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Review Article

Tobacco Control Interventions in Nigeria from 2012 to 2022: A Blueprint to Reduce Smoking Prevalence: A Systematic Review

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Abstract

Background: The results of the risk factors associated with tobacco use is a public health concern that slows global progress in the achievement of the Sustainable Development Goal 3 to ensure healthy lives. This is more pronounced in low-income countries like Nigeria where tobacco use remains prevalent leading to various types of non-communicable diseases. This study aimed to review systematically relevant literature to unravel the effects of interventions and policies geared towards tobacco control within Nigeria.

Methods: A systematic search of PubMed and ProQuest central databases, including an exploration of Google Scholar was carried out from 2012-22 for relevant studies within the last decade. The final selected studies were screened based on strict inclusion and exclusion criteria and their quality critically appraised. Six articles were included in the final review, 2 were cross-sectional studies, and 4 were experimental.

Results: Thematic and narrative synthesis of reports showed that tobacco price increase led to lower tobacco demand and use as the price elasticity of tobacco demand estimated in different target groups provided. Moreover, health education interventions positively affected tobacco control as there was a change in knowledge, attitude and practice in groups that had received interventions in Nigeria.

Conclusion: The chosen interventions and policies were effective in promoting tobacco control. There should therefore be an intentional drive to ensure enactment of policies based on the WHO Framework Convention on Tobacco Control. A global effort also must also be put to tackle prevalent health inequalities especially in developing countries like Nigeria.

Keywords: Cigarette; Smoking; Nigeria; Tobacco; SDG; Policies; Products

Introduction

Following the transition from the Millennium Development Goals (MDG), the universal call to action of the Sustainable Development Goals (SDGs) to ensure peace, prosperity, end poverty and protect lives remain a central theme of Public Health around the globe. With efforts to strive towards achieving the SDGs, even as the target of 2030 draws closer, there remain some way to go across all 17 goals especially in the developing countries (1). With the SDGs established as being intertwined and related with each other, the reality

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of achieving them is dependent on the progress made across the targets that make up each goal. The SDG 3 aims to ensure healthy lives and to promote well-being for all by 2030, having 13 underlying targets to achieve for it to be realized (2). These targets span across different areas of public health practice, which affect the all-round well-being, and stability of a demography. The collective goal to ensure healthy lives depend equally on the addressing of issues around communicable diseases, non-communicable diseases (NCDs) maternal and child health, drug abuse, including other components of health practice.

Nigeria, a low-income country in Sub-Saharan Africa, continue to face struggles in its progress towards achieving the SDGs because of large prevalent inequalities, widespread socio-economic deficiencies, poor leadership and other challenges typical of developing countries (3). This is evident as Nigeria continues to face worrying figures of maternal mortality, poor health coverage, road traffic incidents, communicable diseases and also NCDs (4). The use of tobacco has been established to affect health adversely as a risk factor of cancers, oxidative stress, stroke and heart disease, making it the leading cause of preventable death worldwide (5-7). To combat these, the targets 3.4, 3.5 and 3.a under SDG 3 respectively aim to significantly reduce the premature mortality from NCDs, strengthen the prevention and treatment of various forms of substance abuse and strengthen the implementation of WHO Framework Convention on Tobacco Control (2). Kumar et al. (5) highlights that most of the global mortality burden of tobacco use lies in developing countries, as there has been a growing epidemic of tobacco use, as the commitments control the circulation of tobacco products is not as effective as efforts in the developed countries. In addition, although within the last decade, the global smoking rates declined, the only exception remained in Sub-Saharan Africa, where the rate of tobacco use in males increased (8).

This prevalent use of tobacco products considerably increases the risks of NCDs and hampers progress towards achieving SDG 3 by 2030 (9,10). This is the situation even though it has been over 15 years since Nigeria signed the WHO framework convention on tobacco control (FCTC), there is still work to be done to secure comprehensive national tobacco control policies (9).

