Estimating the prevalence and health risks awareness of smoking in Nigeria: A meta-analysis approach

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Abstract

Background: The increase use of tobacco products in Nigeria, and lack of common aggregated data on its associate diseases and deaths are parts of emerging public concerns.

Objective: This paper estimated national and zonal prevalence of smoking and health risks awareness in Nigeria.

Methods: Random effects meta-analysis was conducted on estimates from 19 studies selected across 13 states, within the six-geopolitical zones of Nigeria, to pool nation-wide estimates of the prevalence and health risk awareness of smoking.

Results: The sample and aggregated mean ages are 14.7 and 22.4 years, respectively. The overall pooled prevalence of current smoking in Nigeria was 19.7% (95%CI: 14.0-25.5), with male and female at 18.9% (CI:13.3-24.4) and 6.8% (CI:4.1-9.6), respectively.

Conclusion: The findings suggest a relatively high prevalence of smoking among the youths in Nigeria. The authors recommend smokers' counseling services among the youth to reduce health hazards and secure youth contributions to sustainable economic development.

Keywords: Health risk, smoking, meta-analysis, youth, sustainable development, Nigeria

Introduction

The use of cigarette (tobacco smoking) has remained a global health challenge globally (World Health Organization, 2008). Efforts aimed at prevention of smoking is highly beneficial, and a significant health promotion initiative in the fight against non-communicable diseases (NCDs) (Brathwaite et al., 2015). Smoking directly and passive tobacco smoking proliferates the danger of cancer, chronic obstructive pulmonary disease, cardiovascular diseases (hypertension, heart attack, and stroke), diabetes, and many other health issues (Brathwaite et al, 2015). This was supported by Udjo and Lalthapersad-Pillay (2014) in their investigation of deaths resulting from non-communicable diseases in South Africa; they found out that the smoking status of a deceased was highly connected with the possibility of dying from a non-communicable disease in South Africa. Furthermore, certain studies have indicated that smoking tobacco and marijuana increases the odds of risky-sexual behaviours among adolescents, which could heighten the exposure to unwanted pregnancies, abortions and birth complications health issues (Amoateng *et al*, 2014; Amoo, Ola-David, Olurinola & Fadayomi, 2014). In Sub-Saharan Africa and many low-middle income countries (LMICs), the problems from tobacco smoking is particularly high, majorly because of the continued cultivation of tobacco leaves, patronization and the influence of tobacco companies (World Health Organization, 2008). Moreover, the relative lack of awareness on smoking risks among several population groups may have further contributed to the increase in smoking and use of tobacco products (Samuel, Ajayi, Idowu & Ogundipe, 2016; World Health Organization, 2008).

Smoking is described as the active or passive breath in of smoke from charred dry leaves of tobacco plant (Brathwaite et al., 2015). Tobacco contains addictive intoxicating and euphoriant properties, mainly from the combined actions of harmane and nicotine present in it (Brathwaite et al., 2015). People tend to smoke simply for delight, or usually to gratify an addiction to the stimulant (Lopez, Collishaw, & Piha, 1994). Reports suggest that the effects of nicotine in starters and experimenters possibly increase alertness and cognition, with mild euphoric tendencies (Lopez et al., 1994). Among

different types of tobacco products, cigarettes are most commonly available and widely used.

According to Brathwaite et al (2015), some relatively similar patterns in smoking prevalence have been reported across Sub-Saharan Africa with men almost always having higher prevalence rates. Moreover, smoking in metropolitan areas is also more than observed in rural areas, owing to the effects of industrialisation and uptake of western lifestyles (Lopez et al., 1994). Meanwhile, increase in smoking rates have been reported among countries in the Eastern and Southern regions of Africa mainly among male populations in Ethiopia, Malawi, Rwanda, and Zambia, and the female populations in Rwanda and rural Zambia (World Health Organization, 2008).

Smoking prevalence is thought to be gradually increasing in Nigeria with limited interventions to curb the increase or challenges inherent in the practice (World Health Organization, 2015). Over 80% of tobacco-related deaths have been reported in low-middle income countries(LMICs), with Nigeria inclusive (World Health Organization, 2008). Tobacco companies have been accused of deliberately targeting vulnerable population groups in developing countries (Lopez et al., 1994). As many people in these settings continue to use tobacco products, health complications gradually build up, with the tobacco-related disease only becoming evident several years later (Jha et al, 2006; Lopez et al., 1994). This shows that smoking may "silently" damage vital organs in the body as the interval between the introduction to cigarette (tobacco product) and the inception of smoking health risks that disguises a sluggish but progressive decline of users health (World Health Organization, 2008). In fact, due to the delayed health manifestations, the use of tobacco products has increased even further in many African countries, compared to several other precarious substances that have health complications which are instant (Lopez et al., 1994; World Health Organization, 2008). Indeed, the prevalent of tobacco smoking diseases and deaths is estimated to escalate in Nigeria and across many LMICs in absence of effective population-wide measures (World Health Organization, 2008).

Literature review

The absolute number of smokers may be decreasing globally and in various countries, but the incidence of tobacco smoking appears to be increasing in the World Health Organization (WHO) African Region (AFRO), and the Eastern Mediterranean Region (EMRO), where control measures are reportedly weak (World Health Organization, 2015). Globally, in 2015 alone, over 1.1billion smokers were reported (World Health Organization, 2015). One of the utmost incidence of tobacco smoking intake have been reported in high-income countries particularly the Western European countries at 37% and 25% among men and women, respectively (Eriksen, Mackay, & Ross, 2012; The World Bank, 2010). Reports suggest Sub-Saharan Africa is at the first phase of the tobacco endemic cycle (Lopez et al., 1994), which is characterized by a greater occurrence of the use of cigarette in men than observed in women. In 2010, the appraised incidence of cigarette smoking in sub-Saharan was 14% in males and 2% in females, which is in congruence with first stage characteristics (The World Bank, 2010). In a review of 17 countries in Sub-Saharan Africa, the incidence of smoking alternated from 7% in Ghana to 37% in Sierra Leone, and 0.17% in Ghana to 6% in Sierra Leone, among men and women, respectively (Mamudu, Rijo, Sreenivas, & Ahmed, 2013).

