was not significant [AOR = 1.44 (95%CI 0.98, 2.10)]. Among adults, being aged 35 to 55 years [AOR = 3.80 (95%CI 2.73, 5.29)] and 55+ years [AOR = 7.37 (95%CI 4.90, 11.10)], overweight [AOR = 2.55 (95%CI 1.39, 4.71)] and obese [AOR = 3.02 (95%CI 1.65, 5.52)] remained significant predictors of hypertension. In addition, the females demonstrated 45% decreased risk of hypertension compared with males [AOR = 0.55 (95%CI 0.42, 0.71) (Table 4).

## DISCUSSION

This study highlights the prevalence of hypertension in children and adults as well as associated risk factors in an urban community. Among the children (3 to 17 years), the overall prevalence of hypertension (12.8%) found in this urban community is higher than the 1 to 5%

reported for general paediatric population (Lurbe et al., 2010; Obarzanek et al., 2010), the 3.0% reported among US children and adolescents (May et al., 2012), 3.1% found among Chinese children (Meng et al., 2013) and the 11% reported among school-aged children with BMI  $>95^{\text{th}}$  percentile in the US (Sorof et al., 2004). However, it is less than the 18.2% reported in a study of children 5 to 16 years in India (Itagi and Patil, 2011). The prevalence also supports an increasing trend as it shows three-fold increase or more from figures reported over the last three decades in Nigeria (Akinlua et al., 2015; Obika et al., 1995; Abdurrahman et al., 1978). There is dearth of information on hypertension in young children in Nigeria. Only one paper was found to have recorded the prevalence of hypertension in children (2-5 years) in southeast Nigeria (Oduwale et al., 2012) and the prevalence (1.9%) was far less than what was found among children 3 to 10 years in this study (17.0%) and the males had a slightly higher prevalence than females. The differences between studies could be because in this study, the age for younger children extended

**Table 5.** Predictors of hypertension among children and adult by demographic characteristics and selected risk factors.

Variable	HTN (Children)		OR (95% CI)	AOR (95% CI)
	No (N=1534) n (%)	Yes (N=226) n (%)		
<b>Age group</b>				
≤10 (Ref)	789(83.1)	161(16.9)	1.00	1.00
11-17	745(92.0)	65(8.0)	0.43 (0.17,0.24)*	0.43 (0.32, 0.58)*
<b>BMI status</b>				
Normal (Ref)	1213(87.7)	170(12.3)	1.00	1.00
Overweight	131(89.1)	16(10.9)	0.87 (0.51,1.50)	1.07 (0.62, 1.87)
Obese	190(82.6)	40(17.4)	1.50 (1.03,2.20)*	1.44 (0.98, 2.10)
<b>Gender</b>				
Male (Ref)	736(88.7)	94(11.3)	1.00	NA
Female	789(85.8)	132(14.2)	1.30 (0.98, 1.72)	
<b>Education</b>				
None (Ref)	51 (86.4)	8 (13.6)	1.00	
Primary	870 (83.3)	175 (16.7)	1.28 (0.60,2.75)	
Secondary	576 (93.8)	38 (6.2)	0.42 (0.19,0.95)	NA
Post-sec	9 (75.0)	3 (25.0)	3.19 (0.50,20.3)	
University	8 (100.0)	0 (0.0)	-	
<b>Sugar level</b>				
Positive	3 (75.0)	1(25.0)	2.51 (0.26,24.34)	NA
Negative (Ref)	965 (88.3)	128 (11.7)	1.00	
<b>Regular exercise</b>				
Yes	378(87.9)	52(12.1)	0.90(0.65, 1.26)	
No	1134(86.8)	173(13.2)	1.00	NA
<b>HTN (Adult ≥ 18 years)</b>				
<b>Age group</b>				
18-35 (ref)	1933 (85.3)	333 (14.7)	1.00	1.00
36-55	642 (61.9)	395 (38.1)	3.57 (3.01, 4.24)*	3.80 (2.73, 5.29)*
55+	174 (36.5)	303 (63.5)	10.11(8.11, 12.60)*	7.37 (4.90, 11.10)*
<b>Gender</b>				
Male (Ref)	1306 (70.0)	559 (30.0)	1.00	1.00
Female	1443 (75.4)	472 (24.6)	0.76 (0.66, 0.88)*	0.55 (0.42, 0.71)*
<b>Education</b>				
None (Ref)	125 (42.5)	169 (57.5)	1.00	1.00
Primary	285 (60.5)	186 (39.5)	0.48 (0.36,0.65)*	0.45 (0.29, 0.69)
Secondary	1395 (77.8)	399 (22.2)	0.21 (0.16,0.27)*	0.38 (0.26, 0.57)
Post-sec	635 (79.3)	166 (20.7)	0.19 (0.15,0.26)*	0.41 (0.26, 0.64)
University	264 (75.9)	84 (24.1)	0.24 (0.17,0.33)*	0.38 (0.22, 0.65)
<b>Sugar level</b>				
Positive	16 (45.7)	19 (54.3)	3.20 (1.63,6.25)*	1.64 (0.75, 3.57)
Negative (Ref)	1597 (72.9)	594 (27.1)	1.00	1.00
<b>BMI Status</b>				
Underweight(Ref)	199 (85.4)	34 (14.6)	1.00	1.00
Normal	1570 (78.5)	430 (21.5)	1.60 (1.10,2.34)*	1.43 (0.80, 2.57)
Overweight	434 (64.7)	237 (35.3)	3.20 (2.15, 4.75)*	2.55 (1.39, 4.71)*
Obese	546 (62.3)	330 (37.7)	3.54 (2.40,5.22)*	3.02 (1.65, 5.52)*
<b>Marital status</b>				
Married	1362 (65.4)	722 (34.6)	0.30 (0.20,0.46)*	0.59 (0.31, 1.13)
Single	1330 (84.6)	242 (15.4)	0.10 (0.07,0.16)*	0.58 (0.28, 1.20)

Table 5. Contd.

Separated/Wid (Ref)	35 (1.3)	61 (6.0)	1.00	1.00
<b>Employment status</b>				
Employed	1791(69.2)	796 (30.8)	1.96 (1.65,2.34)*	0.95 (0.71, 1.29)
Unemployed (Ref)	861(81.5)	195 (18.5)	1.00	1.00
<b>Smoke status</b>				
Yes	193 (62.9)	114 (37.1)	1.66 (1.30,2.11)*	0.83 (0.55, 1.23)
No (Ref)	2486 (73.7)	886 (26.3)	1.00	1.00
<b>Alcohol intake</b>				
Yes	670 (67.8)	318 (32.2)	1.40 (1.20,1.65)*	1.40 (1.07, 1.83)*
No (Ref)	2000 (74.7)	676 (25.3)	1.00	1.00
<b>Regular exercise</b>				
Yes	1163(73.6)	417(26.4)	0.94(0.81, 1.09)	NA
No	1551(72.3)	593(27.7)	1.00	
<b>Take stimulant</b>				
Yes	650 (63.5)	374 (36.5)	1.89 (1.61,2.20)*	0.96 (0.75, 1.22)
No (Ref)	2054 (76.6)	629 (23.4)	1.00	1.00

Wid: Widow; \*significant at  $p < 0.05$ ; \*\*Stimulant: e.g kolanut, bitter cola, coffee.

to 10 years and the sample size was more. According to sex of the younger children, a general observation in this study and others studies in Nigeria are that hypertension is more among girls than boys. Due to the earlier onset of puberty, higher BMI among girls may possibly explain this gender disparity of BP (Also et al., 2016). In this study, the main predictor of hypertension in children is obesity and this was more among the girls than boys. The positive relationship between obesity and hypertension in children is similar to findings in previous studies in Nigeria and other parts of the world (Sorof et al., 2004; Oduwole et al., 2012). This gender difference in blood pressure pattern may also be attributed to hormonal changes that occur during puberty which has been noted to occur more rapidly in females than in males. The psychosocial stress associated with menarche has also been documented to cause an increase in blood pressure in early and mid-adolescent stage (Monyeki and Kemper, 2008).

With regards to adolescent age group, the hypertension prevalence of 8.0% among adolescents (11-17yrs) in this study is higher than the 0.6% (using  $>140/90$  mmHg) and 3.7% (using  $>2SD$  of mean blood pressure for age and sex) reported among secondary school children (10-19 years) in Zaria, (Bugaje et al., 2005) and 3% reported among 6 to 14 year old primary school children in Kano in northern Nigeria (Also et al. 2016). It is also higher than 4.7% reported among children 6-12 years in Port Harcourt, South-south Nigeria (Cole et al., 2000) and in children 10 to 16 years in South Africa (Moselakgomo et al., 2012). However, it is lower than the 17.5% reported by Ejike et al. among 13 to 18 years adolescent in northcentral Nigeria (Ejike et al., 2010), and 16.6% among

12 to 15 year olds in New Delhi, India (Bahl et al., 2015) but about the same with 7% reported in another study in India (Anand et al., 2014).

Going by sex among the adolescents, the prevalence of hypertension which was 7.3% in males and 8.7% in females in this study is more than that reported in south-south Nigeria (3.9% in males and 5.3% in females) and in South Africa (4.1% in males and 2.8% in females) (Moselakgomo et al., 2012) but less than in North central Nigeria (18.0% in females and 16.9 boys) (Ejike et al., 2010). However, it appears it is higher in females in Nigeria than South Africa. The prevalence of hypertension in Zaria adolescents was not disaggregated by sex but the proportions of those with systolic and diastolic hypertension were reported by gender and the proportion with isolated systolic hypertension was less than that found in our study for females (2.6% versus 3.5%) and more for males (2.3% versus 2.1%). However, for diastolic hypertension, the proportion of males was less in the Zaria study (0.8%) compared to our study (2.9%) and the proportion of females was more in our study (4.0%) compared with the Zaria study (2.0%). Albeit, in this study no significant difference in the proportion of male and female adolescents with hypertension and isolated systolic hypertension was demonstrated. But the females were significantly more likely to have isolated diastolic hypertension. The non-differentials in the prevalence of hypertension by sex is similar to the findings of a review of hypertension studies among children in Nigeria (Akinlua et al., 2015) and among adolescents in Zaria. This was also similar to the findings in India (Bahl et al., 2015; Anand et al., 2014). It is however unlike the findings among adolescents in



South Africa where the prevalence of hypertension was higher among boys than girls and this was related to the fact that females stay at home and carry out household chores which is also a culture in Nigeria. The significantly higher prevalence of diastolic hypertension among female adolescents in this study is similar to the findings in the Zaria study (Bugaje et al., 2005). This similarity is in three different geographical location (north, southwest and south-south) of Nigeria suggesting that this may be due to sex related factors, probably hormonal, rather than environmental.

The prevalence of hypertension (27.3%) among adults in this study is more than found in the children but within the range of 2.1 to 47.2% found among adults in Nigeria (Akinlua et al., 2015; Nwokorie, 2014). The prevalence among young adults and older adults is 14.7 and 38.1%, respectively while it is 63.5% among those 56+ years. The high prevalence in the older age group is similar to findings by Peltzer and Phaswana-Mafuya in South Africa. Older adults are disproportionately affected by hypertension, which is an established risk factor for cardiovascular disease (Peltzer and Phaswana-Mafuya, 2013). Looking at the trend from childhood to adult, findings in this study support the fact that hypertension increases with age (Chadha et al., 1999) and that hypertension in adulthood may be related to persistent blood pressure elevation in children and adolescents (Bao et al., 1995; Anjana et al., 2005). Blood pressure has been found to track from childhood into adulthood and vascular damage from hypertension starts in childhood (Chen and Wang, 2008). The increasing trend of blood pressure with age is also reflected in the mean systolic and mean diastolic pressure across the age categories in this study. The high prevalence of hypertension in young adult is similar to findings in past studies (Ekore et al., 2009). This underscores the need to start screening for hypertension from childhood and institute a life course approach to the control of hypertension in order to reduce the prevalence and complications.

The relationship between sex and hypertension among adults in this study is different from that in the children. Among the children there was no significant difference in prevalence by gender except for the females who had significant higher prevalence of isolated diastolic hypertension. Contrarily, among the adults (overall), the males were significantly more likely to be hypertensive than females. The male preponderance for hypertension (using the cut of  $\geq 140/90$  mmHg) is similar to findings in many past community based studies in Nigeria (Ekwunife and Aguwa, 2011; Akinlua et al. 2015; Sowemimo et al., 2015) and sub-Saharan countries (Ataklte et al., 2015). In a review of hypertension studies in Nigeria, a slightly higher prevalence in males (4.5 - 50.2%) than in females (8.8 - 48.8%) irrespective of the population settings and BP criteria was reported (Nwokorie, 2014). However,

with grouping of adult age into young, middle age and older adults, prevalence of hypertension was marginally higher among females in the young (38.6% vs. 37.6%) and middle aged (65.5% vs. 62.4%) groups. This is similar to findings in a survey of hypertension in an older adult population (50+ years) in South Africa where prevalence among females was (79.6%) compared to males (74.4%) (Peltzer and Phaswana-Mafuya, 2013). Studies have shown that through early middle age, or about age 45, high blood pressure is more common in men and women are more likely to develop high blood pressure at later age (Mozzafarian et al., 2015). The larger proportion of those aged less than 65 years may account for the overall higher prevalence in the males in this study.

Higher prevalence of hypertension is common to prevalence studies on hypertension among adults  $\geq 18$  years in urban communities in Nigeria and other African countries compared with rural communities and it is not different in this study as the prevalence is higher than that reported in many rural community studies as illustrated by Akinlua et al. (2015) in a systematic review of hypertension studies in Nigeria. However, hypertension prevalence in this study is still lower than the prevalence found in some other urban communities especially those carried out within the last decade (Akinlua et al., 2015) but higher than the prevalence in studies carried out more than a decade ago (Kadirir et al., 1999) suggesting increasing trend.

There were differentials in the prevalence of known risk for hypertension by age group and in the level of significance of the differences in proportion across the age groups in our study. The known risk factors were more prevalent among adults compared to children and this was more so with the use of stimulants and alcohol, smoking and presence of glycosuria. Overall, just about a third of respondents (comprising 41.8% of the adults and 24.4% of the children) in this study mentioned they engaged in exercise. This differential finding is understandable as human beings pick up various habits along the way growing up. There are limited studies on the prevalence of risk factors for hypertension among children in Africa. However, our findings corroborate risk factors such as overweight and obesity reported in some literature (Moselakgomo et al., 2012, Ejike, 2013). The higher prevalence of overweight and obesity among children aged  $\leq 10$  years compared to adolescent could be related to the fact that children store fat while in early childhood, engage less in physical activity including household chores. The children shed this fat as they grow older because of engaging in more physical activity and are less pampered with food especially energy dense food by their parents (Fetuga et al., 2011; Eze et al., 2017). However, our finding is contrary to a study in south-south Nigeria that found prevalence of overweight to be higher among adolescents 10 to 18 years of age

than among children 5 to 9 years of age (Eno-Obong and Ekweagwu, 2012). The increasing prevalence of some of the known risk factors with age among adults is similar to findings in previous studies (Nwokorie et al., 2014; Ntuli et al., 2015).