The need for action has led to public health interventions and policies aimed at different groups to reduce further the use of tobacco products. These interventions have been rolled out by the government, non-governmental organizations, and civil society organizations to curtail further the risk factors associated with tobacco smoking (11).

This study sets out to explore the various interventions and policies aimed at reducing the prevalence of tobacco users in Nigeria to determine if they have been successful in doing so. This study explores evidence within Nigeria only, however, it includes efforts across all group and demography within the country. Evidence generated from this study will provide insight into the most effective measures taken to reduce the use of tobacco products within Nigeria and provide recommendations for the appropriate measures to be adopted or expanded as appropriate.

This research will seek to answer the question;

"What is the effectiveness of public health interventions and policies in reducing the number of tobacco users in Nigeria within the last decade?"

This research question reflects on aspects around public health interventions and policies with an overarching eye on its contribution to reducing tobacco use to enhance the progress of Nigeria towards achieving SDG 3 by the year 2030. In formulating this research question, the FINER model was first used to guide the development of a research question, which would be feasible, interesting, novel, ethical and relevant. Furthermore, the specific research question was developed on the framework of the PIOT approach, where the population (P) are tobacco smokers in Nigeria, the intervention (I) is the various public health interventions and policies aimed at tobacco control, Outcome (O) is reduced tobacco use and the Time (T) is within the last decade (2012-2022).

The aim of this paper was to systematically review current literature and answer the research question to provide evidence on efficacy of public health interventions and policies implemented in Nigeria

targeted towards tobacco control, while the specific objectives include the following,

i. to conduct a thorough literature search for relevant research,
ii. to analyze and synthesize included literature, and
iii. to provide recommendations for public health practice of tobacco control in Nigeria

Methods

Search Strategy

A systematic search was conducted across two databases (ProQuest Central and PubMed), with additional search conducted on Google Scholar to identify relevant studies. The search strategy used in this study involved exploring the selected databases using key words such as “”cigarette”, “tobacco”, “intervention”, “policy” and “Nigeria”. To ensure a thorough approach to the search, synonyms and alternate terms to keywords were also included in the search and connected with the “OR” Boolean command. Moreover, the “AND” Boolean function was used to combine the search of different keywords. Furthermore, truncation searching was applied to the end of searched words to collect results of terms with singular, plural or variant endings. Some alternate words and the truncation used in the search include, “smok*”, “cigarette”, “nicotine”, “law*”, “control*” and “manag*”. Key phrases in quotation marks were also used in the search, these include phrases such as “tobacco use in Nigeria” and “interventions for tobacco control”. To restrict the search scope to relevant studies, the search for alternate words was limited to ‘anywhere except full text’ (title and abstract). The basic formula adopted for search was as below,

(tobacco OR smok* OR nicotine*) OR (cigarette* AND intervention* OR policy OR policies OR campaign OR law OR laws OR rule*) AND Nigeria* AND (control* OR manag* OR regulat*)

Inclusion and exclusion criteria

The studies obtained were screened based on the following

Inclusion criteria

- Research was conducted in Nigeria
- Research within the last decade (2012 to 2022)
- Research investigating the efficacy of interventions or policies aimed at tobacco control with data evidence
- Peer reviewed journals

Exclusion criteria

- Commentaries, editorials or opinion pieces
- Languages other than English

Appraisal and analysis

The tools used in the critical appraisal of studies included were selected based on the study design. The quality of cross-sectional studies was critically appraised using the AXIS tool developed by the Delphi panel (12, 13), This is an appraisal tool for Cross-Sectional Studies (AXIS). Critical appraisal (CA) is used to systematically assess research papers and to judge the reliability of the study being presented in the paper It is designed to address issues that are often apparent in cross-sectional studies and to aid the reader when assessing the quality of the study that they are appraising. The aim of AXIS in this study is to aid systematic interpretation of the cross-sectional study and to inform decisions about the quality of the study. The experimental studies included were critically appraised using the Joanna Briggs Institute (JBI) critical appraisal tool for Quasi-Experimental studies which assists systematic reviewers assess the trustworthiness, relevance and results of published papers (14, 15).