Worldwide, the indulgence of cigarettes and other substances have been reducing gradually in high-income countries, but with alarming increase in LMICs (Jha and Chaloupka, 2000; World Bank, 1999). According to Guindon and Boisclair (Guindon et al, 2003), between 1970 and 2000, per capita, tobacco consumption rate dropped by 14% in high-income countries and amplified by 46% in LMICs. Although the increase occurred mostly among men, the use among women has gradually increased due to marketing strategies employed by tobacco companies in developing countries (Ernster, Kaufman, Nichter, Samet, & Yoon, 2000; Mackay, 1998). Mackay et al (2006) once attributed the projected global increase in the number of smokers from 1.3 billion to 1.5 billion by 2025 would be due mostly to increase use of tobacco products in developing countries (Mackay, Eriksen, & Shafey, 2006). According to Araújo *et al* (2011), the demographic transition in Sub-Saharan Africa, characterized by an increasing rural-to-urban migration may have contributed to the rapid change through the phases of the tobacco endemic compared to high-income settings (Araújo, Ana, Albertino & Lunet, 2011). Many have further opined that health disparities between nations may continue to worsen, especially due to the spread of cigarette smoking in developing countries without effective control measures and health system response (Araújo et al., 2011; Jha & Chaloupka, 2000). For any response to smoking hazards in sub-Saharan Africa, the understanding of the patterns and dynamics of tobacco consumption within sub-regions (and countries) is crucial.

Moreover, due to economic growth across Sub-Saharan Africa and increasing campaigns by tobacco companies, a potential increase in tobacco consumption may be expected, particularly when the

populations are less informed on the associated health risks. It is therefore essential not to only observe and assess tobacco smoking prevalence rates, but to also ascertain the awareness of the health risks, and the factors and patterns of tobacco smoking across population groups. This may encourage facts oriented decisions on health policies or programs on smoking, and subsequently helps at instituting operative strategies for healthy lifestyle promotion, and overall prevention of smoking-related diseases (Mackay J et al., 2006).

While many studies have not been conducted to ascertain the health risk awareness on smoking in the country, the rising occurrence of non-communicable diseases (NCDs) has been particularly linked to increase smoking rates, owing relatively to poor knowledge of the health effects. There are little or uncommon scientific data on tobacco smoking attributable diseases and death across Nigeria Shittu (2015). The few reported data on the epidemiology smoking are not consistent and marked by contradictory figures. Several studies have reported tobacco smoking prevalence ranging between 4.1% and 8.6% in Nigeria (Elegbeleye and Femi-pearse, 1976; Owie, 1984; Onadeko et al, 1987; Ibeh and Ele, 2003; Omokhodion and Sanya, 2003; Osungbade and Oshiname, 2008; Aina et al, 2009; Desalu et al, 2009a; Desalu et al, 2009b; Hussain et al, 2009).

The awareness on the tobacco-related disease on smoking is poor in Nigeria and across many African countries (American Lung Association, 2008). The analysis of the smokers' knowledge on plausible implications of smoking though limited but cannot be overemphasised. A specific state report indicated that the awareness about the risks of cigarette smoking among adult patients was reportedly low, except for some common complications like lung cancer, chronic bronchitis, and asthma (Shittu, 2015). In a national survey, the incidence of smoking amplified from 8.9% to 16.8% between 1990 and 2003 (Ekanem et al., 2008) and the use of cigarette incidence rates alternated from 5% in Ibadan (South-west Nigeria) to 16.7% in Kano (North-East of Nigeria) among respondents from the ages of 13 to 15 years (Ekanem et al., 2008).

There are different statistics on smoking incidence in Nigeria though most report are tending towards high prevalence. The age of indulgence was examined in a study on the prevalence of alcohol consumption and tobacco smoking in a selection of private universities, and the predominant age was reported to be 15-19 years with cigarette/tobacco constituting the most used substance among 349 out of 431 university students (Adekeye, et al ,2015). A higher smoking rate (32%) was also reported in recent times from the North East region of Nigeria (Adewole, Desalu, Nwogu, Adewole, & Erhabor, 2013). Salawu et al,(2009) indicated that the incidence rate of current smokers to be 34% in North-east Nigeria, while Obot (1990) had earlier reported an 23% among a sample of 1,271 Nigerians. A relatively recent study confirmed that 56% out of 337 respondent smokers indicated that they were they were influenced or attracted into smoking due to tobacco marketing or campaign (Iyola, 2013). Other earlier studies have reported lower rates of 6% among the adolescents in Calabar, South-south Nigeria (Odey et al, 2012), also 6% for Ilorin city (North-central Nigeria) in 2011 (Fawibe & Shittu, 2011).

Although, proof on the health risk of tobacco smoking have been reported worldwide (Shittu, 2015), however, knowledge about this is apparently low in Nigeria and many other low-resource settings (Adewole et al., 2013). In fact, it is believed that large number smokers in Africa are not completely aware of the harmful effects from smoking tobacco, therefore they tend to underestimate the possible health complications (Shittu, 2015). The prevalence of low published evidences on the level of health risk awareness on smoking in Nigeria may have further affected policy response. In view of the above background, and apparent gaps in tobacco and smoking research in Nigeria, this study aims to review publicly available evidences on smoking and associated health risks in Nigeria towards providing an estimate of the burden. This perhaps could prompt relevant public health and policy response across the already affected and vulnerable population groups in the country.