At bivariate and multivariate analysis, the selected known risk factors of hypertension found to be significantly associated with hypertension in this study are similar to findings in past studies (Ejike et al., 2008; Flores-Huerta et al., 2009; Raj et al., 2010; Oduwole et al., 2012; Nwokorie, 2014; Also et al. 2016). When put in regression model the only lifestyle related factor found to be significant predictor of hypertension was alcohol intake among the adults. Obesity which is a disease and a risk factor for cardiovascular diseases was also found to be a predictor of hypertension in both adult and children. This relates to the trend of increasing obesity and high blood pressure in this environment. The non-modifiable factors were increasing age in both adult and children and male sex in adults. However, Ekore et al. (2009) found no significant association between lifestyle habit like diet, alcohol consumption, smoking, physical exercise and hypertension among young adults attending a secondary mission hospital in Ibadan. Regular exercise was also found not to be significantly associated with hypertension in this study. In a study in Limpopo, rural South Africa none of the lifestyle factors was found to be significantly associated with hypertension (Ntuli et al., 2015). This supports the fact that rural dwellers are less exposed to westernisation. The contributory factor to the high prevalence of hypertension in urban areas is the growing urbanization and related lifestyle changes with a shift towards western habits (van de Vijver et al., 2013). Urban dwellers are more likely to consume high energy dense foods (with resultant obesity) and salt intake as well as engage less in physical activity (van de Vijver et al., 2013).

One limitation of this study is that it is a cross sectional study hence the causal relationship between the identified risk factors and hypertension cannot be affirmed. However, the risk factors found to be significant across the ages provide important information to plan larger cohort study for life-course approach and intervention to control hypertension.

## Conclusion

Our study revealed a high prevalence of hypertension in adults and children although with values lower in children than adults. The higher risk of hypertension in younger male and older female adults, female adolescents (diastolic hypertension), the obese and those who engage in unhealthy lifestyle corroborates past findings in this study area and suggests that the effect of the various interventions currently in place to stem the trend is sub-optimal. It is therefore recommended that periodic

screening and monitoring of blood pressure across all ages at every opportunity including in the course of routine health care and in well-child clinics should be encouraged. Multi-sectorial intervention that emphasizes lifestyle counseling by healthcare professionals and intensified effort at general public health education on hypertension and its associated risk factors is also suggested.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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*Full Length Research Paper*

## Role of treatment supporters beyond monitoring daily drug intake for TB-patients: Findings from a qualitative study in Nigeria

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This research was conducted in the Federal Capital Territory (FCT), Abuja of Nigeria and aimed at discovering areas of support needs required by TB patients from Treatment Supporters (TS), from the perspectives of TB patients, as compared to what the managers of TB program consider as ideal support. Here, qualitative design using Focus Group Discussions (FGDs), In-depth Interview (IDI) and Key Informant Interview (KII) were used. From the study, TB patients expressed their support needs while on treatment as follows: (1) monitoring and supervision of daily drug in-take, (2) motivational support to take the drugs as expected, (3) provision of support for feeding (when there is no food or means of eating), and (4) support for provision of transportation cost to visit TB clinic when the need arises. The study thus revealed that left on their own, TB patients may not be committed to taking their drugs and complete their treatment regimen, if any of these supports is lacking while on treatment. Patients with Treatment Supporters who were offered these supports, tend to complete their treatment regimen and not likely to default.

**Key words:** Tuberculosis, TB patients, supports needs.

### INTRODUCTION

Tuberculosis (TB) remains a major global health problem, responsible for ill health among millions of people each

year. TB ranks as the second leading cause of death from an infectious disease worldwide, following Human

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Immunodeficiency Virus (Global TB Report, 2014). Apart from this, TB was responsible for 1.5 million people's deaths (1.1 million HIV-negative and 0.4 million HIV-positive) (Global TB Report, 2015). Nigeria is one of the six countries (India, Indonesia, China, Nigeria, Pakistan and South Africa) accounting for 60% of new TB cases and progress in TB control globally depends equally on major advancement in TB prevention and care (Global TB Report, 2016). An important mandate of Community Tuberculosis Care (CTBC) program in Nigeria is demand creation for TB services through health education, social mobilization and awareness via trained individuals and Community Based Organizations (CBOs) involved in TB control at the community level. This is expected to translate into early TB detection, referral and treatment, also aimed to improve community support to TB patients through implementation of Treatment Supporters' concept and other community support structures which also include TB clubs in schools.

WHO-recommended Directly Observed Treatment Short-course (DOTS) requires patients taking their drugs under daily observation of a healthcare professional (World Health Organization, 2001). DOTS ensures better patient adherence though it places a high burden of care on both providers and patients, leading to increased work load and patients having to walk long distances daily to receive their medication, which often results in high level default in treatment due to transportation costs.

Although it may be argued that tests and drugs are free for TB patients and therefore all other expenses should be left for patients to bear, reality shows that some patients cannot afford these other costs. This category of individuals constitutes a larger proportion of Nigerian population. Therefore, ignoring the socio-economic aspect of TB treatment has grave implications for disease control and development (World Bank Report on Poverty in Nigeria, 2014). The socioeconomic context of providing care and services for TB patients cannot be neglected especially in poor and developing countries.

For example, in the last (2013) National Demographic Health Survey (NDHS) conducted in the country, findings from household possessions indicated that; "in both urban and rural areas, only a small percentage of households possess a means of transport. Rural households are slightly more likely than urban households to own a motorcycle or scooter (34% versus 27%) or a bicycle (23% versus 13%), only 9% of households own a car or truck" (National Population Commission (NPC) [Nigeria] and ICF International, 2014).

While the DOTS approach has been in place and seems to have lessened the burden of care on patients, adherence to TB treatment still leaves much to be desired especially in a tenuous health system lacking in adequate human resources for health and infrastructures. As a result of this indisputable factor, the introduction of

treatment support in TB therapy is meant to complement efforts and the effectiveness of this strategy has also engaged scholars' attention. Review of literature on patients' understanding of treatment support shows clearly the importance of patients' social networks in facilitating effective treatment support for TB. Findings from studies underscore the need for a patient-centered approach to TB treatment as a veritable approach for disease treatment, cure and control.

In this respect, four factors are key; proximity to patient, emotional support, moral authority of the treatment supporter and the demonstrated confidence exhumed (Nachege et al., 2006). Proximity to the patient would enable the Treatment Supporter witness in-take of drugs by patient; obtain inventory of drugs to ensure availability as and when necessary. In providing emotional support, patients would expect a treatment supporter to demonstrate compassion, exhibit willingness to listen to the patient's concerns, fears, etc. and have the moral authority to command the patient's respect or influence his/her decisions (Nachege et al., 2006). The 'social capital' provided by a trusted patient-nominated treatment supporter (e.g. material and emotional support, health care utilization, etc.), may have contributed to saving lives, regardless of the DOTS component of intervention (Nachege et al., 2010).

In a qualitative study of patients' understanding of treatment support in Nepal, respondents reported that the TB treatment burden was high, particularly in terms of difficulties with social and psychological aspects of undergoing treatment. They identified three main areas for support during treatment, namely: relevant information for them and their families about their disease, its treatment, potential side-effects and what they should do if side-effects arise; approachable and supportive healthcare staff with whom patients feel comfortable discussing (often non-medical) problems that arise during treatment; and some flexibility in treatment to allow essential elements of patients' lives (Christopher and Newell, 2009). Having such support systems is beneficial in helping patients follow a physician's recommendations and a strong social support will help patients stick to their medical regimen by reminding them among other things to keep their medical appointments and take their medicines (John Hopkins Centre to Eliminate Cardiovascular Health Disparity, 2015).

The mandate of TB control in Nigeria is vested on the National TB and Leprosy Control Programme (NTBLCP). The trend of the annual TB case notifications of all forms of TB in the country shows an unimpressive drift, though TB treatment success rate remain progressively consistent. The result of the first National TB Prevalence survey (2012), indicated that TB prevalence level in Nigeria for 2012 is estimated at 323 (95% CI: 239-406) per 100,000; indicating a higher level of TB prevalence in the country, than previously estimated by the World

Health Organization (WHO) (The First National TB-Prevalence Survey in Nigeria, 2012).

In order to improve on treatment supporters' concept implementation in Nigeria, the Association for Reproductive and Family Health (ARFH), a Principal Recipient of the Global Fund Grant, conducted an Operations research using qualitative research methodology on patients' understanding of treatment supporter concept in Nigeria's Federal Capital Territory (FCT). The objective of this study was to identify and document patients' support needs during TB treatment from TB patients' perspectives, in order to inform the development of appropriate support and supervision strategies that accurately and appropriately meet patients' needs.

## MATERIALS AND METHODS

### Study area

The study area is the Federal Capital Territory [FCT]; fondly referred to as Abuja, is the capital city of Nigeria. It is located at the geographic center of Nigeria and is bordered by Niger, Kaduna, Nasarawa and Kogi states. It occupies a land area of about 7,315 km<sup>2</sup> (2,824 square miles). It was initially sparsely populated (1,406,239 population) as at the last census in 2006, which was nationally estimated at 140,431,790" (National Population Commission, Nigeria (2006). Currently, FCT is now the most rapidly expanding settlement in Nigeria with an annual growth rate of 9.3%. There are six area councils in the FCT namely; Abaji, Gwagwalada, Kuje, Bwari, Kwali and Abuja Municipal Area Council (AMAC). The major ethnic groups are Gwari, Hausa and Fulani.

### Study design

As shown in Table 1, one public health facility providing TB services was purposively selected in each of the area council due to their patronage by members of the community. The research methodology is qualitative. Key Informant Interviews (KII) and Focus Group Discussions (FGDs) techniques were adopted. The suitability of the choice of methodology was based on the naturalistic and descriptive nature of qualitative research (Crosby et al., 2006); which is helpful to provide the information that addresses the specific objectives of the study. More importantly, the purpose of qualitative research is to understand social life and to disclose reality exactly as it is (Sotirios, 2003).

### Study population and sampling

Owning to the specific objective and nature of the study, the sampling methodology for the selection of participants was purposive. Data was collected from three categories of respondents, namely; Treatment Supporters, health care workers providing health care services to TB patients in DOTS centers and TB patients on treatment. While Treatment Supporters and health care workers were interviewed through KII technique, TB patients participated in FGDs.

In each of the six Area Councils, two (2) FGDs (1 male, 1 female groups) were conducted among TB patients. These FGDs participants were identified and selected from DOTS facility's TB

Central register where TB patients' were registered after diagnosis of TB. Participants who were selected for participation in the FGDs have been on treatment for not less than two months preceding the study. Fifteen (15) Treatment Supporters (TS) were identified from facilities' records, and were interviewed as key informants across the six study sites. Lastly, in-depth interview was conducted with one (1) DOTS staff in each of the six facilities, where the FGDs were conducted.

Ethical approval for the study was granted by Federal Ministry of Health and Department of Public Health, National Health Research Ethics Committee. Consent from the management of the selected health facilities was obtained and participants were recruited into the study based on Informed consent.

### Data management and analysis

Data generated was recorded on a Digital recording device with the consent of the participants and transcribed verbatim. Data content was analyzed in a rigorous manner guided by the objectives and themes from the discussion guides used for each category of the participants. Also, social, economic, cultural and political contexts in which the study was conducted, was considered in the interpretation of the findings. No qualitative data analysis software was used.

## RESULTS

Data generated from this study revealed general low level of awareness and knowledge about TB among Treatment Supporters, health care workers and TB patients in DOTS centers and TB patients. The overwhelming majority of respondents lack accurate knowledge about the causes of TB. Although few described TB as a communicable or airborne disease, in most groups discussion conducted, patients described the modes of TB transmission as; sharing food, cigarettes and cutleries with an infected person. This widespread ignorance about TB is also a reflection of people's beliefs in the communities. Most patients admitted that they never knew they had the disease until they were enrolled for treatment in a DOTS facility. This finding corroborated the result from the Knowledge, Attitude and Practice (KAP) survey conducted in six states selected from each of the six geo-political zones of the country in 2012. Survey results revealed that only 27% of respondents surveyed knew the cause of TB (National TB Knowledge, Attitude and Practice (KAP) survey, 2012). This is a slight increase over the baseline figure of 19.5% ( $p < 0.05$ ), conducted in 2008 Survey.

Apart from this, there were also several misconceptions about TB which point towards ignorance and lack of adequate knowledge about the disease. This is dangerous and may fuel stigma and discrimination. As a result, those with TB symptoms may be tempted to avoid taking measures that will reveal their identity, and regrettably, may prevent them from seeking treatment at appropriate place. The reported delays in seeking TB therapy from appropriate facilities may not be unconnected

with ignorance about the disease. Furthermore, where availability of TB treatment services is obtainable, due to lack of knowledge about the disease, TB symptoms are mistaken for other ailments such as malaria, typhoid and ordinary cough and consequently, many potential TB cases may be missed.

Based on experiences shared across the 12 FGDs, the period of TB treatment is a trying one that requires every support that TB patients could receive to adhere to treatment regimen. The period is characterized by several challenges, including difficulties in swallowing some of the drugs, considered to be too big in size, associated with nausea, vomiting, uneasiness and loss of appetite, especially during the 2-month intensive phase of TB treatment. However, these unfavorable experiences in TB patients' perspective, begin to subside even as initial TB symptoms weakens due to treatment effect and also coupled with effective treatment support from patient's family members, treatment supporters and the DOTS facility health worker.

Analysis of data revealed four elements that reflected patients' perception of TB treatment support, namely: monitoring and supervision of drug administration, provision of emotional support, provision of support in feeding and provision of support in transportation.

## DISCUSSION

Findings clearly reinforced the type of support required by TB patients as outlined under the following sub-headings.

### Monitoring and supervision of drug administration

As part of the strategy to ensure adherence to treatment, patients initiating treatment are requested to bring someone who they trust and respect that could supervise and monitor their treatment. Interviews with DOTS staff in all the six Area Councils show that patients are given the opportunity to choose who they would like to be their Treatment Supporter. This was confirmed from the findings of the interviews conducted among TB patients and Treatment Supporters. Therefore, most of the people who act as Treatment Supporters were either related to the patient or friends of the patient family.

The quotations below were from DOTS staff description of a Treatment Supporter to a TB patient;

*We need somebody who is close to you who can be with you at all time... somebody that will support your treatment, to help you to make sure you're taking the drug at the time you should take it, and also to help you so that you will eat, small at frequent intervals so that you'll be able to recover what you have lost*

(body weight). Female DOTS Staff, Gwagwalada.

*The person should be close, either they are living in the same household or it's a walking distance or they are living in the same complex or living in the same community.* Male DOTS Staff, Kuje.