An analysis and synthesis of information therein was conducted to elucidate the collective findings that would answer the research question. A mix of thematic analysis and narrative synthesis was used to systematically extract, analyze and describe findings depicted in the different studies included. Meta-analysis could not be conducted in this review due to the heterogeneity in the studies that

were included, these involved variations across the treatment, target population, design, follow-up period and treatment lengths (Fig. 1).

A data summary table was used to summarize key information of each study, which contained information on the author, aims, study design, sample size, methods, and key findings.

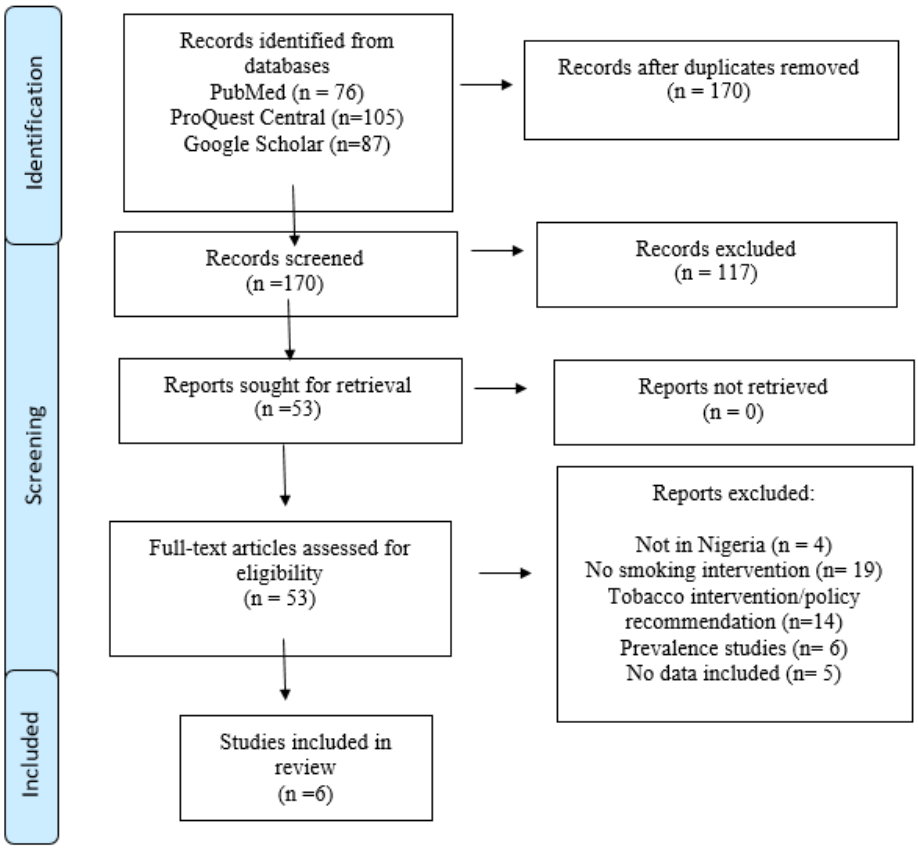

Fig. 1: PRISMA Flow diagram

Results

The six studies included were peer-reviewed articles from scholarly journals, which was an established part of the inclusion criteria to ensure standard reports were used for this review. Two of the studies included were cross-sectional studies aimed to establish the effects of increased prices of tobacco products on smoking in Nigeria while the remaining four were quasi-experimental studies that explored the effects of various types of public health interventions on knowledge, attitude and practice around smoking and tobacco use in different target groups within Nigeria.