Data and methods

In this study, we searched MEDLINE, EMBASE, Global Health, AJOL and Google Scholar for publicly available articles on smoking prevalence and health risk awareness in Nigeria. We strictly adhered to the PRISMA guidelines of systematic reviews. Newspapers, books, and a range of related tobacco and smoking websites were searched. Relevant experts were contacted to identify more published or unpublished works. References of involving studies were hand-searched to identify other potentially eligible studies.

Selection criteria

Studies were extracted in the assessment based on certain standards: (i) conducted in Nigeria; (ii) population-based (cross-sectional or cohort); and (iii) directly attempted to estimate smoking prevalence and/or associated health risk awareness in the population. We excluded studies if: (i) it was mainly evaluations, perspectives, and comments; (ii) it the

study design was elusive; and (iii) had not consistently applied case definitions of smoking. For this study, current smokers are well-defined as persons who smoked tobacco/cigarettes in the last 30 days prior to the evaluation process. Ever smokers were those persons that had smoked at least one cigarette in their lifetime. This also includes former smokers who had smoked cigarette for about a 1 year but had not smoked in the last 30 days prior to the evaluation process. While never smokers were persons that had under no circumstances tried or experimented on smoking in their lifetime. Health risk awareness was defined as the proportion of those current smokers who were aware of related health consequences of smoking. Persons willing to quit were interpreted as the number persons presently smoking and are willing to quit smoking.

Quality assessment

For every completed manuscript retrieved, we ensured that the stated sample population size was suitable to represent an evaluation of the state or local government in Nigeria where the study was conducted. We further checked if the statistical analysis was appropriate, clearly presented, and limitations of the overall study designs explained.

Data collection process

The significant data retrieved from the carefully chosen studies were scrutinized accumulated and recorded in Excel spreadsheet. In the selected studies, information on study location, year, design, mean age, definitions of terms, sample size, and smoking prevalence (including health risk awareness) were extracted. Data were sorted by geopolitical zones, smoking type and gender.

Data analysis

All extracted data on smoking prevalence and corresponding health risk awareness were converted to percentages. A random-effects meta-analysis was conducted on extracted smoking prevalence and health risk awareness. To further appreciate the data dissemination and enhance relationships between the pooled estimates and the confidence intervals, In addition, the study presented the range, median and data points within each data set as a graph box. All statistical analyses were conducted in Excel 2010 (Microsoft, Redmond, United States of America) and Stata version 13.1 (StataCorp. LP, College Station, United States of America).

Results

Study characteristics

Out of the 55 studies initially identified from the literature search, 19 studies were suitable for the selection criteria were finally selected. These studies were conducted in 13 states in Nigeria, spreading across all geopolitical zones (Table 1). Majority of the studies were done in the South-south and South-west regions, representing 27.5% and 27% of all data points respectively. Urban settings recorded the highest data points at 70%, and most studies employed cross-sectional study designs (67%). Data on "current smoking" was reported in 47.5% of studies, while "ever smoking" and "never smoking" were reported in 32.5% and 20% of studies, respectively. Most studies were conducted mainly in adolescence and young adults, with a mean age of sample population ranging from 14.7 to 50.5 years (aggregated mean 22.4 years). In all, there were 40 observations (data points) as shown in Table 2.

Pooled estimates

Current smoking

The overall pooled prevalence of current smoking in Nigeria was 19.7% (95% CI: 14.0-25.5), with male and female prevalence rates at 18.9% (13.3-24.4) and 6.8% (4.1-9.6). The highest prevalence of current smoking was estimated in the South-south at 35.3% (12.3-58.2), while the lowest was recorded in North-west at 8.3% (4.7-11.9) (Figures 1 and 2, Table 2).

Ever smoking

Ever-smoking had almost the same prevalence with current smoking at 18.1% (14.4-22.0). This may be due to the fewer data points on ever smoking as observed from the geopolitical zones' distribution. Men who had ever smoked were higher at 23.1% (21.0-25.2) compared to women at 8.9% (3.3-14.4). The highest prevalence of ever smoking was also observed in South-south at 24.8% (4.6-62.2), with the lowest recorded in South-east at 13.6% (12.2-14.9) as indicated in Table 2.

Never smoking

As expected, many respondents in the overall sample population reported having never smoked, with an overall pooled prevalence of never smokers at 71.3% (61.5-81.2). The prevalence of never smokers was higher among females at 80% (44.7-114.6), compared to males at 62.3 (25.1-99.4). All geopolitical zones had a prevalence of never smokers above 80%, except North-east and South-south at 63.4% and 56.7%, respectively (Table 2).

Health risk awareness

There were about 55% (23-86) of respondents were not knowledgeable about the health dangers related with tobacco smoking. This was lowest in South-south (9.2%), which understandably, among other

factors, suggests the reason for high smoking prevalence in the region. However, the distribution of data on respondents who were aware of the health risk shows that a higher proportion (>70%) were aware of some forms of health risks associated with smoking. Although we could not identify the specific health risks the respondents were aware of, the high figure, however, suggests being aware of health risk may not necessarily deter persons from smoking. However, further analysis shows that 41.3% (17.3-65.4) of current smokers were willing to quit smoking. The South-south region has the lowest proportion of smokers (17%) who were willing to quit, which also possibly suggests the reasons for the higher prevalence of current smokers in the South-south (Figures 3, 4 and 5, Table 2).