These characteristics put an enormous burden of care on treatment supporter who is expected to ensure that the patient takes his/her drug regularly and on schedule; and monitors the level of drug usage to ensure constant availability even when the patient is incapacitated. Interestingly, TB patients themselves acknowledged the need for someone to encourage or persuade them to adhere to the treatment regimen, especially when some measure of relief sets in. Some of the patients reported that they were discouraged from discontinuing treatment by their Treatment Supporters. The comments below corroborate the ideal Treatment Supporter's responsibility to a TB patient.

*When it is time to take my medicine, even when am sleeping, my husband will wake me up.* Female TB Patient, Kuje

*The drugs are with me. That is the normal thing I do. I collect the drugs and I give it to the patient. I give him a cup of water and she swallows them in my presence.* Male Treatment Supporter, Gwagwalada

*As for me, honestly there is nothing they have not done for me, my Treatment Supporter is trying his best, because if I can call him that my medicine is almost finished; before you know it, he comes to get another blister for me...most of the time, he comes on Saturdays, when he's supposed to be resting or doing other things and he normally care for me and ask how I am doing, whether the situation is getting better or not.* Male TB Patient, Kwali

*He helps me a lot to the extent that if my drugs is to finish tomorrow, he would call me to remind me saying: 'someone has called from Asokoro Hospital to remind you that your drugs will finish tomorrow, please come before you finish the one with you'.* Male TB Patient, Asokoro

In order to obtain their perception about treatment support, Treatment Supporters and DOTS staffs were asked to describe what it entails to provide such a support and how effective it has been. From the point of view of DOTS staff, having a Treatment Supporter is essential for adherence. Left on their own, patients may not be committed to taking their drugs according to the treatment regimen. But with a treatment supporter, they are encouraged, persuaded and reminded of the un-

wholesome consequences for missing their drugs. This support enables them to adhere to the treatment regimen. Supporting a patient at times requires collecting the drugs on behalf of the patient when he/she is not able to make it to the DOTS centre. In some cases, the Treatment Supporter may have to be called unplanned to attend to patients. This suggests that a Treatment Supporter must have the quality of providing care though may not be a trained health worker.

The following statements corroborate this finding:

*If the patient didn't see me, he will say they should go call me and immediately they will call me. If they call me, whatever the support he needed by that time I will just give.* Female Treatment Supporter, Kwali

*Giving support to the patient means I have to talk with her on how she takes her drugs, I have to be around most of the times to look over her, to watch over her. I have to tell her the time she is supposed to come for her checkup, that's after 2 months, 5 months and 6 months, I'm always there to take care of her. Then I tell her a way to prevent her family members from getting the disease.* Female Treatment Supporter, Gwagwalada

Apart from monitoring and supporting patients to take their drugs, the Treatment Supporter also gives emotional support to reinforce his/her efforts. Patients, from the point of view of Treatment Supporters, need to be encouraged and spoken to in comforting words to enable them complete their treatment.

*If I want to take TB drugs, I will just pretend and hide the drugs, but thank God that my Treatment Supporter will see it and complain and that is why I will now take the drugs.* Male TB Patient, Abaji

*Yes, my Treatment Supporter use to remind me through my telephone...* Male TB Patient, Asokoro

### Providing emotional support

Most TB patients considered taking their drugs as drudgery, complaining bitterly about the size of the drugs which they considered too big to swallow. Therefore, they need a lot of emotional support in form of encouragement, persuasions and reassurance of quick recovery to adhere to treatment.

Patients cherished and value motivations received from their Treatment Supporters, DOTS staff and members of their immediate families. Regarding motivations from health care workers, patients believed that dispensing drugs and managing them clinically is not enough; the

disposition of the health care worker to patients is as important as the drugs being administered. That is, effectiveness of TB therapy begins with the attitude of health care workers they interact with in the first place. While respondents were full of appreciation for some DOTS staff for their care and support during treatment, they castigated other health care workers, especially nurses in secondary level facilities, for their unfriendly attitude to them.

After their interface with the DOTS provider, the next source of care for most respondents was their immediate family members. Responses from TB patients revealed that their family members have been supportive and this has aided their quick recovery. They enumerated the receipt of material, financial and emotional support received; some specifically mentioned the invaluable emotional support provided by their close relatives such as from parents, spouses and siblings. Effective support received by some patients from their family links, may have informed the pattern of participants views as stated in the statements stated below:

*Whenever I am seating lonely and quiet, my husband usually comes to me and asks: 'why am I seating quiet, am I alright? And whenever my drugs are finished, he goes and gets them for me and he advises me to take the drugs.* Female TB Patient, Kwali

*Ever since I started this cough, I have not done anything by myself. My aunt is the one cooking for me. She is the one doing everything for me. She takes me out sometimes, and then if she sees that I am not happy, she talks with me to make me happy".* Male TB Patient, Bwari

*For me it was very traumatic to start taking drugs I have not been used to... but I got so many encouragements, people around me, my pastor's wife, she had such experience herself, they tried to tell me that it will stop, ...though even here they told me that when I started taking my drugs it will stop. And probably to be frank, if not for their own encouragement and everything, I would have stopped; because this is my last month, I wouldn't have taken it this far, I would have stopped, but they encouraged me that I had to complete the period of medication".* Female TB Patient, Asokoro

### Feeding support

According to TB patients, appetite for food— increases with the in-take of TB drugs. Unfortunately, for some, having to factor in the additional expenses on food in addition to other burden of care is a big challenge. In a



situation where the patient could ill-afford the extra demand for food; socio-economic support is needed at that stage. Inability to meet demands for food creates a disincentive to continue with the use of the drugs. -Some would not like to take the drugs fearing that it would lead to an increased appetite for food which they could not afford.

Treatment Supporters and DOTS staff reported that in such cases, there is need for intervention to either provide money to buy food or seek for assistance from willing members of the community to cover the gap. A DOTS staff reported how she had to promise a patient supply of food before she was convinced to take her drugs.

*When you take this medicine, it makes you eat, and sometimes is hard for me to get money to buy. Sometimes, food is available in the house but no money to buy other ingredients".* Female TB Patients, Bwari

*The support I provided is that, even sometimes I have to give patients money. Some patient will come here, they have not eaten, they don't have money for transport and they don't have anything to eat, so many times I give money to patients to go and eat. One time, a patient almost nearly collapsed in my office. I asked him; what is the problem? He said he has not eaten since morning.* Female DOTS Staff, Gwagwalada.

### **Provision of money for TB patients transportation to and from DOTS facility**

Interviews conducted with some DOTS staff provided some insights into patients' challenges with transportation. Although TB medication is free, the burden of transportation cost to and from the DOTS facility for drug resupply and follow up appointments on a weekly basis is a challenge for some patients. It was found that those who live far away from DOTS facilities are more likely to complain about transportation cost.

Those Patients, who were not able to afford the transportation cost to and from the facility, have to rely on the generosity of DOTS staff and Treatment Supporters, from time to time during the period of their treatment. The following quotations supported this finding:

*The only thing is that, there are occasions when I will not have money for transportation; so I have to walk down to collect drugs because I don't want to miss the date of my scheduled appointment. So, I normally undergo difficulty in trekking down to this facility and back home.* Female TB Patients, Bwari  
*My difficulty is getting transportation to get to this*

*place (DOTS centre). I will go and meet my brother to tell him that I am supposed to go and take drugs then he will find me some money for transportation.*  
Male TB Patient, Asokoro

The challenge of meeting transportation cost for routine visit to TB treatment centre by TB patient for their drug refill, has given rise to drug re-supply in advance, to minimize the frequency of visits to the health facility. This development was due to the low economic class to which majority of the TB patients belong. If real DOTS is to be practiced, TB patients will have to visit DOTS site on a daily and regular basis; but the Treatment Supporter will have to provide a bail-out for the attendant transport costs.

### **Treatment support and defaulting in TB treatment**

Interviews with Treatment Supporters and DOTS staff provided opportunity to explore the different factors that may be responsible for defaulting TB treatment. The findings revealed different factors that could be responsible for defaulting in TB treatment. Interestingly, they include: long duration of treatment, lack of close supervision and monitoring, difficulties involved in swallowing of drugs which are considered to be too big in size by some TB patients, and inability to meet financial burden required for obtaining TB treatment, which are connected with feeding and transportation costs to and from DOTS centers.

An important inference that was drawn from these findings is a correlation between treatment support and defaulting in TB treatment. Meaning that, where the elements of treatment support mentioned above are lacking, poor adherence to medication is a likely consequence leading to treatment default.

As soon as patients begin to feel better after two months of treatment (the intensive phase), they feel they are well enough and don't have to continue taking their drugs. At this stage, the intention to default begins to set in, however with persuasions and threats from their Treatment Supporters and DOTS staff, patients are encouraged to persevere to complete their treatment.

In order to reduce the incidence of defaulting by patients, Treatment Supporters and DOTS staffs were asked to share strategies they have devised and adopted. The main strategies mentioned are; close supervision and monitoring of drugs intake, as well as taking of inventory of TB drugs with patients. However, for a more effective supervision, some believed that managers of TB programs need to introduce home visits by DOTS staff. The justification being that, patients need to be followed up, encouraged or persuaded to continue and complete treatment.

### **Effectiveness of treatment support**

Going by opinions and views from TB patients on their experiences during their TB therapy, it can be safely asserted that the treatment support they received from members of their immediate family, Treatment Supporters and DOTS personnel, have been largely effective.

However, treatment support seems to be more effective where TB patient have maximum emotional and physical support from members of their family. This underscores the importance of selecting a family member as Treatment Supporter at the initiation of TB treatment. Although, this study did not explore preference between types of Treatment Supporters, a similar finding has been documented in a study on impact of treatment supporters in Pakistan (Soomro et al., 2012).

### **RECOMMENDATIONS AND IMPLICATIONS FOR TB PROGRAM DESIGN**

In the light of the above inferences drawn from views and opinions of majority of respondents, an effective treatment support is required for the patients to adhere strictly to treatment regimen for treatment success to be achieved.

Experiences shared by TB patients revealed that the treatment support they received from family members, their Treatment Supporters and the DOTS facility personnel has been effective. Most patients acknowledged that their ability to sustain the treatment until the present study was largely due to the quality of treatment support they got.

This study highlights the importance of patient-centered approach to TB treatment and underscored the TB patients' need for someone who can provide assistance for patients' drug in-take, and the needed emotional and material support. From the data generated from this study, TB patients' understanding of treatment support was mainly for:

- 1) Close monitoring of TB patients to ensure adherence to taking of drugs.
- 2) Provision of emotional support in terms of providing encouragement, persuasions and reassuring the patient of his/her ability to complete treatment and get cured.
- 3) Provision of food to meet up with increase in appetite engendered by drug taking.
- 4) Provision of assistance in transportation to and from DOTS facilities for routine visits to collect drugs and for subsequent follow up visits.

Based on the findings from this study, the following are being recommended to further enhance the control of TB in Nigeria and in other African countries.

### **Need for public enlightenment on TB**

In the light of general lack of awareness and knowledge about TB, even as acknowledged by the three categories of respondents, there is need for comprehensive public enlightenment on diseases' cause, symptoms, means of transmission and preventions measures. While designing public enlightenment activities, it would be suggested that behavior change communication strategies specifically targeted at the individual, family, community and policy makers be designed.

An integral part of communication strategy should be community mobilization. It is expected that through this, members of the community would be sensitized to complement government efforts and development partners in providing treatment support for TB patients, especially concerning their emotional, material and financial needs as highlighted in this paper.

### **Motivation**

Findings from this study revealed the need to motivate TB patients, Treatment Supporters and DOTS staff. Evidence abounds to show that indigent patients may not be able to meet with the financial needs for transportation and feeding required during the period of treatment. In the light of this, some form of incentives needs to be put in place to motivate these individuals to ensure effective treatment support of TB patients.

### **Creation of more DOTS facilities**

The findings from the study imply that some patients live far away from DOTS facilities and as a result, visiting the DOTS center for TB drug re-supply and follow up becomes a burden. The DOTS staff from Abaji and Gwagwalada Area councils confirmed this challenge. Therefore, more DOTS facilities would need to be created especially in communities where the prevalence of TB appears to be high. By so doing, accessibility to DOTS facility would be facilitated for TB patients and other presumptive TB cases that are yet to be detected.

### **Interpersonal communication skills**

Most TB patients found DOTS facility personnel friendly and supportive. Some of them believe that the healing process begins from interactions with a friendly DOTS staff. Therefore, nurses and other frontline health workers need to be trained on interpersonal communication especially concerning to dealing with TB patients. It would also be suggested that behavior change communication materials be designed specifically for

health care workers.

It is strongly believed that implementation of aforementioned measures would also stem the tide of defaulting in TB treatment.

Although TB drugs are free in Nigeria and Treatment Supporters are being engaged to support TB treatment, TB patients' support needs should be part of the design of Community TB care.

## Conclusion

Findings from this study revealed that the TB treatment burden is borne between DOTS staff, Treatment Supporter and patients. Although the study shares almost the same objectives with similar studies reviewed, it has revealed the importance and effectiveness of a patient-nominated Treatment Supporter and patient-centered approach to TB therapy.

As acknowledged by the three categories of respondents for this study; TB patients, Treatment Supporters and DOTS staff, the period of TB therapy is a demanding one for TB patients. More so, for those who belong to lower socio-economic class. Thus, it is difficult for the majority of TB patients to cope with financial demands of therapy. The burden is worse for patients taking into consideration the stigma and discrimination they have to contend with in an environment of limited or no knowledge about the disease.

Information gathered from the three categories of respondents, especially Treatment Supporters and DOTS staff, revealed that where the four elements of treatment support mentioned above are lacking, patients are likely to contemplate and to ultimately default on treatment. Some patients acknowledged that if not for the effective treatment support they received, they would have defaulted on treatment. The implications of this finding is that, left on their own, TB patients may not be committed to taking their drugs and complete their treatment regimen, if any of the supports highlighted in this study is lacking when needed. Patients with Treatment Supporters who offer these supports tend to complete their treatment regimen and not likely to default.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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*Full Length Research Paper*

# Health seeking behaviour among particularly vulnerable tribal groups: A case study of Nilgiris

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The article hinged upon exploring the patterns and determinants of healthcare utilization and financing amongst particularly vulnerable tribal groups (PVTG's) in Nilgiri district of Tamil Nadu. Three PVTG's viz Paniyas (P), Kattunayakans (KN) and Bettakurumbas (BK) are explored in the study. These groups have some quint essential features impacting the healthcare seeking behaviour e.g. Paniyas were subject to historical repression after they were brought over from Kerala as agricultural labourers culminating into their seclusion and accentuated patient provider wedge. Kattunayackans have their behaviour embedded in using magico-religious beliefs and indigenous medicines. Bettakurumbas are the other forest dwellers residing in Nilgiris biosphere reserve and contemporaneously seek institutional care. Mixed method approach (amalgamation of quantitative and qualitative) was adopted and the households were selected through two stage stratified random sampling. The health seeking behaviour was captured by running a Logit model and Blinder Oaxaca decomposition analysis was conducted to decompose the health gap amongst the tribal groups.