The study of Asare et al. (16) on the effects of prices on youth cigarette smoking in Nigeria was one of the two cross-sectional studies included in this review. The study depicted a clear aim to estimate impact of cigarette prices on smoking in youths and employed standard models to estimate required variables in youths within Nigeria. The WHO designed Global Youth Tobacco Survey (GYTS) data for monitoring and tracking key tobacco indicators alongside logit models were used in this study to explore study aim, which was an ideal method to use. Results obtained showed a direct correlation between cigarette prices and smoking as increase in prices dropped tobacco use and initiation. A $1 increase in PPP-adjusted price

of a pack of cigarettes reduced smoking by 28% followed a clear statistical approach and was internally consistent, which was a strength of the study. Besides, the discussions and conclusions were justified by the study modelling and analyzed data obtained. However, the included sample size of 1555 youth in only 2 states out of the entire 36 states and the Federal Capital of Nigeria means the generalization of the result is limited.

The appraisal of Adeniji (17), a similar cross-sectional study, had a clearly stated aim to evaluate the consumption function and price elasticity in Nigeria, the target population being households in Nigeria. The study used cross-section data from the Harmonized Nigerian Living Standard Survey (HNLSS) alongside an empirical model and economic theoretical framework to elucidate findings. The price elasticity for rural and urban areas to be -0.63 and -0.49, concluding that for every 5% increase in the price of tobacco, there will be a 3% reduction in demand. This finding was consistent with the data obtained, reached by the detailed methodology outlined. A high point of the study was identifying variables for both urban and rural household for an in-depth analysis. Although, a concern about this study lies with the unclarity as regards to how non-responders were handled, with no clear illustration to show that non-response bias did not affect the results.

Onyechi et al. (18) in their work studied the effect of group-focused cognitive behavioral health education program on cigarette smoking in a sample of Nigerian prisoners. The choice of using multi-stage test administration on randomized groups as the method to achieve the study aim was suitable. Results obtained showed a difference in mean scores in both groups at the post-test stage as the treatment group had better results towards breaking smoking habits. The study showed strength in ensuring similar treatment for all groups apart from the intervention, which enhanced the internal validity. In addition, the statistical method used was clearly illustrated, providing for the possibility of being recreated while also ensuring that outcomes of participants were measured in an effective and uniform way.

Salaudeen et al. (17) explored the effects of health education on smoking habits of students in Nigerian tertiary institutions using a quasi-experimental study design. The institutions were randomly assigned to groups, which strengthened the adopted method's validity in achieving goals. Groups had similar indices at the start of the intervention, however, at the end; there was a statistically significant difference between both groups as regards to knowledge on risks of tobacco use. The work showed strength in ensuring a sound methodology with multiple measurement of outcome at both before and after the intervention. A weakness of the study however was the peripheral analysis done, with only proportions of measurements reported without a further analysis of the possible demographic implications on findings (Tables 1 and 2).

Table 1: Critical appraisal using AXIS tool (10,11)

Variable	Adeniji, (17)	Asare et al. (16)
Were the aims/objectives of the study clear?	Yes	Yes
Was the study design appropriate for the stated aim(s)?	Yes	Yes
Was the sample size justified?	Yes	No
Was the target/reference population clearly defined?	Yes	Yes
Was the sample frame taken from an appropriate population base?	Yes	Yes
Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?	Yes	Yes

Table 1: Continued …

Were measures undertaken to address and categorize non-responders?	Unclear	Yes
Were the risk factor and outcome variables measured appropriate to the aims of the study?	Yes	Yes
Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialed, piloted or published previously?	Yes	Yes
Is it clear what was used to determined statistical significance and/or precision estimates?	Yes	Yes
Were the methods sufficiently described to enable them to be repeated?	Yes	Yes
Were the basic data adequately described?	Yes	Yes
Does the response rate raise concerns about non-response bias?	Unclear	No
If appropriate, was information about non-responders described?	Unclear	Yes
Were the results internally consistent?	Yes	Yes
Were the results for the analyses described in the methods, presented?	Yes	Yes
Were the authors' discussions and conclusions justified by the results?	Yes	Yes
Were the limitations of the study discussed?	Yes	Yes
Were there any funding sources or conflicts of interest?	No	No

Table 2: Critical appraisal using JBI tool (12,13)