Discussion

The study provided a comprehensive nationwide prevalence and health risk awareness of smoking in Nigeria as a distinct addition to limited data on cigarette smoking in the country. Specifically, it has added to the pooled of limited data that were currently concentrated in the Southern geopolitical zones of Nigeria e.g. South-south and South-west regions (Ekanem et al., 2008; Odey et al, 2012; Dimkpa & Wilcox, 2016; Abikoye et al., 2013).

One of the findings from this study indicated that the highest proportion of smokers skewed to the young people (aggregate mean age of 22 years). This has implications for policy direction on regulation of tobacco use and smoking hazards in the country. For a country like Nigeria with teaming young population (Population Reference Bureau, 2017), larger proportion of young people involvement in cigarette smoking could make them vulnerable to smoking hazards with negative consequences on young people wellbeing and contribution to economic development. The average age of Nigerian smokers discovered by this study tallies with other existing studies across sub-Saharan Africa (Ernster et al., 2000; Makay, 1998). This finding could also be used to modify the recently introduced restriction of trading cigarette (tobacco products) to persons above 18 years (The Federal of Nigeria Official Gazette, 2015), considering the fact that the average age of smokers is 22 years. There might be need to extend these tobacco control measures to include young person aged 22 years and below in order to save overwhelming young population the risk of smoking hazards that include risk of death (Jha, et al, 2015).

Another insight from the study is that the South-south zone has the highest prevalence of current smokers (35.3%). This may not be unconnected with the fact that the South-south region is home to people working offshore with high tendency for smoking at least to ward-off cold weather associated with ocean areas (Odey et al., 2012). The next highest is the North-east zone that is characterized with several displaced communities due to ongoing terrorist attacked. The condition of conflict-displaced people could make them vulnerable also to smoking, alcohol consumption to forestall depression and other harsh conditions (Adekola, Azuh, Adeloye & Amoo, 2018; Fawibe & Shittu, 2011).

Due to limited data points on ever smoking, we observed a close range of estimates between ever smoking and current smoking in this study. However, ever smokers are generally expected to be higher than current smokers, as this is a combination of people who have ever smoked regardless of the current status (Owonaro, et al, 2016; Odey et al, 2012; Fawibe and Shittu, 2011; Salawu et al, 2009; Obot, 1990; Eniojukan & Owonaro, 2016; Awopeju et al, 2013) This also points to the need to comprehensively document reports on the wide range of smoking practices across population groups in Nigeria.

Considering the overwhelming population that is at risk of smoking in Nigeria, with the lower specific smoking health risk awareness rate (< 50%), this signifies danger for life expectancy, and wellbeing generally. This finding could be relevant for program initiatives towards public awareness and informed modification of legislation on smoking in Nigeria (Abade, 2017). One major factor that may have led to the increased smoking prevalence in Nigeria is connected with the thriving tobacco market in the country. Nigeria is among the top three biggest tobacco markets in Africa (including Egypt and South Africa). Tobacco sales in Nigeria have continued to increase with huge profits reported annually by Nigerian tobacco companies. A WHO report (World Health Organization, 2012) estimated Nigeria has a population of almost 13 million smokers, with over 18 billion cigarettes sold each year, and accounting for about $931m in sales and profit. Specifically, the increased use of tobacco products smoking, particularly among the youths, and limited knowledge on the specific smoking health risks signaled dangers to SDG-3 target of tobacco control (W.H.O Framework Convention on Tobacco Control, 2016; SDGs, UN, 2015) in all countries.

Study limitations

One of the limitations in this study is that there is limited number of literature from Northern region compared to other regions which could make estimates reported not too representative of the entire nation. The study only extracted few data on

the distribution of health risk awareness across variance in awareness of smoking health risks. An understanding of the gender differences in awareness of smoking risks could have further assisted in instituting gender-based interventions on smoking in Nigeria. However, having included 19 studies across all geopolitical zones in Nigeria, we could have provided a near-estimate of the prevalence of smoking in Nigeria, which may provide a solid foundation for further research.

Conclusion

The research paper finalized that the incidence of cigarettes (tobacco smoking) is relatively high in gender, which prevented a description of the gender Nigeria, particularly in the southern parts of the country. The findings further suggest there was increased use of tobacco products smoking, particularly among the youths, and limited knowledge on the specific smoking health risks among younger population. The authors recommend policy response and population-wide interventions in the country over smoking. The provision for smokers' health care services and unhindered access to such service could enhance reduction in the smoking health hazards especially among the young people whose contribution to economic development and achievement of sustainable development is crucial.

Figures

Figure 1. Pooled prevalence of smoking in Nigeria.