**Key words:** Health seeking behaviour, barriers to care, out of pocket expenses, vulnerable population, tribal group.

## INTRODUCTION

### Background

The state of health care provided around the world is an often ignored and under researched topic. A ubiquitous challenge for Indigenous communities globally is adequate access to and utilization of quality health care services. Many of these communities tend to be isolated in remote rural locations and have limited access to ambulatory, acute and specialized health care (Marrone,

2007). The variations in the availability of preventive and curative public health services amongst particularly vulnerable tribal groups are pronounced inequitable due to differences in infrastructure, human resources, supplies and spatial distribution. Burgeoning social inequality, booming private health sector, deteriorating quality of public health sector and to exacerbate, the

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barriers to access to healthcare has increased the differential vulnerability of tribal population. Most of the health service delivery pertaining to indigenous population has drawn flake as cultural sensitivities are not imbibed in it whereas the interpretation of illness amongst these communities is a culturally informed process. Ignoring the strong preference for cultural sensitivities jeopardizes the otherwise precarious health status of Indigenous population. In terms of health seeking behaviour; the concepts of health, healing and illness for adivasis transcends the biomedical realms and is concerned with reordering the social, environmental and spiritual balance (Eder et al., 2003). The fundamentals of health are understood from 'functional perspective' and as a state of dynamic equilibrium between an organism and its environment. Both patient and provider attributes have a bearing on the health seeking behaviour. Health in a tribal society is understood not as phenomena in isolation but in relation to the magico-religious fabric of existence. Also most tribal communities define health, medical care and aetiology of disease in relation to social context (Islary, 2014). Patients are more likely to adhere poorly to treatment regimens and refuse to take recommended services. Provider's side of exchange may include bias (or prejudice) against tribals, greater clinical uncertainty when interacting with tribal patients and beliefs (or stereotypes) held by provider about the behaviour or health of tribals. Also, it is exigent to note that health seeking behaviour among tribal communities illustrates the role of social capital and reflexive communities. There is a unanimous agreement pertaining to the rudimentary health status of tribals specifically the primitive tribes owing to their isolation, geographic remoteness and more recently land alienation endangering the nutritional status and access to healthcare.

### **Ethnography**

In Indian context the term indigenous tribe is also interchangeably used as Adivasi or 'original inhabitants', which literally means 'Adi or earliest time', and 'vasi or resident of'. The term has further been renamed as Particularly Vulnerable Tribal Groups in India. There are 75 centrally recognized Particularly Vulnerable Tribal Groups in the country who were originally categorized as Primitive Tribal Groups. Existence of pre agricultural practices, practice of hunting and gathering, zero or negative population growth and relatively low level of literacy compared to other tribal groups are some of the quintessential features embedded in these groups. Due to changes in their ecological settings as well as outside influences, these groups are facing the problem of survival in general: either in their health and nutritional aspects or in the process of acculturation.

There are six particularly vulnerable tribal groups in

Nilgiri district of Tamil Nadu of which three groups Paniya (P), Kattunayakan (KN) and Bettakurumbas (BK) are explored in the study. The Paniyas were brought over from Malabar in Kerala to the Nilgiris as agricultural labourers and are considered to be the lowest in the socio economic hierarchy whereas Kattunayakans connoting the word 'chiefs of forests' are considered adept sorcerers and work as healers using magico-religious herbal medicines. Bettakurumbas are the other forest dwellers residing in Nilgiris biosphere reserve that used to practice shifting agriculture before the ban was imposed on this practice. Betel leaf chewing to subdue hunger pangs is a common addiction among these tribes especially among Paniyas.

### **Rationale**

There is pronounced difference in healthcare utilization between the tribal and non-tribal population in India in general and Tamil Nadu in particular cutting across various dimensions of healthcare. For example for maternal health dimension the utilization rates for tribal population pertaining to indicators like full ante natal check-up and institutional delivery is 41.2 and 64.7% respectively vis a vis 52.1 and 94.6% for non-tribal population (Xaxa, 2014). Majority of Scheduled Tribe population depends on the public health system, as private providers do not have any interest to work in tribal dominated areas. Reports revealed that more than three-fourths of Scheduled Tribe population seeks treatment from Government funded health facilities, as compared to only 47% of non-scheduled tribes. One-fifth of scheduled tribes seeks health care services from private sources (Xaxa, 2014). However, reports and studies have not delved particularly into indigenous tribes, rendering it imperative to conduct specific surveys to elicit the information specifically on this vulnerable group

Despite significant disparities in the health outcomes, data and research on indigenous health is often unavailable because governments and organizations have been impassive in disaggregating statistics due to lack of resources or even official policy. There's dearth of figures to support the hypothesis of low utilization rates amongst the indigenous population. Research on tribal health so far has predominantly focused on the prevalence of morbidity, illness profile and health provision coverage rather than people's practices, knowledge, opinions of and attitude towards health provision in tribal areas (Jain et al., 2015; Yadav et al., 2010; Kerketta et al., 2009; Santhosam et al., 2013). This paper intends to compliment the previous literature and provide further insight into factors impacting health seeking behaviour in terms of utilization and barriers to utilization with the aim to influence policy formulation, decision making and targeted service provision planning for tribal population. Another improvisation is to add a

dynamic perspective in analysing individual's health seeking behaviour and check the exposition if agents are biased towards one type of healthcare and does not switch caregivers even if treatment was ineffective for them. Another pertinent issue grappling this economically and otherwise deprived community is payments related to health; incidence and intensity of which subjects them to further impoverishment and vulnerability given the narrow band of coping mechanisms at their disposal. Financial dimension (expenditure and coping) should be explored in depth to guide the policy makers to direct the intervention towards the component where it impacts the most.

## Objectives

There are two main objectives of this paper. The primary objective is to study the pattern and determinants/impediments of utilization of healthcare services amongst these tribals; and the secondary objective is to determine the factors affecting out of pocket expenditure. Also, the differences in the healthcare utilization among three tribal groups are analyzed.

## METHODOLOGY

### Study population and location

For the present research, we have selected Gudalur block of Nilgiris district (Tamil Nadu). This is situated at the tri-junction of three states of Tamil Nadu, Karnataka and Kerala and is divided into two taluks namely Gudalur and Pandalur. According to 2011 census, population of Gudalur is 49,535 out of which 12,433 are from the Particularly Vulnerable Tribal Groups. There are six particularly vulnerable tribal groups in Nilgiris of which three groups Paniya (P), Kattunayakan (KN) and Bettakurumbas (BK) are explored in the study. These two taluks consist of 14.3 and 32% of tribal population of Nilgiris respectively and abode to 336 tribal settlements.

### Sampling design and data collection

We adopted a mixed method sampling design via concurrent triangulation approach. The main purpose of this design is to offset the weakness inherent within one method with the strengths of the other method (Creswell and Plano Clark, 2007; Tashakkori and Teddlie, 2003). In this study, quantitative data was collected through survey method and the qualitative information through focussed group discussion; these two datasets were later corroborated in the interpretation and analysis section. Consistent with the objectives, the quantitative data was given more importance and qualitative data was used to complement the inferences.

For the quantitative analysis, a sample of 150 households were chosen through two stage stratified random sampling technique; whereas, qualitative information was ascertained through 12 Focused Group Discussions using a purposive sampling method. Participants who fulfilled the following eligibility criteria were included in the discussions. Firstly, the respondent should be a part of tribal group (KN, BK or P); secondly, he/she should not be less

than 15 years old and thirdly, the participant should be willing to participate.

Focus groups comprised of head of Adivasi Munnetra Sangam (tribal group leader), members of tribal community, traditional healers and district officers, discussions were generally conducted in their cultural centres or educational institutions. Data was gathered through structured interview process, involving face to face conversation.

### Data collection

Quantitative information was elicited by administering a questionnaire which encapsulated the information on the prevalence of disease, utilization trends and patterns, details of the inpatient and outpatient like the type of provider visited, expenditure incurred (direct and indirect) to avail the treatment and coping mechanisms to cover the expenses. While conducting qualitative analysis, user's perspective was kept on the fore. Questions assessing the mechanism to deal with infectious and other diseases, knowledge on traditional medicine, common practices adopted by the tribal communities, community financing in case of emergency, tribal population's adherence to modern medicine were discussed in detail.

### Sampling techniques

Three sampling techniques were adopted to measure the aforementioned objectives: Descriptive statistics, logistic regression and blinder Oaxaca decomposition analysis. Descriptive statistics provided a brief summary of the entire sample population categorised into predisposing, enabling and need based indicators. Logistic regression model was used to estimate the effect of covariates on probability of utilization of healthcare services. The covariates were selected through Andersen's framework of health care utilization (Andersen, 1968). This framework assumes that health care utilisation is influenced by predisposing factors, enabling factors and need based factors (Andersen, 1995). Decomposition analysis was conducted to measure the tribe wise differences in utilization of health care services, this was deconstructed using a "three fold" decomposition technique in which outcome difference (R) is divided into endowment effect (E), coefficient effect (C) and interaction effect (I) for logistic regression model (Jann, 2008).

$$R=E+C+I$$

In this model the contribution of group differences in predictors to the overall outcome difference was formulated from viewpoint of Group B<sup>1</sup> as against Group A. The E component measures the expected change in Group B's mean outcome if Group B had Group A's predictor levels for the second component (coefficient effect), the differences in coefficients are weighted by Group B's predictor levels. That is, the second component measures the expected change in Group B's mean outcome, if Group B had Group A's coefficients. The interaction term captures the interaction between differences in coefficients and differences in endowments. It is imperative to incorporate the interaction term because the differential between the two groups might arise due to the past exclusion culminated by historic repression or by contemporaneous one outside of health sector.

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<sup>1</sup>If Group B is KN then Group A is (BK and P), when Group B is P then Group A is (KN and BK). Similarly, if Group B is BK, Group A is (KN and P)

**Table 1.** Descriptive statistics.

Variable	Percentage	Type
<b>Predisposing factors</b>		
Age (in years)		Individual
Sex (%)		
Male	51.96	Individual
Female	48.04	
Tribe wise		Individual
Paniyas	46.44	
Kattunayakans	19.75	
Bettukurumbas	33.81	
Marital status (%)		
Never married	41.88	Individual
Currently married	47.29	
Widowed	10.11	
Divorced / separated	0.72	
<b>Enabling factors</b>		
Educational level (%)		Individual
Literate	48.28	
Illiterate	51.72	
Income (Quintiles)		
Poor	33.99	HH
Middle	34.48	
Rich	31.53	
<b>Need based factors</b>		
Health problems (%)		Individual
Suffering from illness	36.06	
No illness	63.94	
Seeking treatment	62.07	
Not Seeking treatment	37.93	
Utilization		
Inpatient care	37.3	Individual
Out patient	63.7	Individual

## FINDINGS

### Descriptive statistics

Table 1 presents the descriptive statistics of the participant's characteristics. The mean age of participants surveyed was 26.95 years. The percentage of male and female participants is 51.96 and 48.06% respectively. About 41% of the participants were unmarried and 47.29% of them were married. As far as the need based factors are concerned it is found that nearly 36.06% of the participants were ailing from some kind of illness of which 62% of the participants have been availing some form of health care services which includes both inpatient and outpatient services. Outpatient services were utilized by 63.7% and inpatient services were consumed by 37.3% of the participants respectively.

Figure 1 illustrates the reasons for non-utilization of healthcare facilities by the study group. One of the

ubiquitous issues plaguing the utilization patterns are the cultural barriers with 28% of households citing it as paramount reason for not seeking care. Residing in geographically isolated places is another governing factor acting as a barrier to access and utilization as 18.2% respondents reported travelling long distances from their settlements to the point of care. Yet another important determinant of non-utilization is practice amongst the tribals to seek the treatment only in the case of emergency and severe cases. They tend to neglect the symptoms of illness as 14.55% of those who are ill do not consider it as necessary to seek care immediately after the onset of disease. Since indigenous communities are living on the brinks of marginalization thus, financial constraints inhibit the take up of health service as healthcare is a luxury good for them. According to 11% of those surveyed, inability to pay for direct and indirect costs associated with treatment is major impediment to receive the care. However, among the quality indicators only long waiting hours is the significant factor of non-utilization.

Table 2 reflects the tribe wise analysis of the type of facility chosen in case of illness disaggregated into inpatient and outpatient. It is ascertained that 46.9% of Bettukurumbas and 40.2% of the Paniya prefer hospitals run by NGO's for hospitalisation, whereas 40.5% of kattunayakans, sought care from traditional healers. For the outpatient care, 26.4% of the Bettukurumba's preferred Government hospitals, 45% of the Kattunayakans resorted to traditional healing and 30.8% of Paniya tribes sought care from health facilities run by NGO's.

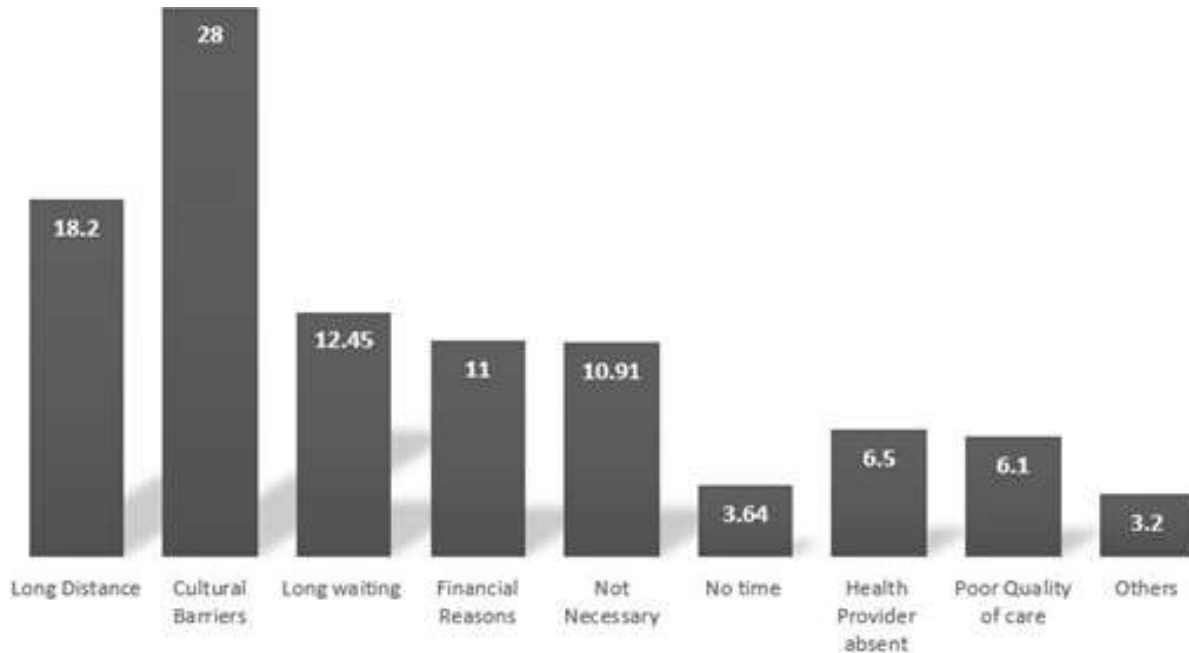
The utilization of public health facilities as presented in Figure 2 is subjacent as compared to both private providers and NGO's. The participants were probed about the reasons for not seeking care in the government facility. The cardinal reason for Paniyas is reflected upon the access parameter as 32% of the respondent's stated non -availability of required services as a reason for underutilization, 30% of the Bettukurumbas did not seek care due to long waiting hours. However, Kattunayackans feel that distance is the major impediment in seeking public health care.