Variable	Onyechi et al. (18)	Salaudeen et al. (19)	Raji et al. (20)	Odukoya et al. (21)
Is it clear in the study what is the 'cause' and what is the 'effect'?	Yes	Yes	Yes	Yes
Were the participants included in any comparisons similar?	Yes	Yes	Yes	Yes
Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	Yes	Yes	Yes	Yes
Was there a control group?	Yes	Yes	Yes	Yes
Were there multiple measurements of the outcome both pre- and post the intervention/exposure?	Yes	Yes	Yes	Yes
Was follow up complete and if not, were differences between groups described and analyzed?	Yes	Yes	Yes	Yes
Were the outcomes of participants included in any comparisons measured in the same way?	Yes	Yes	Yes	Yes
Were outcomes measured in a reliable way?	Yes	Yes	Yes	Yes
Was appropriate statistical analysis used?	Yes	Partially	Partially	Yes

The quasi-experimental study of Raji et al. (20) on using peer-led health education to improve cigarette smoking knowledge, attitude and practice also employed a methodological design appropriate for the objectives. The study ensured both groups remained similar and comparable allthrough to ensure valid results and conclusion. Results showed a reduction in tobacco use at the end of intervention in the test groups when compared to the control group. With strength in ensuring complete follow up and measurement of outcomes at multiple stage of the intervention, the study ensured validity. The authors also clearly illustrated statistical methods employed leading to a transparent result generation. Although a weakness is the failure to highlight the limitations of the study.

In exploring the effect of an anti-smoking awareness campaign on tobacco-smoking related knowledge, attitude and practice of students in Nigeria, Odukoya et al. (21) employed a non-randomized experiment to achieve the aim of their study. Following pre and post-test analysis, although there was a statistically significant change in the mean knowledge and attitude scores after the intervention, there was no statistically significant change in current smoking habits in the intervention group. The research in reaching that inference ensured a detailed information on the sampling, selection and methodology used for transparency. The authors also based the measurement of outcomes using the standard Global Youth Tobacco Survey questionnaire (GYTS) which also increased the overall validity. Another strength was measurement of the outcome in three stages of the study rather than just two, for a more thorough approach. Additionally, the study had its indicators pre-determined and specified which gave a clear direction of the study. A weakness of the study though was the short duration of intervention, (just 2 terms of school) which does not allow for a proper measurement of intervention efficacy in the long term.

Overall, although the included studies had their various limitations, they were of sound methods of which findings could be relied upon. Furthermore, all had indicated clearance from the required ethical bodies (Table 3).

Table 3: Data summary table

Author and date	Title	method	Aim(s)	Target population	sample size	Intervention	Outcomes and main findings
Adeniji (17)	Consumption function and price elasticity of tobacco demand in Nigeria	Cross-sectional	Evaluate tobacco consumption function and price elasticity in Nigeria.	rural and urban Households	77,400	Increased tobacco prices	Increase in prices reduced demand. For every 5% increase in the price of tobacco, there will be a corresponding 3% in the quantity of tobacco demanded. This is more pronounced in the rural samples more than in urban.
Asare et al. (16)	Effects of prices on youth cigarette smoking and tobacco use in Ghana and Nigeria	Cross-sectional	Estimate impact of cigarette prices on youth smoking	Youths	15,669	Increased tobacco prices	Cigarette prices affected youth smoking. A $1 increase I a pack of cigarette reduced smoking by 28% among youth in Nigeria. $1 increase in price of a pack also reduced smoking initiation by 14.8%.
Onyechi. et al. (18)	Effects of a group-focused cognitive behav-	Quasi-experimental (pre- and	Examine effects of GCBHEP on cigarette smoking in prisoners	Prisoners	301	Group-focused cognitive behav-	Results show that the program was effective in helping overcome the