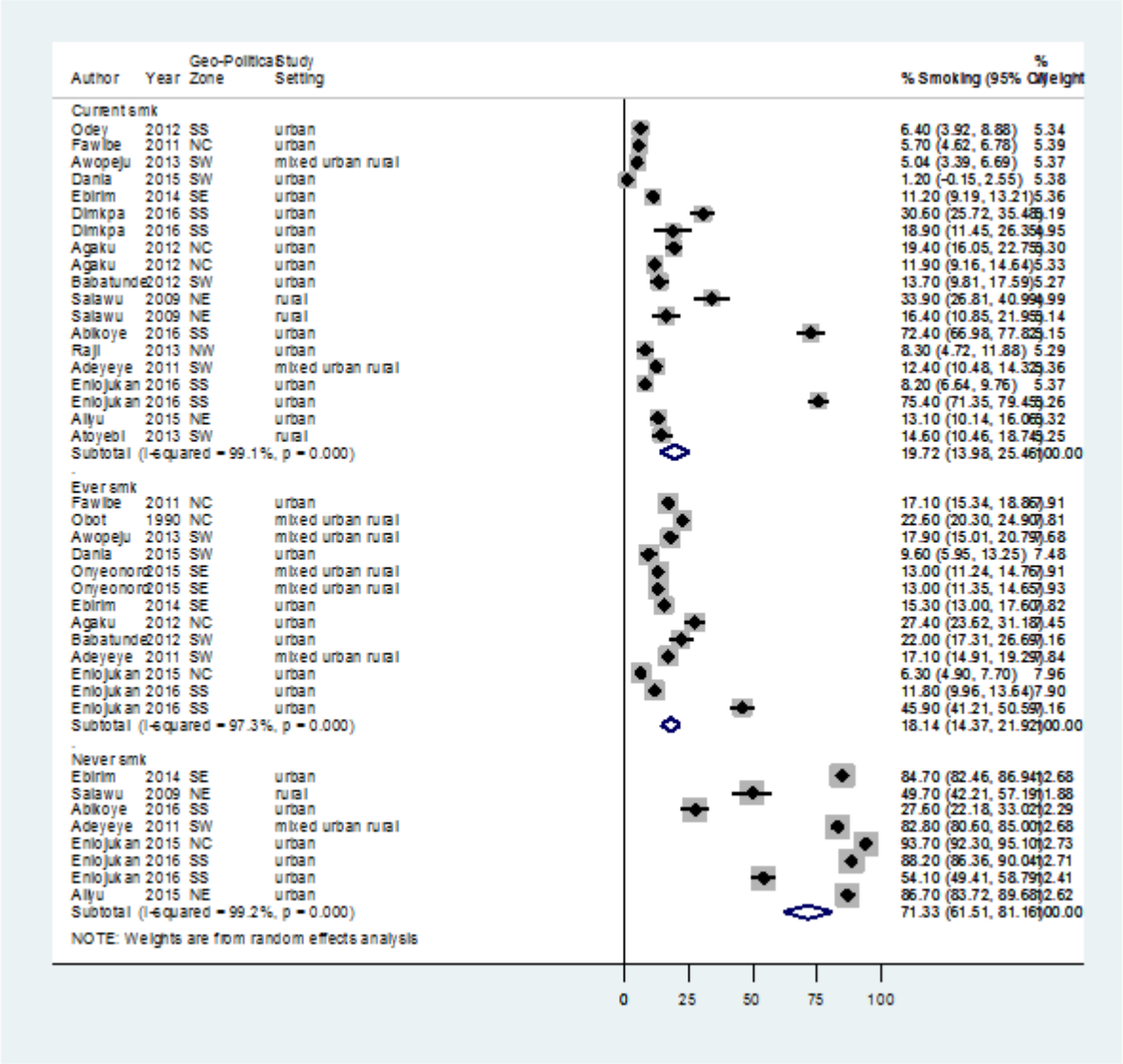
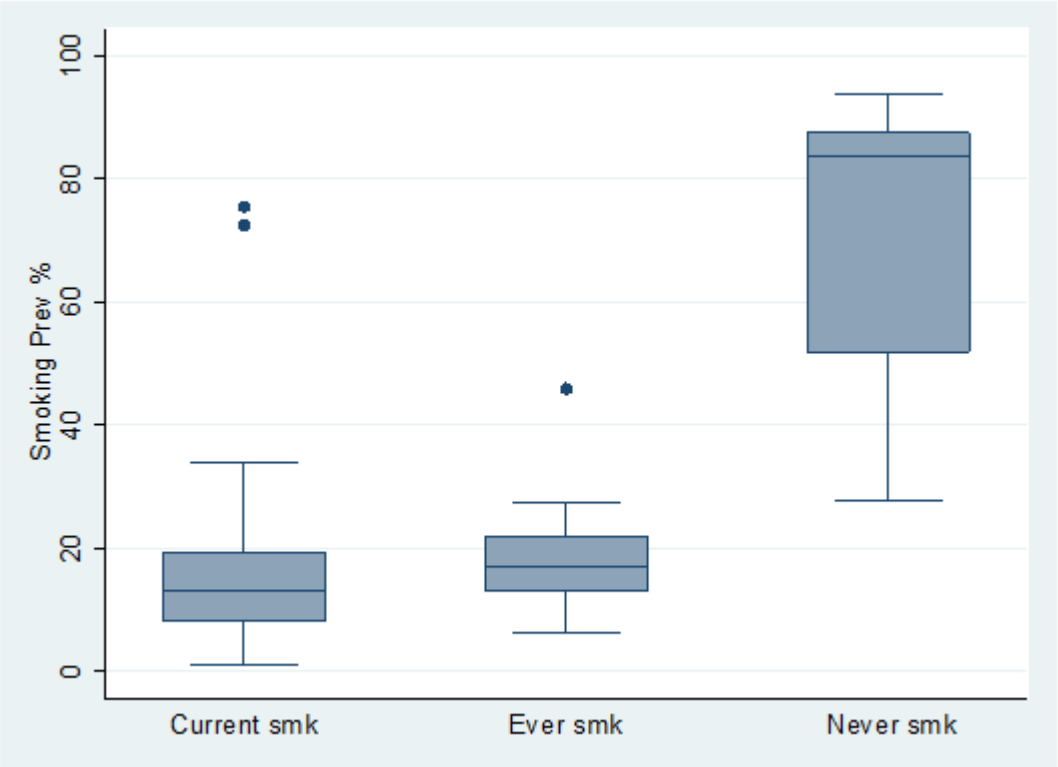


Figure 2:
Distribution of smoking prevalence extracted from all studies.