### Logistic regression results

The results for logistic regression are represented in Table 3 which illustrates the marginal effects of determinants of healthcare utilization on the probability of seeking care. Healthcare utilization is being explained by a consortium of independent variables ranging from predisposing, enabling and need based factors.

### Effects of predisposing characteristics

Significant relation was found between household size



**Figure 1.** Barriers for utilization of health care facility.

**Table 2.** Type of facility chosen.

Tribe	IP/OP	Percentage			
		Government	NGO	Private	Traditional
BK	Inpatient	26.4	46.9	18.7	10
	Outpatient	20.9	23.4	38.9	16.8
KN	Inpatient	15.2	21.5	23.2	40.1
	Outpatient	11.6	28.2	15.1	45
P	Inpatient	19.8	40.2	23.5	16.5
	Outpatient	17.6	32.8	26.5	20.1

and healthcare seeking. The probability of healthcare utilization decreases by 12.7% with the addition of one more members in the household. Similarly, the coefficient for marital status is highly significant and the marginal effects tantamount to 44.8% point decrease in the probability of utilization for a married person when compared to unmarried person. Further, it is discerned from the model that transition from being literate to illiterate leads to increase in the probability of utilization by 37.9%.

#### **Effects of enabling characteristics**

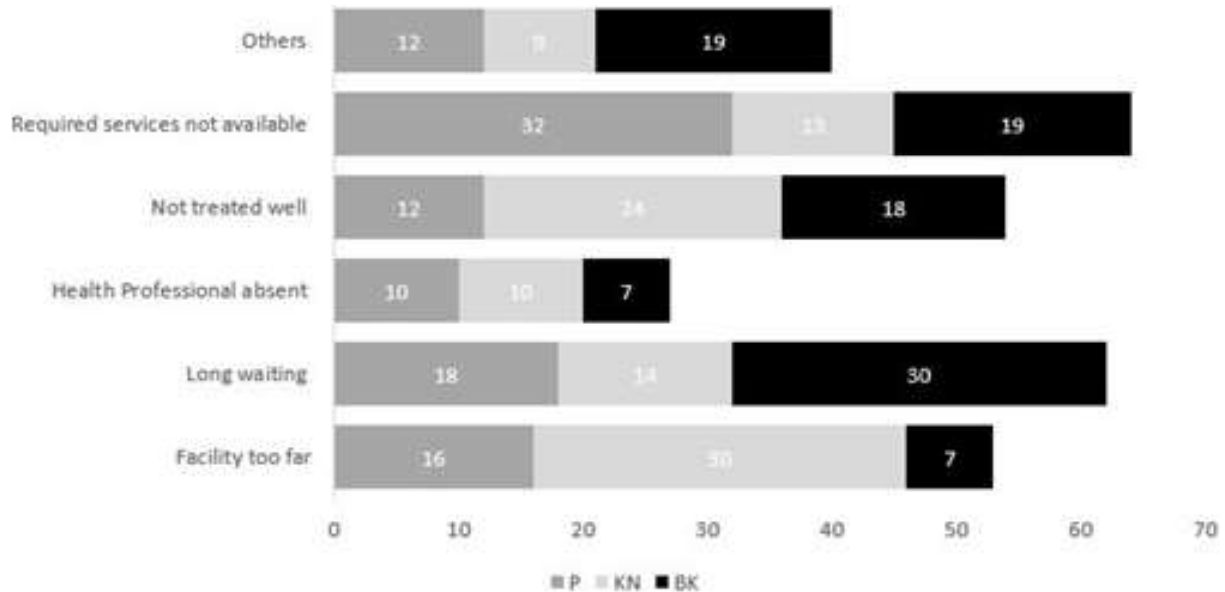
There are two enabling factors incorporated in the model, that is, income grouped into low, middle and highest income and time taken to reach the nearest health

facility. Both the factors momentarily explain the behavior. Participants falling in middle and highest income group expound increased probability to seek care with probability increasing to 33.7 and 55.1% for middle and highest income respectively as compared to low income group. Time taken to reach the nearest facility is also significantly found to be incongruous to visiting the facility.

#### **Effects of need based characteristics**

Among the gamut of need based characteristics reflected in the model, follow up on the warnings of health, confidence in staff and awareness in the progression of disease significantly explains the utilization behavior. Those tribals who proactively follow up on the onset of





**Figure 2.** Reasons for not utilizing government services.

**Table 3.** Logistic regression results.

Variable	Marginal effects
Constant	
Age	0.0036
Household size	-0.127***
Gender	
Male	0.175
Marital status (Reference category = Female)	
Married	-0.448***
Widowed	-0.618***
Separated	-0.836
Income (Reference category = Low)	
Middle Income	0.337***
Highest Income	0.551***
Education (Reference category = illiterate)	
Literate	0.379***
Time taken to reach the facility	-0.126***
Awareness of symptoms related to health	0.089
Say in making decisions related to health	0.98
Follow up on the warnings of health	0.315***
Ill patients well taken care of	0.207
Confidence in staff	0.192*
Awareness of progression of disease	0.326***

disease are 31.5% more likely to seek care when compared with tribals reporting nonchalant attitude towards the warnings. Similarly, those who are aware of diagnosis and progression of disease are 32.6% more likely to solicit care.

### Blinder Oaxaca decomposition

Blinder Oaxaca decomposition as illustrated in Table 4 is used to decompose the health gap amongst the tribes. The results of the endowment effect indicate that should

**Table 4.** Blinder Oaxaca decomposition results.

Outcome	P vs. other two tribes			
	Health gap	Difference due to endowments	Difference due to tribal status	Interaction
Utilization	-0.0953 (100)	0.475 (-49.89)	-0.0938 (98.38)	-0.0491 (51.51)
	KN vs. other two tribes			
Utilization	Health gap -0.152 (100)	Difference due to endowments -0.151 (99.26)	Difference due to tribal status -0.251 (16.51)	Interaction 0.240 (-15.77)
	BK vs. other two tribes			
Utilization	Health gap 0.2032 (100)	Difference due to endowments 0.689 (33.94)	Difference due to tribal status 0.0099 (4.89)	Interaction 0.124 (61.17)

**Table 5.** Mean of inpatient and outpatient care.

Components	Measured in INR	
	Mean (IP)	Mean (OP)
Consultation charges	252.64	87.17
Diagnostic charges	652.55	69.56
Medicine	1441.27	198.96
Lodging and food	1636.18	70.43
Transport	2819.23	410.87
Total	6801.87	837

BK embody the same endowments as the other groups (KN and P), the health gap would increase by around 47%. The second component, the 'coefficient' effect measures the discrimination, if there were no discrimination and all the tribal groups were rewarded in the same way, the health gap of P would decrease by 9.3%. The interaction component captures the covariation of disparities in endowments and coefficients. The interaction effect is 4.9% and also works in the opposite direction, that is, interaction of differences in endowments and coefficients narrows the gap between the BK and P which would otherwise occur due to the endowment effect alone.

Decomposition analysis of KN with other groups reveals that should KN embody the same endowments as other groups (BK and P), the health utilization gap would decrease by around 15%. Similarly, the coefficient reveals that if there were no discrimination, and both groups were rewarded in the same way, the health gap would decrease by 25%. The interaction effect however, was found out to be 24%, that is, interaction of differences in endowments and coefficients increases the gap between the Kattunayackans and other groups which would otherwise occur due to the endowment effect alone.

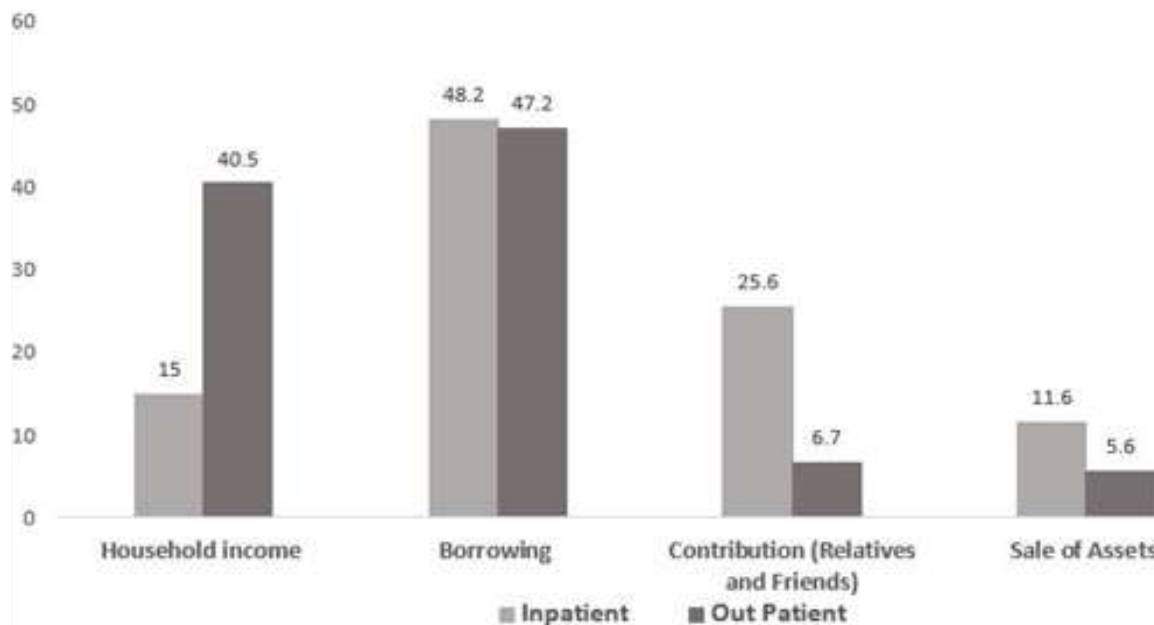
Table 5 exhibits mean expenditure of Inpatient and Outpatient across various categories. The total mean per visit expenditure for the outpatient services are INR 837. It was observed that most of the contribution of outpatient

expenditure was in terms of travel (INR 410) and medicines (INR 198.96). The total mean expenditure per hospitalisation visit was found to be INR 6801.87. For the inpatient services, significant contribution of expenditure was in the form of transportation (INR 2819.23) and lodging and food expenses (INR 1636.18).

Figure 3 shows the different payment- coping strategies adopted by the households to finance the health care services availed. One of the common sources of finance existing among the three tribal communities was borrowing, as 48.2% of the inpatient services were financed through borrowing and 47.2% of the households borrowed to finance their outpatient costs. Due to the very nature and magnitude of the outpatient costs, a huge chunk of it is covered through the household's respective savings which certainly does not hold true for inpatient care expenses. 25.6% of the respondent's managed their inpatient cost through contribution from friends and relatives, this is mainly because of the community health insurance which enables a tribe to entail financial aid in case of an emergence of a health care financial crisis, the main motto of this scheme was to ease the financial burden among the tribal population due to the exorbitant inpatient costs.

## DISCUSSION

The major impediment to utilization, that is, cultural



**Figure 3.** Sources of financing inpatient and outpatient costs.

barriers are related to specific codes of etiquette/ ways of doing things and also to a much larger social structures and experiences (Braun et al., 2011). The perceptions of health and disease are multifaceted in the culturally diverse patient's worldview and play a predominant role in augmenting cooperation and compliance to the advice given by healthcare professionals. Patients reported not fully comprehending to the western biomedical mode of treatment and ascribing higher value to their belief and indigenous systems of treatment. As narrated by the community leader of Kattunayackan tribe "In event of the illness, the decision pertaining to seek institutional care is taken by conglomeration of community members headed by the traditional healer. *"Dices are rolled and combinations of numbers on the top decide the odds of whether to visit a health professional or to allow for self-healing."* Also, narratives of fear and mistrust triggered by multitude of factors such as patient- provider rift, negative past experiences, language barriers and perceived racism driving the non-utilization were reported which explains the relative relevance of culture in determining the trajectory of utilization.

The barrier of geographical isolation is exacerbated due to the presence of the reserve forest area in the region and the way in which the core and buffer regions in the reserve area is carved. The movement of people is restricted due to the fact that entire reserve areas such as in Mudhumulai is declared as the core area but the villages having an abode in such areas are not acknowledged as core, thus rendering it difficult for people to utilize the health facilities. Concomitant with this is the issue of transportation as the infrastructure and provision for same is absent in most of the areas,

thereby; leading to the access of health providers quite exigent. The results are symptomatic with other qualitative study conducted on Paniya tribe in Kerala. Despite relatively good access to public healthcare, the Paniyas of Waynad have low utilization rates. Difficulties in geographical access arise due to the remoteness of their colonies, a common problem encountered by indigenous populations (Mohindra et al., 2009).

Preference for health services provided by non-governmental organizations in the area could be attributed to the free quality care and recruitment of staff from their tribes by the healthcare facilities run by them. Also, ratcheting up the uptake is the fact that these institutions are having more cultural and lingual congruence towards the tribal population thereby; leading to effective communication between the patient and provider. Lingual barriers present a formidable obstacle to accessing adequate healthcare. However, even if the provider and the patient both speak the same language, cultural values and experiences of the patient influences how they communicate their symptoms and how they perceive feedback about their health status from the provider (Marrone, 2007). Traditional healing is often the first contact of treatment among the participants as the culture of these tribes is embedded in the ethnomedicine and sorcery practices; though it varies among the tribal groups. Groups like Kattunayackans and Paniyas exhibit more preference towards the traditional healing as it is governed by the cultural practices and degree of geographic remoteness. Percentage of Kattunayackas admitted at the centres run by healers exceeds that of Bettakurumbas by four times. Upon discourse with a traditional healer, he remarked "A week ago, a girl

*suffering from severe diarrhea and admitted to a public hospital escaped the hospital premises as she was traumatized and deranged by modern facilities, equipment's and environment. I treated her with herbs which restored her mental and physical state.* Similarly, there is colossal variation for the outpatients as well. Even private providers are visited more frequently as compared to public health facilities. The findings are converging to the study conducted on the hill tribe population of Bangladesh where it was found that regardless of their distance and the costs that Christian missionary hospitals charged for their services; the tribal people who had access to the hospitals appreciated the quality of services, cleanliness and polite behavior of the health staff working there (Rahman et al., 2012)

The evidence is clear that social determinants of health entrenched in proximal, intermediate and distal factors influence health seeking behavior in complex and dynamic ways. Proximal factors like behavior regarding incessant substance abuse especially alcohol and tobacco consumption, delay in seeking care after the onset of disease and preferences emanating from individual psychology of fear of modern medicine and profound faith in traditional medicine is attributed to the utilization behavior. The field experience of the study is replete with incidents to establish the same. During the course of visiting the remote village in core reserve area, a snake bite case was encountered where the treatment for the patient was sought from a traditional healer despite the same physical access to the nearby public health centre. Even after the patient failed to recuperate from the placebo treatment given to him, formal institutional care was not sought, eventually leading to the death of the patient. The strong preference for traditional healing is also evident in the study conducted amongst the tribals of South Bastar in Chhattisgarh (Mahant, 2015) where 75.3% of the villager's first preference was to seek care from traditional healer for the treatment. However, intermediate factors like community practices and cultural environment passed on to generations particularly with regards to some specific illnesses like mental health, skin disease etc. coupled with access to the healthcare significantly influences the demand for same. Our encounter with a teenage girl incarcerated by intellectual disability resounds the finding as the girl's family perceived the experience with local public hospital as disappointing after investing time and resources and complained that the condition has deteriorated rather than improved. At the time of the visit, the family with a whiff of optimism was scrambling resources to seek care from an unskilled informal care provider located some 250 km away from their settlement therefore exhibiting that the behavior is more of guided by cultural acceptability and poor quality of institutional care in the locality. There is an encouraging evidence in terms of seeking care at hospitals run by NGO's which is also articulated in an ethnographic qualitative study done in same region documenting people seeking treatment in

non-profit private facilities for major problems (Sathyamurthi, 2016).