Table 3: Continued …

	ioral health education program on cigarette smoking in a sample of Nigerian prisoners.	post-test grouping)				ioral health education (GCBHEP)	habit of cigarette smoking in the treatment group compared with that of the control group over time.
Salaudeen et al. (19)	Effects of health education on cigarette smoking habits of young adults in tertiary institutions in a Northern Nigerian state.	Quasi-experimental (pre- and post-test grouping)	Assess effects of health education on KAP of cigarette smoking among students.	students	2,987	Health education	There was an increase in knowledge of the health consequences of smoking in group that received intervention. Also, there was an increased will to quit smoking.
Raji et al. (20)	Using peer led health education intervention to improve in-school adolescents' cigarette smoking related knowledge, attitude and behavior in a Northwest Nigerian state.	Quasi-experimental (pre- and post-test grouping)	Assess effects of peer-led intervention on KAP of cigarette smoking among school adolescents	students (adolescents)	114	Peer-led health education	Significant increase in the proportion of respondents in test group with improved KAP.
Odukoya et al (21)	The effect of a short anti-smoking awareness program on the knowledge, attitude and practice of cigarette smoking among secondary school students in Lagos state, Nigeria.	Quasi-experimental (pre- and post-test grouping)	Assess effects of short anti-smoking program on KAP of cigarette smoking among students	students	948	Anti-smoking awareness program	The intervention improved tobacco knowledge and influenced attitudes of test group against tobacco use.

Discussion

The studies of Asare et al. (16) and Adeniji (17) showed similar findings regarding the association of increased tobacco prices with its demand and use within Nigeria albeit on different target populations. The findings both suggested a statistically significant relationship between increased tobacco prices and reduction of its demand and use within households and youth in Nigeria. These finding are also consistent with those in high-income nations, as a similar study by Yeh et al. (22) involving data across 28 European Union countries reported similar outcomes, as increase in tobacco prices reduced cigarette consumption. With the finding of Adeniji (17) highlighting a greater reduction of tobacco demand in rural areas more than urban areas on increase of prices, it provides a dimension that further strengthens evidence that the rural dominated low-income countries, including Nigeria, will have better results in tobacco control if policies to increase tobacco taxation is enforced. Increase of tobacco prices through increased tax of tobacco products is part of the WHO FCTC that have succeeded in the developed countries and should be replicated for similar outcome in the low-income countries as findings suggest.

The experimental studies all depicted different levels of efficacy of the various health education interventions albeit on different target population. Another study reported better knowledge, attitude, and practices of school students with regards to tobacco use and initiation, concluding that incorporating health education programs in school curriculums will reduce smoking prevalence (19-21). Although such conclusion is valid with the evidence of the studies, there was no data obtained to collaborate the findings with a reduction in smoking prevalence among students in Nigeria. However, other studies conducted in both high-income and low-income countries have identified health education in schools as one of the most effective tools in reducing smoking prevalence as

key indicators of smoking such as the drive for initiation, intention to smoke when older, knowledge about health deficits of smoking and attitude towards smoking are all positively affected by its implementation (23, 24,). Efficacy of a health education program in facilitating smoking behavioral changes in prison inmates, as results showed noticeable changes in treatment group when compared with control group, although the sample size used is not sufficient for generalization of its efficacy, the randomization of groups and its leverage on similar findings from other studies enforces the validity of results (18). The experimental studies also presented a variant of approaches in providing health education messages to reduce prevalence of tobacco use, these include forms of awareness programs, peer-led, group-focused or curriculum-based studies. The collective evidence from this systematic review supports the importance of including health education and health promotion interventions in reducing the prevalent smokers in Nigeria and the world in entirety. In line with this, the United States Preventive Services Task Force (25) recommends the use of health education to drive smoking cessation among multiple groups as it has proven effective in reducing smoking prevalence.

Limitations

A limitation of this study is the few numbers of report selected to be included. Also, the search for records covered only two databases (PubMed and ProQuest central), while other popular database such as Web of Science and CINAHL were not explored. However, to mitigate this, the Google Scholar was deeply explored for available related papers. Another limitation of this study is the independent review being done by a single author without a second reviewer as an extra layer to reduce bias and ensure quality. Nonetheless, the study ensured adherence to PRISMA protocols for conducting systematic review to keep up with quality standards.