Foot Note
Current Smk- Current Smoking
Ever Smk- Ever Smoking
Never Smk- Never Smoking

Figure 3:
Pooled prevalence of proportion of persons not aware of health risks of smoking

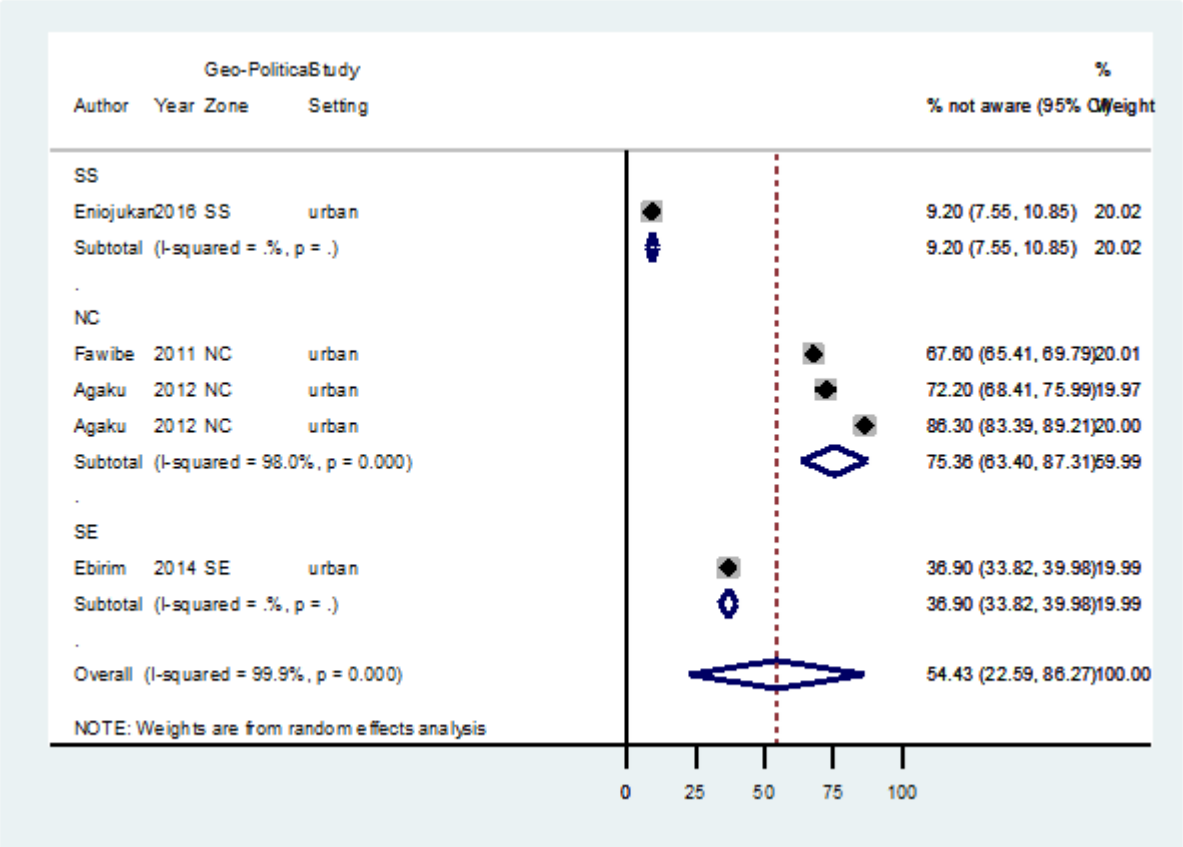


Figure 4:
Proportion of Pooled prevalence of persons aware of the health risk of smoking