## Conclusion

The study indicates that healthcare seeking behaviour of tribals is remarkably different from the non tribals. Cultural factors followed by the long distance to cover owing to the geographical remoteness and dwelling in the reserve forest areas explain most of the reasons for non-utilization. Government facilities have not found acceptance amongst these communities vis a vis private providers and traditional healers due to non-availability of services, accessibility and long waiting hours in these units. Moreover, there is resounding unanimous opinion regarding the trust wedge between the patient and providers in government run facilities. Indirect medical expenses are more as compared to the direct medical expenses as a component of out of pocket expenditure and most of the payments is financed by the borrowing from friends/relatives. Similarly, based on the logit model results consortium of factors like time taken to reach facility, household size, educational status, awareness of progression of disease and symptoms significantly explains the utilization. An integrated and holistic approach involving all stakeholders in tandem is imperative to address the complexities involving the tribal health issues. A range of culture's negative effect on utilization can be ameliorated through addressing structural determinants of health inequities thereby, improving community awareness regarding cultural differences and augmenting cultural tolerance among health workers.

The findings are subject to certain limitations. The findings though can be generalizable to the hill tribes may not account for non-hill tribes due to geographical variations. Also, the selected sample size may not be a good representative of entire indigenous population in the state of Tamil Nadu and is suitable for local context only. Also, the distal factors like macrosocial, inequities in service delivery and organization of services were not explored in detail in the study context.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

## Informed consent

Informed consent was obtained from all individual participants included in the study.

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*Full Length Research Paper*

# Risky sexual behavior and associated factors among youth in Haramaya Secondary and Preparatory School, East Ethiopia, 2015

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World Health Organization (WHO) defines “youths” as age group of 15 to 24 years, and are characterized by significant physiological, psychological and social changes that place their life at high risk. Youth who initiate sexual activity earlier get exposed to risks such as sexually transmitted diseases and unwanted pregnancy, at a time when their developmental status places them at a disadvantage in the assessment and management of these risks. The objective of this research was to assess the prevalence and factors associated with risk of sexual behavior among youths in Haramaya Secondary and Preparatory School. Institutional based cross-sectional study was conducted. Simple random sampling technique was used to select a sample of 394 participants. A structured, pretested and self-administered questionnaire was used to collect data. Collected data was entered and analyzed using SPSS version 20. Crude and adjusted odds ratio with its confidence interval was used as measure of association and statistical significance was declared at  $P < 0.05$ . Among 363 school youths who completed the questionnaire, 134 (36.9%) were sexually active and more than quarter (25.3%) of the youth had engaged in risky sexual behavior. Living arrangement, substance use, watching pornographic movie, age at sex doubt, peer influence and perceived family control were predictors of risky sexual behavior. This study revealed that risky sexual practice of the study area was relatively high among the respondents. The school, local health bureau and stakeholders should work together to address the identified risky behaviors with particular focus on behaviour change communication.

**Key words:** Risky sexual behavior, youth, sexually active, sexually transmitted diseases.

## INTRODUCTION

We are living in a very youthful world, indeed, with almost half of the current global population under the age of 25. There are 1.2 billion young people in the world today, and the next generation of youth (children presently below the

age of 15) will be half again as large, numbering 1.8 billion (UN World Youth Report, 2005).

According to the World Health Organization (WHO), “adolescents” cover the age of 10 to 19 years; “youths”

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are defined as belonging to the age group of 15 to 24 years, while the terminology young people covers the age of 10 to 24 years (International Planned Parenthood Federation (IPPF), 1994), characterized by significant physiological, psychological and social changes that place their life at high risk and making up about 20% of the world's population, of whom 85% live in developing countries (WHO, 1999).

Adolescent is a transition period in life from dependent childhood to self-reliant adulthood and includes the range in which the majority of young people join the labour force. It is the period where young person achieve the highest stage of cognitive and physical development and strive to define their self-identity. A need for independence is also one of the features of this group (Fekadu and Kraft, 2001).

Young adolescents who initiate sexual activity get a "head start" on exposure to risks such as sexually transmitted diseases and unwanted fertility, at a time when their developmental status places them at a disadvantage in the assessment and management of these risks (Keating, 2004). In addition to these direct risks, early onset of sexual activity is associated with other indirect outcomes, such as diminished mental health and increased involvement in other risk behaviors (Resnick et al., 1997). It is not surprising, then, that researchers have devoted considerable attention to the determinants of entry into sexual activity among adolescents (Albert et al., 2003).

Worldwide youth have been observed to have the highest STIs and HIV/AIDS rates since most of them have sexual encounters without protection. Although these youth have a lot of information on STIs and HIV/AIDS from various sources, they fail to translate this knowledge into practice in order to bring about behaviour change (Bekwitt and Martins, 2003). The many cases of STIs and HIV/AIDS as well as unwanted pregnancies witnessed in high schools are clear indicators and definers of what is actually on the ground (Mushoriwa, 2014)

The health threats for adolescents today are predominantly behavioral rather than biomedical and more of today's adolescents are involved in health behaviors with potential for serious consequences (Elster and Kznets, 2000). Sexual activities among adolescents have been reported to be increasing worldwide. Several studies in sub-Saharan Africa have also documented high and increasing premarital sexual activities among adolescents (Federal Ministry of Health, 2001). However, viewing adolescents as a specific group with their own needs is a relatively recent practice, especially in developing countries (Sederowitz, 1999).

Studies also suggested that adolescents have limited knowledge about sexual and reproductive health and know little about the natural process of puberty. This lack of knowledge about reproductive health may have grave consequences (HIV/AIDS Prevention and Control Office (HAPCO), 2000). Young people often face enormous

pressure to engage in sex, especially from peers, exposure to unlicensed erotic video films and the desire for economic gain (Taffa and Johannes, 2002). As a result of this, a significant number of adolescents are involved in sexual activities at an early age (Taffa and Johannes, 2002; Taffa et al., 1999). Since there are limited study with regard to risky sexual behavior in the area in youth as many prior studies focus on adolescents or age group 10-18 years old, the aim of this study was to assess the prevalence and factors associated with risk sexual behavior among youths in Haramaya Secondary and Preparatory School.

## MATERIALS AND METHODS

The study was conducted in Haramaya town at Haramaya Secondary and Preparatory School from March 24 to April 11, 2015. Haramaya town is located in Oromia Regional State, in Eastern Hararge zone. Haramaya town, which is the administrative town of Haramaya, was established in 1935 and it means "Lake of Maya". It has 3 kebele (the smallest administrative unit) and total population of 42,815.

The town is located 506 km east from Addis Ababa. Its altitude ranges from 1600-2500 m above sea level and located 9° and 24° North, and 42° and 01° East. The climate condition of the town is highland and its annual rainfall is about 850 ml. The town is bounded by Awaday in the east, Adelle in the west, Tuji in the north and Gube Chala in the south. Currently, the town has 4 kindergarten, 8 elementary schools, 3 high schools, 2 preparatory schools, 1 TVET college and 1 university.

### Study design

A cross-sectional study was carried among Haramaya High and Preparatory School youths enrolled in the year of 2015 in Haramaya town. Haramaya high and preparatory school was selected by lottery method from the three schools in the district and 394 youths were included in the sample. First, the students were stratified first by their grade. In the school, there were 10 grade 9 sections, 8 for grade 10; and 4 each for grades 11 and 12. Ten sections: 3, 3, 2 and 2 from grade 9, 10, 11 and 12 were selected randomly respectively.

The numbers of students from each grade were selected using simple random sampling to obtain the total sample for the study after preparing the sampling frame using list of the names of the students from the class attendances. Sample proportional to size allocated for each grade and random sampling technique was used to draw the required number of students.

### Data collection methods and tools

Structured self-administered questionnaires adopted from relevant articles (Mushoriwa, 2014; Elster and Kznets, 2000; Negeri, 2014) and translated to local language. Questionnaire was pre-tested for clarity and consistency prior to the actual data collection. Then, necessary correction was made based on the feedback of the data collectors.

Information on student's risky sexual behavior, socio demographic characteristic of the respondents, factor contributing for the involvement of the respondents in risky sexual activity and another related data was collected. The principal investigators coordinated and supervised the overall activity of the study.

### Data processing and analysis

The collected data were entered, cleaned and analyzed using Statistical Package for Social Sciences (SPSS) version 20. Descriptive statistics results including socio-demographic characteristics of the study participants, magnitude of risky sexual behaviors and factors of risky sexual behavior were tabulated using frequency distribution. Univariate analysis was carried out to identify the predictors of risky sexual behavior and then, multivariate logistic regression model was run to control potential confounding variables. Statistical level of significance was set at  $\alpha < 5\%$ .

### Data quality assurance

The quality of data was ensured through proper training of data collector and pre test of the questionnaire and close supervision of data collectors. All collected data was checked for completeness, accuracy and consistency by the principal investigator and communicated to the data collectors on the next day.

### Limitation of the study

The limitation of this study was that respondents may not give response as required because of the sensitive nature of the sexual behavior. This might under estimate the prevalence of risky sexual behaviors.

### Ethical consideration

Ethical Clearance was obtained and formal letter was written by Haramaya University Public Health Department to Haramaya Secondary and Preparatory School explaining objectives of the study and its significance, relevant permission was asked to obtain desirable cooperation and necessary information during data collection. At individual level, the purpose of the study was discussed with all participants prior to their participation in this study. Furthermore, the participants were informed that their participation in the study was voluntary and that they were not obliged to answer any question with which they were uncomfortable and was also free to withdraw their participation from the study at any time they want. Participants were assured that confidentiality would be maintained.

## RESULTS

A total of 394 students participated, 363 completed questionnaires and those questionnaires with inconsistent and incomplete response were excluded from the analysis which make response rate 92.13%. The mean age of respondents was  $16.63 \pm 1.94$  years. From the 363, 257 (70.8%), 187 (51.5%) of them were in 15-17 years age group, 142 (39.1%) were grade 9, 301 (82.9%) were Oromo in ethnicity and 293 (80.7%) were Muslin. Regarding the marital status, 353 (97.2%) participants were single. Concerning parents of the study participants, 232 (66.2%) mothers were not educated as opposed 271 (79.5%) fathers that were not educated; 161 (45.9%) were housewife and 78 (22.9%) fathers were employed. From the study participants, 134 (36.9) reported not living with their parent (Table 1).

### Risky sexual behaviors

The prevalence risky sexual behavior in the High and Preparatory School youth was 25.5%. From 363 youths, 179 (49.9%) of them have had sexual intercourse; of these, 57 (46.7) of them had sexual intercourse at the age less than 15 year old. 134 (36.9%) of them had sexual intercourse in the last 12 months before the survey. From sexual active youths: 46 (34.3%) of them did not use condom during the last sexual intercourse and 25 (54.3%) reported the reason for not using condom was, it reduces pleasure, 42 (31.3%) of them had more than one sexual partners. From the total participants, 122 (33.6%) of them reported to have watched pornographic movies and 162 (44.6%) of them use substance (Table 2).

### Factors associated with risky sexual behavior

Bivariate analysis was carried out to identify predictors of risky sexual behavior and all variables with  $P < 0.3$  were selected to be included in multivariate logistic regression. Multivariable logistic regression analysis was done to identify the effect of independent factors after controlling other confounding variables. The overall model to predict the probability of risky sexual behavior was statistically significant ( $P < 0.05$ ). After controlling for effects of potential confounding variables, living arrangement, substance use, watch pornographic movie, age at sex doubt, perceived family control and peer influence were significantly associated with risky sexual behavior.

Accordingly, living arrangement is significantly associated with risky sexual practice. Those who live in rural area were 1.87 [95% CI: 1.03, 3.40] times more likely to practice risky sexual behavior than those who were living. Similarly, substances use is significantly associated with risky sexual practice. Youth who were reported to use substance were 1.93 [95% CI: 1.11, 3.35] times more likely to practice risk sexual behavior than students who did not use substances.

Moreover, watching illicit pornographic movie is significantly associated with risky sexual behavior. Students who have exposure to pornographic movies were 1.96 (95% CI: 1.12, 3.44] times more likely to practice risky sexual behavior than those who did not watch pornographic movies. Besides, age at sexual doubt is strongly associated with risk sexual behavior. Those that initiated sexual intercourse at age less than 15 years, were 3.35 [95% CI: 1.73, 6.52] times higher at odds of practicing risky sexual behavior when compared with those whose age at sexual doubt was 15 years or more.

Furthermore, perceived family control is significantly associated with risk sexual behavior. Youths who perceive no or less parental control over their behaviors were 1.91 [95% CI: 1.10, 3.34] times higher at odds of engaging in risky sexual behavior when compared with those who reported perceived parental control. Finally,



**Table 1.** Socio-demographic characteristics of students and parents in Haramaya high and preparatory school, Haramaya, 2015.