The study showed strength in ensuring quality of included reports by filtering for the most valid peer-reviewed journals in drawing evidence while excluding commentaries, editorials or opinion pieces that may be prone to bias. Overall, the methods employed in the search and synthesis in this study ensured valid findings that provide key insight on efficacy of tobacco interventions and policy

Implications arising

A search for evidence of the efficacy of public health intervention and policies was met with little locally driven research on efficacy of tobacco control interventions and especially policies in Nigeria and low-income countries, also documented in the review (5). There were no RCTs conducted to explore the efficacies of tobacco interventions and policies. To work towards achieving SDG 3, and the associated targets in Nigeria, resources and efforts must be channeled towards the right policies and interventions. Limited evidence of research serves as a drawback in facilitating proper advocacy and implementing the most effective interventions.

The WHO (2021) identifies tobacco use as a major risk factor of various NCDs including cancer, with 8 million deaths yearly from tobacco use and majority of those deaths being in low- and middle-income countries. This consequence is dire and further worrying, as the low-income countries have become targets of intensive tobacco industry marketing and interference due to the strict regulatory processes in developed nations (24). This economic dimension of globalization is a key determinant of the prevalent NCDs caused by tobacco smoking in Nigeria. On the other hand, a political dimension of globalization also plays out in the power tussle in the enforcing of strict policies and laws to ensure tobacco control in low-income countries. These and other dimensions of globalization are key drivers that have facilitated the large inequality of NCD prevalence in low-income countries compared to more developed nations (11). The lack of sustained interventions on smoking cessation and initiation targeted especially at youths in educational system is another drawback to reducing the prevalence in the region. These roadblocks to tobacco regulation in Nigeria only serve as a major drawback to achieving the SDG 3 goal by 2030, and by proxy other SDGs

(26). This is as ensuring healthy lives entails curbing the major identified risk factor in NCDs. In addition, without a healthy population, the push all other SDGs by 2030 will be highly compromised.

As the bid to uphold fundamental right to health for all at all ages remain the focus of SDG 3, the most effective health policies and interventions need to be at the heart of global efforts if the 2030 goal is to be achieved. Prevalent health inequities around the world provided by economic, political and developmental differences need to be addressed. Poor health, especially in low-income countries will conversely increase poverty and hunger, reduce access to education and clean water, which are all key themes that will facilitate sustainable development and resourcefulness (27).

The findings of the collective efficacy of interventions in this study hence provides evidence of efficacy in reducing tobacco use in Nigeria if key measures are taken. There should be an active drive by the government to enact the WHO FCTC guides within Nigeria as stipulated. The government need to take a cue from industrial policies that served well in developed countries and facilitate tax increase on tobacco products to increase market prices proven to reduce smoking prevalence. In addition, with the youth and young adults being a target market for tobacco companies, a school curriculum that incorporates a stringent health education program at early developmental stages can also reduce initiation as highlighted by this study. Furthermore, international support and funding channeled into health promotion interventions in Nigeria should also carry messages to facilitate best knowledge, attitude and practice as regards to smoking and tobacco use.

Conclusion

Tobacco use in Nigeria has remained a concern as its implication in the development of NCDs remain a drawback as the country continues to strive towards achieving SDG 3 by 2030. The need for action to reduce prevalence of smoking and associated tobacco use has led to various policies and interventions in the country. Thematic analysis of studies shows that increases in tobacco prices leads to a reduction in its demand and use, while various health education interventions are effective in promoting healthy knowledge, attitude and practices as regards to smoking in a wide range of population. Although, economic and political dimensions of globalization have been key factors in facilitating health inequalities in low-income countries like Nigeria, measures must be taken to ensure the progress towards SDG 3 remain on track. A commitment to strict laws on tobacco industries and incorporation of health education into academic curriculums could reduce the users of tobacco in Nigeria.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of Interest

The authors do not have any conflict to declare

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