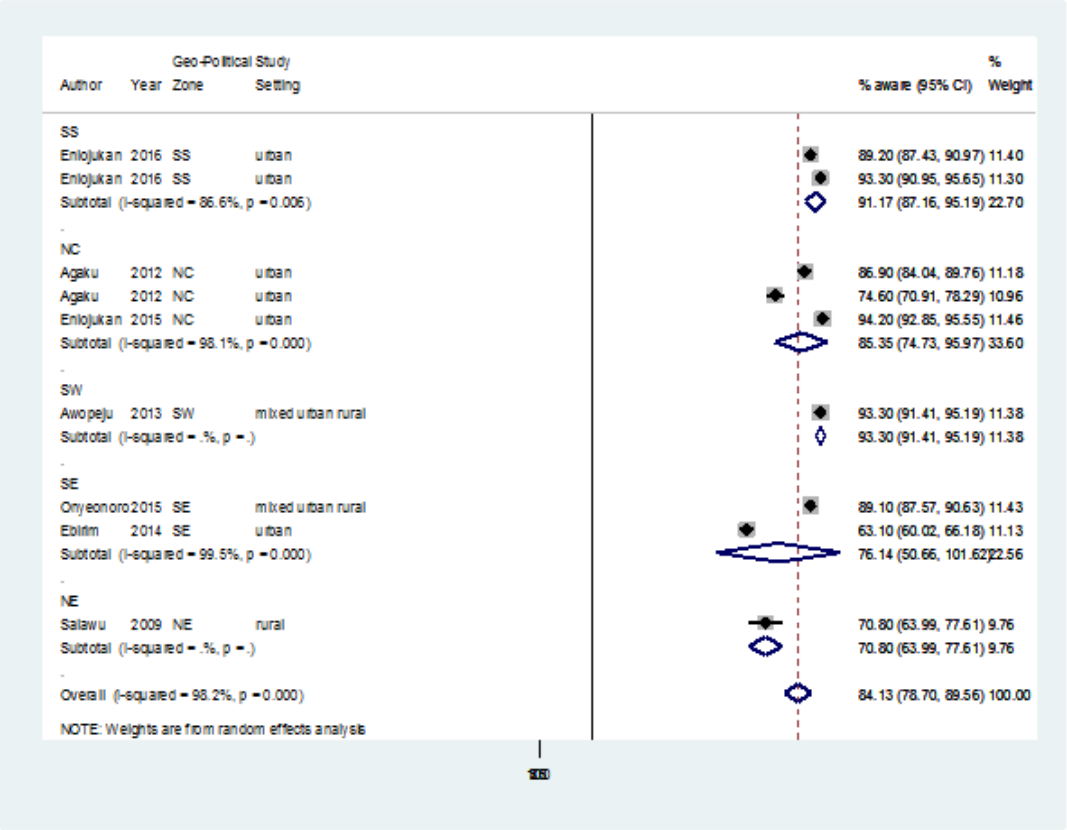
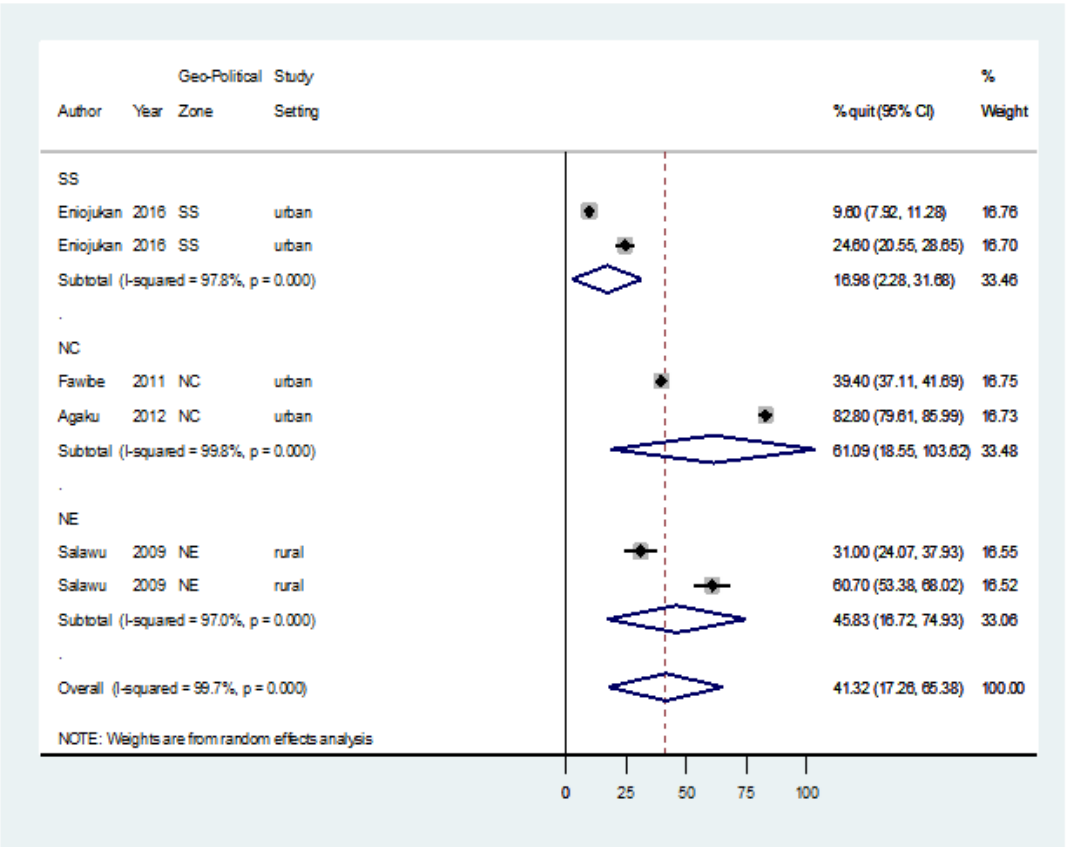


Figure 5. Pooled prevalence of proportion of persons willing to quit smoking.



Foot Note:
SS-south-south
NC-North Central
NE-North East

Tables

Table 1. Description of data points (40) from all studies

State	Data points	Percentage (%)
Abia	2	5
Adamawa	3	7.5
Bayelsa	10	25
Benue	5	12.5
Cross-River	1	2.5
Ekiti	3	7.5
Kwara	2	5
Lagos	5	12.5
Lagos and Osun	2	5
Maiduguri	2	5
Owerri	3	7.5
Plateau	1	2.5
Sokoto	1	2.5
Geo-political zone		
NC	8	20
NE	5	12.5
NW	1	2.5
SE	5	12.5
SS	11	27.5
SW	10	25
Study setting		
Rural	4	10
Urban	28	70
Mixed Urban-rural	8	20
Study design		
Cross-Sectional Study	27	67
Descriptive cross-sectional study	9	22.5
Descriptive survey	2	5
Multi-stage survey	2	5
Data type		
Current smoking	19	47.5
Ever smoking	13	32.5
Never smoking	8	20

Source: Researchers compilation

Table 2: Characteristics of included studies

First author	Year of publication	Location	Geo-political zone	Study design	Study setting	Data type	*Mean Age*	Sample (all)	Prevalence % (all)	Prevalence % (male)	Prevalence % (female)	Not aware of health risk %	Aware of health risk %	Willing to quit %
Odey (Odey et al., 2012)	2012	Calabar	SS	CrS	Urban	CS	14.67	375	6.4	13	2.1			
Fawibe (Fawibe & Shittu, 2011)	2011	Ilorin	NC	CrS	Urban	CS	21.6	1754	5.7	7.7	2	67.6		39.4
						ES	21.6	1754	17.1	22.9	6.2			
Obot (Obot, 1990)	1990	Jos	NC	CrS		ES	50.5	1271	22.6					
Awopeju (Awopeju et al., 2013)	2013	Ile-Ife & Lagos	SW	CrS	Urban & Rural	ES	21.5	675	17.9	23.9	11.9		93.3	
						CS	21.5	675	5.04	3.4	1.6			
Dania (Dania, Ozoh, & Bandel, 2015)	2015	Lagos	SW	CrS	Urban	ES	21.4	250	9.6					
						CS	21.4	250	1.2					
Onyeonoro(Onyeonoro et al., 2015)	2015	Abia	SE	CrS	Urban	ES	17.4	1396	13					
					Rural	ES	19.2	1587	13				89.1	
Ebirim(Ebirim, Amadi, Abanobi, & Iloh, 2014)	2014	Owerri	SE	DeS	urban	ES	15	944	15.3			36.9	63.1	
						CS	15	944	11.2					