<b>Variable</b>	<b>Frequency</b>	<b>Percent</b>
<b>Sex</b>		
Female	106	29.2
Male	257	70.8
<b>Age in year</b>		
15-17	187	51.5
18-24	176	48.5
<b>Grade</b>		
9 <sup>th</sup>	142	39.1
10 <sup>th</sup>	113	31.1
11 <sup>th</sup>	49	13.5
12 <sup>th</sup>	59	16.3
<b>Religion</b>		
Christian	293	80.7
Muslim	70	19.3
<b>Ethnicity</b>		
Oromo	301	82.9
Amhara	48	13.2
Guraghe	8	2.2
Somali	6	1.7
<b>Marital status</b>		
Single	353	97.2
Married	8	2.2
Divorced	2	0.6
<b>Mother educational status(n=350)</b>		
Not educated	232	66.3
Educated	118	33.7
<b>Father educational status</b>		
Not educated	70	20.5
Educated	271	79.5
<b>Mother occupation</b>		
Housewife	161	45.9
Merchant	117	33.3
Employed	73	20.8
<b>Father occupation</b>		
Daily laborer	46	13.5
Merchant	98	28.7
Farmer	119	34.9
Employed	78	22.9
<b>Living with parent</b>		
Yes	229	63.1
No	134	36.9

**Table 2.** Risky sexual behaviors among Haramaya high and preparatory school youth, Haramaya, 2015.

<b>Variables</b>	<b>Frequency</b>	<b>Percent</b>
<b>Ever had sexual intercourse(n=363)</b>		
Yes	179	49.3
No	183	50.7
<b>Age at sexual doubt(n=179)</b>		
Less than 15 years old	57	46.7
15 or more years old	122	53.3
<b>Sexually in last 12 months (n=363)</b>		
Yes	134	46.9
No	229	63.1
<b>Used condom during last sex(n=134)</b>		
Yes	88	65.7
No	46	34.3
<b>Reason for not using condom(n=46)</b>		
I don't know about it	9	19.6
It reduce pleasure	25	54.3
Religion doesn't allow	7	15.2
Don't like	5	10.9
<b>Number of sexual partner</b>		
One	92	68.7
Two or more	42	31.3
<b>Watch pornographic movie</b>		
Yes	122	33.6
No	241	66.4
<b>Risk sexual behavior(n=363)</b>		
Yes	92	25.3
No	271	74.7
<b>Substance use</b>		
Yes	162	44.6
No	201	55.4
<b>Peer pressure</b>		
Yes	166	45.7
No	197	54.3
<b>Perceived family control</b>		
Yes	249	68.6
No	114	31.4

perceived peer pressure was significantly associated with risky sexual behavior. Youths who perceive peer pressure influence their behavior were 1.77 [95% CI:

1.03, 3.05] times higher at odds of practicing risk sexual behavior when compared with those who perceive their behaviors are not influenced by peer pressure. Other

**Table 3.** Factors associated with risk sexual behaviour among youth in Haramaya high school student, Haramaya, 2015.

Variable	Risk sexual behaviour		COR 95% CI	AOR 95% CI
	Yes	No		
<b>Grade</b>				
9 <sup>th</sup>	40	102	1.26(0.62, 2.55)	1.39(0.49, 3.97)
10 <sup>th</sup>	25	88	0.91(0.43, 1.93)	0.99(0.39, 2.50)
11 <sup>th</sup>	13	36	1.16(0.49, 2.78)	1.16(0.44, 3.08)
12 <sup>th</sup>	14	45	1	1
<b>Age in year</b>				
< 17year	49	138	1	1
18-24	43	133	0.91(0.57, 1.46)	0.93(0.43, 2.01)
<b>Sex</b>				
Female	25	118	1	1
Male	67	153	2.07(1.23, 3.47)*	1.70(0.95, 3.04)
<b>Living arrangement</b>				
Urban	64	167	1	1
Rural	28	104	0.70(0.42, 1.17)	1.87(1.03, 3.40)*
<b>Religion</b>				
Muslim	71	222	1	1
Christian	31	49	1.34(0.75, 2.38)	1.40(0.72, 2.72)
<b>Living with family</b>				
Yes	62	167	1	1
No	30	104	0.78(0.47, 1.28)	0.65(0.36, 1.17)
<b>Substance use</b>				
Yes	52	110	1	1
No	40	161	1.93(1.18, 3.07)*	1.93(1.11, 3.35)*
<b>Watch pornographic movie</b>				
Yes	47	75	2.72(1.67, 4.42)*	1.96(1.12, 3.44)*
No	45	195	1	1
<b>Age at sex doubt</b>				
Less than 15	31	26	4.80(2.65, 8.66)*	3.35(1.73, 6.52)
15 and more years	61	245	1	1
<b>Perceived family control</b>				
Yes	52	197	1	1
No	40	74	2.05(1.25, 3.35)*	1.91(1.10, 3.34)*
<b>Perceived peer pressure</b>				
Yes	55	111	2.14(1.32, 3.47)*	1.77(1.03, 3.05)*
No	37	160	1	1

\*Significant at  $p < 0.05$ .

variables in the model: grade, age in year, sex, religion and living with family are not associated with risk sexual behavior of youths (Table 3).

## DISCUSSION

This study attempted to provide insight into the

prevalence and risk factors associated with risky sexual behavior among high and preparatory school youth in Haramaya town. It is found that there were several factors that affect youth's sexual behavior.

The finding showed that the magnitude of risky sexual behavior was 25.3% among school youths. This finding was consistent with study conducted in Addis Ababa (Taffa and Johannes, 2002) which reported the 25.3%. But, it was slightly lower than the finding of other study conducted in Addis Ababa (Gizaw et al., 2014) which was 26.7% and Pawe District Benishangul Gumuz Region of Ethiopia (Agajie et al., 2015) which was 37.6%. However, the finding of this study was higher than the prevalence of risky sexual behavior among adolescent in Boditi town, Ethiopia (Daka and Shaweno, 2014) which was 17.9% and western zone of Tigray, Ethiopia (Abel et al., 2014) which was 13.7%. The observed difference could be explained by the access to electronic devices through which youths are easily exposed to pornographic movies and pictures in this area when compared with the two areas.

According to this study, substance use is strongly associated with risk sexual behavior. The odds of engaging in risky sexual behavior is higher among substance user when compared with non-user. This is consistent with several studies (Agajie et al., 2015; Getabalew and Mitsiwat, 2015; Dereje et al., 2015; Jacqueline et al., 2007; Chaveepojnkamjorn and Pichainarong, 2011; Tadesse and Yakob, 2015) and substance use was found to be strongly associated with a wide range of other health risk behaviors. Furthermore, study (Jacqueline et al., 2007) showed that there is strong dose-response relationship between the frequency of substance use and the prevalence of other health risk behaviors. This can be explained by that fact that substance use tended to be the first risk behavior that the youth initiated, and then transitioned to risk sexual behavior (Lori-Ann, 2009)

Moreover, watching sexually explicit/pornographic movies was significantly associated with risky sexual behavior when compared with those that did not watch one. This finding is consistent with several study conducted in various parts of Ethiopia (Dereje et al., 2015; Tadesse and Yakob, 2015; Abel and Fiseha, 2014; Oljira et al., 2012). This indicates that exposure to pornography might affect their decision making regarding sex. Besides, the contents of pornographic media may contain inappropriate and unsafe sexual behaviors such as not using condom, sex with causal partner and multiple sexual partnerships that can promote risky behaviors.

In addition, age at sexual debut was significantly associated with risky sexual behavior. This result is consistent with the study conducted in preparatory schools youth in Addis Ababa (Dereje et al., 2015). Study in U.S.A (de Ravello et al., 2014) also showed that early sexual intercourse before age 13 year increases the

likelihood of involvement in other risky sexual behavior. In this study, significant proportion of school youth had their first sexual intercourse before age 15 years and the longer time of sexual experience was followed by change of partner and others risky behavior.

Furthermore, perceived family control was significantly associated with risky sexual behavior. This finding coincided with study conducted in the Jimma University (Tura et al., 2012). Similarly, study in U.S.A showed that parenting influence many aspects of development, including risky sexual behavior (Biglan et al., 1990). This might be explained by the fact that parental control over adolescents' had minor effect on engaging in sexual intercourse.

Study conducted in San Francisco, U.S.A, showed that adolescents reporting successful parental monitoring (accurately knowing the adolescents' whereabouts and activities outside the home) significantly expressed cognitions which is less favorable for initiating intercourse, while adolescents that reported more unrestricted time were more likely to express cognitions that favored initiating intercourse (John, 2005). Parental supervision and monitoring may be particularly relevant to sexual expression by communicating parents' concern about risky behavior and increasing children's awareness of the costs of such behavior.

The finding of this study showed that perceived peer pressure was the predictor of risky sexual behavior among high school youth. This is similar to study conducted in Ethiopia (Daka and Shaweno, 2014; Abel and Fiseha, 2014; Tura and Dejene, 2012). This might be due to the fact that adolescents are at higher probability of sharing their day to day life experience and they spend majority of their time with their friends, especially with students that does not live with their families.

## CONCLUSION AND RECOMMENDATION

In conclusion, the study revealed that risky sexual practice was relatively high among school youth in the study area. Living arrangement, substance use, watching pornographic movie, age at sex debut, perceived family control and perceived peer pressure were the predictors of risky sexual behavior among youths. The school, and local health bureau and stakeholders should work together to address the identified risky behaviors with particular focus on behaviour change communication.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interest.

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*Full Length Research Paper*

# Malaria prevention practices among pregnant women resident in two Nigeria army barracks, Ibadan, South Western, Nigeria

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Malaria in pregnancy is one of the major disease burdens of public health significance in sub-Saharan Africa. Comprehensive preventive strategy including intermittent preventive treatment and effective use of insecticide treated bed nets has been recommended among pregnant women in endemic regions. However the extent to which these preventive strategies are utilized are not fully explored among pregnant women living in controlled environments like the military barracks. This cross-sectional study explored the practices relating to Insecticide-Treated Nets (ITNs) and Intermittent Preventive Treatment using Sulfadoxine Pyrimethamine (IPT-SP) for the prevention of malaria among 420 purposively selected pregnant women from households in Odogbo and Mokola army barracks, Ibadan, Southwest Nigeria. Data were collected using a validated questionnaire, which contained a nine-point knowledge scale. Data were analysed using descriptive and Chi-square statistics. Mean age was 29.3±6.0 years and mean knowledge score was 8.3±1.8. Forty-nine percent of respondents had heard about SP, 17.5% knew the correct dose of IPT-SP, 31.8% had ever used SP and only 10.5% were aware of the stage of pregnancy at which SP should be initiated. Most (92.3%) respondents had heard about ITNs and 76.7% owned one. Almost 60% of respondents prevented malaria with ITNs, 17.8% used insecticide sprays alone, 15.0% used SP while 2.5% used both insecticide sprays and ITNs. Other preventive measures adopted by respondents included environmental control (4.0%) and use of mosquito coils (2.8%). Public enlightenment, advocacy and community mobilization activities are needed in the barracks to improve utilization of malaria prevention strategies among pregnant women.

**Key words:** Malaria in pregnancy, malaria preventive practices, insecticide treated nets, Sulfadoxine pyrimethamine.

## INTRODUCTION

Malaria is a social and medical problem receiving multidisciplinary and multidimensional solution (WHO, 2003) and has been a major public health problem in sub-Saharan Africa. According to Ogbu et al. (2015)

prevalence of malaria parasitaemia was 38.8% in a study conducted among asymptomatic women at booking visit in a tertiary hospital, North central Nigeria.

All ages are susceptible but children under 5 years and

pregnant women are particularly at risk of severe and complicated malaria. Malaria has remained a major public health problem in Nigeria and it is responsible for 30% childhood and 11% maternal mortality despite the availability of effective interventions. A study showed that 87% of women had undergone at least one episode of malaria during the current pregnancy with 89.0% of them attributing it to bites from infected mosquitoes, while 75% consider malaria an important health risk during pregnancy (Enato et al., 2007a). In Northern part of Nigeria pregnant women and their unborn children have been reported to be vulnerable to malaria which kills children every 30 seconds (Davidson, 2000; Bawa et al., 2014).

The disease burden is especially high among these groups as a result of immature and weakened immunity. Malaria prevention and control program focus on these biologically vulnerable groups particularly those living in poor and hard to reach communities. These communities often have limited access to primary health care as well as to simple and effective preventive tools such as Insecticide Treated Nets (ITNs). In addition, they are less likely to have access to information regarding the disease and how to avoid it (WHO, 2003; Enato et al., 2007a).

Malaria in pregnancy is a common and serious public health problem in Nigeria as large proportion of the asymptomatic pregnant women had malaria parasitaemia with its attendant anaemia (Ogbu et al., 2015). Malarial infestation during pregnancy affects more primigravidae and teenage mothers than those of higher gravidity and older age group. Malaria increases susceptibility to other infections and retard growth and development in children. It is associated with considerable economic burden including direct loss to government productive work or education (Oladebo et al., 2010; Bawa, 2014). Malaria during pregnancy has been associated with increased incidence of anaemia, spontaneous abortions, preterm labour, fetal distress, congenital infections, fetal death in-utero, still births and intrauterine growth restriction (Mutabingwa, 2003).

Despite the evidence that the use of ITNs decreases malaria related mortality and morbidity, its use is still low as reported by the 2013 Demographic Health survey where only 30% of pregnant women in households with ITN slept under lone the night preceding the interview (NPC & ICF Macro, 2014). Encouragement of consistent and appropriate use of bed-nets has been reported to be a challenge (Cruz et al., 2006). Up to 400,000 infant deaths due to low birth weight could be averted each year if IPT were routinely available to every woman during pregnancy (USAID Health, 2007). According to a study carried out in Southern Nigeria, the prevalence of

malaria in pregnancy was 30% and despite the common occurrence of malaria during pregnancy, there was a limited knowledge and use of recommended anti-malarial intervention by women attending antenatal clinics (Enato et al., 2007b).

Many pregnant women who due to poverty and/or lack of education do not go for antenatal care and have no access to preventive malaria care may hence present when the disease is severe. This may lead to abortion, stillbirth, premature delivery, low birth weight babies and/or high mortality for pregnant women. Malaria infection is estimated to cause 400,000 cases of severe maternal anaemia and from 75,000-200,000 infant deaths annually in sub-Saharan Africa (Centre for Disease Control and Prevention, 2007).

According to Abasiatai et al. (2008) in order to prevent the deleterious effects of malaria during pregnancy, intermittent preventive treatment (IPT) of asymptomatic pregnant women, use of insecticide treated bed nets (ITNs) and prompt and effective case management of malaria have been recommended by the World Health Organisation (WHO) as a three pronged approach to the prevention and control of malaria during pregnancy in areas of stable transmission (WHO, 2004).

In the Barracks there is congestion in the accommodation areas and the level of sanitation is quite low, especially in non-commissioned officers' quarters. The use of Insecticide Treated nets and intermittent preventive treatment to prevent malaria in pregnancy is relatively new in the barracks where they were launched in 2005 and there has not been an effective follow-up to ensure the sustainability of the practice. Also, out-patient records in the Second Mechanized Division Military Hospital in Odogbo Barrack one of the study sites showed that about 12,000 people reported sick from January to October 2007 and 550 had malaria constituting 5.0% of all the patients. From the maternity section of the hospital, out of one hundred and eleven (111) pregnant women that booked between same period 20(18.0%) had malaria related illness. These records showed that pregnant women are at risk of malaria and there is the need to target them for malaria prevention and treatment interventions. The study was therefore carried out to assess the knowledge and practice of malaria prevention in pregnancy among women in the two army barracks in Ibadan, Nigeria.