						NS	15	994	84.7					
Dimkpa (Dimkpa & Wilcox, 2016)	2016	Bayelsa	SS	DeS	Urban	CS	18	343	30.6	43.7	20			
						CS	18	106	18.9	25.7	10.5			
Agaku(Agaku, Akinyele, & Omaduvie, 2012)	2012	Benue	NC	CrS	Urban	ES	16	536	27.4					
					Rural	CS	16	536	19.4			72.2	86.9	82.8
						CS	16	536	11.9			86.3	74.6	
Babatunde(Babatunde et al., 2012)	2012	Ekiti	SW	CrS	Urban	ES	15.14	300	22					
						CS	15.14	300	13.7					
Salawu(Salawu et al., 2009)	2009	Adamawa	NE	CrS	Rural	CS	14.70	171	33.9	40.4	22.6			31
						CS	14.70	171	16.4	16.5	16.1		70.8	60.7
						NS	14.70	171	49.7	43.1	61.3			
Abikoye(Abikoye, Kashimawo, & Eze, 2013)	2013	Bayelsa	SS	CrS	Urban	CS	25.9	261	72.4					
						NS	25.9	261	27.6					
Raji (M.O. Raji , I.S. Abubakar , M.O. Oche, & A.U. Kaoje, 2013)	2013	Sokoto	NW	DeS	Urban	CS	16.6	228	8.3					
Adeyeye(Adeyeye, 2011)	2011	Lagos	SW	CrS		CS	16.1	1132	12.4	16.1	7.1			
						NS	16.1	1132	82.8					
						ES	16.1	1132	17.1					

Eniojukan(Eniojukan JF & Chichi RM, 2015)	2015	Benue	NC	CrS	Urban	ES	20.0	1149	6.3				94.2	
						NS	20.0	1149	93.7					
Owonaro(Owonaro A. Peter, Eniojukan F. Joshua, & Owonaro A. E Daughter, 2016)	2016	Bayelsa	SS	DeS	Urban	CS	21.4	1182	8.2			9.2	89.2	9.6
						NS	21.4	1182	88.2					
						ES	21.4	1182	11.8					
Eniojukan(Eniojukan Joshua F & Owonaro Peter A, 2016)	2016	Bayelsa	SS	CrS	Urban	ES	45.5	434	45.9				93.3	24.6
						NS	45.5	434	54.1					
						CS	45.5	434	75.4					
Aliyu(Salamatu Umar Aliyu, Abubakar Samaila Chiroma, Abdurrahman Mohammad Jajere, & Fatima Kachalla Gujba, 2015)	2015	Maiduguri	NE	CrS	Urban	CS	42.5	498	13.1	18.1	3			
						NS	42.5	498	86.7	81	97			
Atoyebi(Atoyebi, Ibirongbe, Babatunde, & Atoyebi, 2013)	2013	Ekiti	SW	CrS	Urban	CS	21.4	280	14.6	14.6				

DeS=DescriptiveCrossSectional CrS= Cross Sectional ES=EverSmoking CS= Current Smoking NS= Never Smoking, ES= Ever Smoking,

Table 3. Pooled prevalence of smoking and health risk awareness in Nigeria

Data type	Geo-political zone	Prevalence % (95% CI) *Both sexes*	*Male*	*Female*
Current smokers	Overall	***19.7 (14.0-25.5)***	***18.90 (13.34, 24.45)***	***6.83 (4.10, 9.56)***
	NC	12.2 (4.35, 20.07)		
	NE	20.7 (9.82, 31.66)		
	NW	8.3 (4.72, 11.88)		
	SE	11.2 (9.19,13.21)		
	SS	35.3 (12.32, 58.23)		
	SW	9.2 (3.92, 14.46)		
Ever smokers	Overall	18.1 (14.4, 22.0)	23.12 (20.97, 25.27)	8.87 (3.29, 14.44)
	NC	18.3 (9.31, 27.20		
	SE	13.6 (12.24, 14.91)		
	SS	24.8 (4.64, 62.20)		
	SW	16.6 (12.41, 20.68)		
Never smokers	Overall	71.3 (61.5, 81.2)	62.29 (25.15, 99.42)	79.66 (44.69, 114.63)
	NC	93.7 (92.30, 95.10)		
	NE	63.4 (32.11, 104.62)		
	SE	84.7 (82.46, 86.94)		
	SW	82.8 (80.60, 85.00)		
	SS	56.7 (19.66, 93.74)		
Not aware of the health risk	Overall	54.43 (22.59, 86.27)		
	NC	75.36 (63.40, 87.31)		
	SE	36.90 (33.82, 39.98)		
	SS	9.20 (7.55, 10.85)		
Aware of health risk	Overall	84.13 (78.70,89.56)		
	NC	85.35 (74.73, 95.97)		
	NE	70.80 (63.99,77.61)		
	SE	76.14 (50.66, 101.62)		
	SW	93.30 (91.41, 95.19)		
	SS	91.17 (87.16,95.19)		
Willing to quit	Overall	41.31 (17.26, 65.38)		
	NC	61.09 (18.56, 103.62)		
	NE	45.83 (16.72, 74.93)		
	SS	16.98 (2.28, 31.68)		

Source: Researchers Compilation

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