## MATERIALS AND METHODS

The study was conducted in two Army Barracks in Ibadan the capital of Oyo State and Nigeria's third most populous city after Lagos and Kano (NPC, 2006). It is located in south-western

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Nigeria. It is an ancient city and a major center for trade in cassava, kolanut, cotton, timber, rubber and palm oil. The growth rate is high and with rapid urbanization which replete with urban slums. This slum poses public health problems. Ibadan's geographical position and climatic conditions had been favourable to the transmission of malaria. Temperature, humidity, rainfall and attitude affect the transmission of malaria.

A relatively high humidity is required for the survival of adult vector while rainfall is essential in regions lying between latitude 60° north and 40° south. Ibadan falls into the region where malaria is commonly found and it is one of the major causes of mortality and morbidity among children under five years and pregnant women.

### Study design and population

The cross-sectional design was used for the study, which involved the collection of self-report information from sample participants with the aim of describing the population based on variables involved. The population for the study consisted of women who were pregnant during the period of study and residing within the Military Barracks in Ibadan. Sample size was calculated using the formula  $n = \frac{Z^2pq}{d^2}$  yielding a minimum sample of 323 with a prevalence of 30% (Isreal, 1992) but 400 women were recruited so as to account for possible non-response.

### Sampling process

Non-probability sampling method (convenience) was used where all pregnant women attending antenatal clinic have opportunity to participate. Other pregnant women who were not attending antenatal clinic were recruited by snowball approach where one pregnant woman was used to link another one giving them equal opportunity to participate.

### Instrument for data collection

The instrument used in this study was an interviewer-administered questionnaire. The instrument divided into five sections was designed through review of literature and extracting pertinent variables relating to the prevention practice of malaria in pregnancy. The study instrument was pre-tested in another military barrack in Lagos state.

### Data analysis

Administered copies of the questionnaire were edited and hand coded. The data were entered into the computer. An attitudinal score was constructed from the responses. Each correct item was scored on a one-point scale and incorrect items were zero. A 10-point score was generated and respondents that scored (0-6) points were categorized as negative attitude while those with (7-10) points were categorized as positive attitude. The categorization was based on 50<sup>th</sup> percentile attitudinal score of 7 points descriptive statistics of frequency counts and percentages were used to describe the attribute of respondents and also inferential statistics of Chi square ( $\chi^2$ ) were used to test hypothesis at 0.05 alpha level.

### Ethical consideration

Ethical approval to conduct the study was sought for and obtained from the Commanding Officer of the intelligent department of the Division, Commander 2 Division Hospital Nigerian Army Ibadan and

the Commanding Officer 81 Battalion Nigerian Army Ibadan. Also, the study instrument contained an informed consent clause to respect voluntary participation of the respondents. Confidentiality of the respondents was assured by not writing names or address on the copies of the questionnaire. The right and integrity of the study participants were fully protected. The objectives of the study were explicitly made known to the respondents.

## RESULTS

### Socio-demographic characteristics of the respondents

Four hundred respondents completed the questionnaire consisting 340 in Odogbo and 60 in Mokola cantonments. The ages of the pregnant women in the two barracks ranged from 17 to 49 years with a mean age of  $29.3 \pm 6.0$  years. A higher number 348(87%) of the respondents were married, while 40(10.0%) were single and 12(3.0%) were divorced. A total of 148(37.0%) were Yorubas, 120(30.0%) were Hausas, 85(21.3%) were Igbos and 47(11.8%) were other ethnic groups such as Igala and Idoma.

Two hundred and twenty six (56.5%) of the respondents were Christians while 163 (40.8%), 5(1.3%) and 6(1.5%) were Moslems, traditional and other religions respectively. Two hundred and fifty eight (64.4%) of them had secondary education and 41(10.3%) had primary education. Two hundred and sixteen (54%) were housewives while 23 (5.8%) were unskilled. However, 163 (40.8%) had two children, 92(23.0%) had three children or more. 90(22.5%) had one child while 53(13.3%) had no child prior to the study (Table 1).

### Respondents' knowledge about malaria

Three hundred and ninety seven (99.3%) of the respondents have heard about malaria before, 384(96%) said they knew the causes of malaria; 389(97.9%) correctly knew that the mosquito bites led to malaria while 7(1.8%) said that the cause of malaria was sunshine and 1 (0.2%) did not know what causes malaria (Table 2). The mean knowledge score of the respondents was  $8.3 \pm 1.8$  of malaria out of 9-point scale.

Respondents' knowledge about the consequences of malaria to the pregnant woman and unborn child was assessed. Consequences for the pregnant woman known by respondents included anaemia (59.3%) and abortion (51.4%). Consequences to the unborn child included anaemia, (58.7%), and stillbirth (57.5%) (Table 2).

### Respondents' knowledge about preventive measures for malaria

Three hundred and forth-six (93.7%) knew that ITNs are



**Table 1.** Demographic characteristics of respondent (N=400).

Demographic variable	Frequency	Percentage
<b>Ethnic group</b>		
Yoruba	148	37.0
Hausa	120	30.0
Igbo	85	21.3
Other	47	11.3
Total	100	100.0
<b>Religion</b>		
Christianity	226	56.5
Islam	163	40.8
Traditional	5	1.3
Others	6	1.5
<b>Education</b>		
Secondary	258	64.4
Tertiary	89	22.3
Primary	41	10.3
Non-formal	12	3.0

**Table 2.** Respondents' awareness and knowledge about malaria (N=400).

Variable	Frequency	Percentage
<b>Awareness of malaria</b>		
Yes	397	99.3
No	3	0.7
<b>Knowledge of causation</b>		
Mosquito bites*	389	97.9
Sunshine	7	1.8
Don't know	1	0.2
<b>Knowledge of consequences malaria among pregnant mothers**</b>		
Anaemia	235	59.3
Abortion	204	51.4
Deaths	173	43.6
Premature baby	168	42.3
Weakness of the body	85	21.4
<b>Knowledge of consequences of malaria in the unborn child**</b>		
Premature delivery	249	62.7
Anemia	233	58.7
Jaundice	176	44.3
Still birth	230	57.5

\*Correct response; \*\*Multiple responses included.

used to prevent mosquito bites. Ten (2.8%) of the respondents believe that ITNs are used to beautify their houses, 4(1.0%) to create warmth while nine (2.5%) did not know what ITN is used for (Table 3).

### Respondents' attitudes to prevention of malaria

The respondents' responses to attitudinal statements are presented in Table 4. Three hundred and eight (77.0%)

**Table 3.** Respondents' perceived use of ITN.

Perceived use of ITN	Frequency	Percentage
Prevent mosquitoes bites	346	93.7
Beautify house	10	2.8
Create warmth	4	2.5
Don't Know	9	1.0

**Table 4.** Respondents' attitudes to prevention of malaria.

Variables statements	Agree (%)	Disagree (%)	Uncertain (%)
Sleeping without mosquito bed-nets exposes one to mosquito bites	308(77.0)	89(22.0)	3(1.0)
Sleeping in mosquito bed-nets prevent malaria	371 (93.0)	22(5.5)	6 (1.5)
It is not necessary to use ITN to prevent malaria	92(23.0)	296(74.0)	12 (3.0)
ITN prevent other insect bites	321(80.3)	43 (10.7)	36(9.0)
Retreating bed-nets is not necessary to prevent malaria	107(26.8)	264(66.0)	29(7.2)
It is necessary to attend antenatal clinic to know how to prevent malaria	341(85.2)	33(8.3)	26(6.5)
Taking of IPT is necessary to prevent malaria	291(72.7)	17(4.3)	92(23.0)
Two doses of IPT after the first trimester of pregnancy is not dangerous to baby	177(44.2)	80(20.0)	143(35.8)
The use of IPT in pregnancy prevents complications of malaria in pregnancy	247(61.7)	19(4.8)	134(33.5)

respondents agreed that sleeping without mosquito bed-nets exposes one to mosquito bites while 89 (22.0%) disagreed. A good number 371 (92.8%) agreed that it prevents malaria while 22 (5.5%) disagreed. Two hundred and ninety six of them disagreed that it is not necessary to use ITN to prevent malaria while 92(23.0%) agreed. Three hundred and seventy eight (94.5%) agreed that ITN kills mosquitoes and prevents their bites while 15(3.7%) disagreed. Forty-three (10.7%) disagreed that ITN prevents other insect bites while 321(80.3%) agreed and 107 (28.8%) agreed that it is not necessary to retreat ITN with insecticides while 264(66.0%) disagreed.

Furthermore 341 (85.2%) agreed that it is necessary to go to antenatal clinic to know how to prevent malaria while 33 (8.3%) disagreed. Two hundred and ninety one (72.7%) agreed that taking of intermittent preventive treatment drug to prevent malaria in pregnancy is necessary while 17 (4.3%) disagreed. One hundred and seventy seven (44.2%) agreed that two doses of IPT is not dangerous to baby while 80(20.0%) disagreed. Two hundred and forty seven (61.7%) agreed that IPT in pregnancy prevents the complications of malaria in pregnancy while 19 (4.8%) disagreed (Table 4). It was observed that (52.5%) of the respondents had positive attitude while the remaining (47.5%) had negative attitude.

#### Respondents' preventive practices with ITNs

Three hundred and eighty eight (97.0%) respondents

said that malaria is preventable, 2 (0.5%) knew it was not while 10 (2.5%) did not know whether malaria is preventable or not. A total of 307 (76.8%) respondents had ITN. A total of 228 (57.0%) of the respondent used ITN as a measure for malaria prevention and 10 respondents out of this number used a combination insecticide spray and ITNs. Two hundred and thirty seven of the respondents (59.2%) used ITN regularly to prevent mosquito bites. Seventy-one (17.8%) of the respondents used insecticide only, while 5(1.3%) did not use anything as a preventive measure (Table 5).

#### Respondents' preventive practices with intermittent preventive treatment

One hundred and twenty seven (31.8%) had taken IPT while more than half (50.8%) of the respondents had never taken SP for malaria and 70(17.5%) did not know about IPT before (Table 6). Two hundred and sixty three (65.8%) did not know the number of doses that should be taken in each pregnancy, 70 (17.5%) of them said that two doses should be taken in each pregnancy. Thirty-three (8.3%) respondents said that one dose should be taken, while the same number said that three doses should be taken.

The study showed that there was statistical significance difference between measures of preventing malaria and knowledge of causation of malaria ( $p=0.16$ ,  $\chi^2=15.394$ ). The study also showed that there was no statistical difference between knowledge of ITN and its use for

**Table 5.** Respondents' preventive practices with ITNs (N=400).

Respondents' possession of ITNs	Frequency	Percentage
Yes	307	76.8
No	93	23.2
<b>Regular use of ITNs</b>		
Yes	237	59.2
No	163	40.8
<b>Measures respondents use in preventing malaria</b>		
ITNs	228	57.0
Insecticide spray	71	17.8
IPTs	60	15.0
Environmental control	16	4.0
Mosquito coils	11	2.8
Insecticide spray/ITN	10	2.5
Nothing	4	1.0

**Table 6.** Respondents' preventive practice with IPT.

Preventive practice with IPT	Frequency	Percentage
Never taken Sulfadoxine pyrimethamine	203	50.8
Had taken Sulfadoxine pyrimethamine	127	31.7
Don't know if taken	70	17.5

prevention of malaria in pregnancy ( $p=0.550$ ,  $\chi^2=0.001$ ).

## DISCUSSION

The age distribution of the respondents showed that most of respondents fall within the age of 20 to 29 years, which corresponds with the active reproductive age group for women (Lawson et al., 1991). The majority (87.0%) of them were married which was expected, as pregnancy is usually an outcome of marriage. People marry usually for procreation. Thirty seven percent of them were Yorubas. This was so as the study was carried out in south-western Nigeria which is predominantly Yorubas.

A majority, (64.4%) attended secondary school and 22.3% tertiary institution. The high number of those who attended secondary is not unconnected with Universal Basic Education (UBE) in Nigeria supported by UNICEF (UNICEF, 2002). Women with formal education were more likely to prevent malaria in pregnancy using ITN and IPT (Gikandi et al., 2008). Most of them were housewives as majority of them were wives of junior non-commissioned officer who are of the lower cadre of soldier of the Nigerian Army.

Knowledge is the key to behavioural antecedent though knowledge alone cannot influence behaviour. In this study, the awareness and knowledge of malaria among

the respondents' was high as 99.3% knew about malaria, and 97.3% of them knew that mosquito bites transmit the parasites which lead to malaria. The knowledge of the causation of malaria in pregnancy was one of the factors that influence prevention of malaria by the respondents.

The respondents knew that malaria has adverse consequences on the pregnant woman which are fever, anemia, weakness, and death. They also knew that the unborn baby is exposed to the risk of prematurity, abortion, and stillbirth and even after birth malaria can give the risk of jaundice. This corresponds therefore with the assertion of the consequences of malaria infection to the mother and baby by Bawa et al. (2014) and Lucas and Gilles (2003) which stated that malaria causes severe maternal anemia, spontaneous abortion, stillbirth, premature delivery (gestation of less than 37 weeks), intrauterine growth retardation and low birth weight increasing rise of infant death. The findings was also similar to those of Abasiattai et al. (2008) at the maternity unit of the University of Uyo Teaching Hospital, Uyo where they determined the degree of awareness and practice of malaria prevention strategies among antenatal attendees in Uyo, South-South Nigeria and found about 71.2% of the respondents knew that malaria had adverse effects in pregnancy.

Respondents' knowledge of malaria, causes and preventive methods of malaria in pregnancy was high.

These had positive effect on the ways the respondents prevent malaria during pregnancy. Their preventive practices of malaria in pregnancy with some preventive methods were also high as majority of them knew that malaria is a preventable disease. They adhered to one or combination of methods for prevention. Majority of the respondents used ITNs to prevent malaria in their homes. This is probably because malaria including its causes, effects and prevention are often discussed by midwives while giving health talks in the antenatal clinic of the hospital. In addition following the Roll back malaria initiative (RBM) in 1998 and the United Nations Millennium declaration and Abuja declaration in 2000, (FMOH, 2005), there has been a lot of public enlightenment particularly concerning adverse effects of malaria in children and pregnant women (Abasiattai et al., 2008).

## CONCLUSION AND RECOMMENDATIONS

The study showed that there was statistical significance difference between measures of preventing malaria and knowledge of causation of malaria. There was also no statistical difference between knowledge of ITN and use to prevent malaria in pregnancy. The study also showed that there was a no statistical difference between knowledge of ITN and use to prevent malaria in pregnancy. Health education of pregnant women on the different methods of preventing malaria in pregnancy during ANC is essential to prevention of malaria in pregnancy.

The following recommendations were made based on the findings from the study:

1. There should be sustenance and increased distribution of free insecticide treated nets (ITNs).
2. Involvement of the mass media in community enlightenment programs for improving malaria preventive practices among pregnancy women.
3. Organization of regular training on current trends in malaria preventive measures for all health staff involved in maternity care are advocated.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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The background of the entire page is a microscopic image showing various types of bacteria and viruses. There are several large, rod-shaped bacteria with a textured surface, and many smaller, spherical viruses with prominent spikes or filaments. The colors are primarily orange, yellow, and red, with some blue and purple highlights.

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