

REVIEW ARTICLE

FACTORS ASSOCIATED WITH KNOWLEDGE AND AWARENESS ON SMOKE-FREE POLICY AT FOOD PREMISES: A SYSTEMATIC REVIEW

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ABSTRACT

Smoke-free policy is designed to primarily protect non-smokers, as well as smokers. Food premises are considered to be hospitality areas where all segments of the population congregate, including the vulnerable groups such as children, pregnant women, and the elderly. This systematic review aims to present and systematically determine the factors associated with knowledge and awareness on smoke-free policy at food premises. We conducted an electronic search for articles related to factors associated with smoke-free policies, utilizing two databases: EBSCOhost and Scopus. Two pairs of independent reviewers screened the titles and abstracts of the collected data, stored in Microsoft Excel version 2211 against both the inclusion and exclusion criteria. Afterwards, the included articles were critically appraised to assess the quality of the studies using the Mixed Method Appraisal Tool (MMAT). Of the 332 articles identified, only four were included in the final review. Age, education level, smoking status, belief towards smoking, and location are the factors associated with knowledge and awareness of the smoke-free policy at food premises. In conclusion, smoking imposes a significant public health risk and an economic burden. Therefore, understanding the factors influencing knowledge and awareness of smoke-free policies at food premises is critical. By considering the findings from this review, policymakers can design more effective and sustainable policies that not only maximize health outcomes but also elevate the overall health status of communities..

Keywords: smoke free, food premise, restaurants

INTRODUCTION

Findings from the Global Burden of Disease Study 2019 estimated that there are currently 1.14 billion smokers worldwide. The significant increase from 0.99 billion smokers in 1990 is mainly driven by global population growth. Smoking tobacco use contributed 7.69 million people to the annual death toll and 200 million disability-adjusted life years (DALYs)¹. There is a higher prevalence of common diseases related to cardiovascular system as well as respiratory system among smokers, such as atherosclerosis and chronic obstructive pulmonary disorder (COPD). The effects of smoking can be systemic due to raised levels of inflammatory mediators and oxidants-antioxidants imbalance².

The financial burden of smoking is substantial. Premature deaths and the cost of outpatient treatment were identified as the major direct and indirect cost drivers, respectively. Smoking-related diseases account for 1.5% - 6.8% of national health system spending and 0.22% - 0.88% of a nation's gross domestic product (GDP)³. Smoking does not only impact the health of a population, it affects their wealth as well. A study

focusing on the burden of smoking in Asia-Pacific countries outlined the lifetime spending on purchasing one pack of cigarettes each day. For example, in Australia and Malaysia, a lifetime spending of \$308,993.67 and \$72,338.26 on cigarettes were recorded, respectively⁴.

The annual global deaths attributed to smoking are projected to increase over the coming decades in the absence of intervention. Increased taxation and smoke-free policy are some of the measures implemented in countries worldwide to curb the smoking pandemic. According to the Centre for Disease Control and Prevention (CDC), the main goal of smokefree legislation and practices is to protect non-smokers from secondhand smoke. Smokefree regulations can also encourage and assist tobacco users in quitting, as well as prevent the onset of tobacco use⁵.

The trend towards implementing smoke-free policies in food premises reflects a growing recognition of the importance of protecting public health in shared spaces where individuals gather to eat, socialize, and conduct business.. Food premises are premises involved in the

preparation, serving, and handling of food⁶. A similar definition was adopted by New York Codes, Rules and Regulations in which the term food service establishment is used to describe a place where food is prepared and intended for individual portion service and includes the site at which the individual portions are provided, whether consumption occurs on or off the premises⁷. The adopted definition is different from that used in the Malaysia Food Act 1983 which defines food premises as premises used for or in connection with the preparation, preservation, packaging, storage, conveyance, distribution or sale of any food, or the relabeling, reprocessing or reconditioning of any food⁸. This wide definition would include factories and industries which are not the focus of this review.

Despite global efforts to reduce tobacco use, there remains a need to address specific challenges, such as enhancing awareness of smoke-free policies in public spaces like food premises. To alleviate the economic burden of smoking, policies such as increasing the tax rate on cigarettes and declaring smoke-free policy in designated areas are necessary and should be implemented. However, there is still a huge implementation gap when it comes to tobacco control. Countries have a direct and critical opportunity to enact robust, evidence-based policies to expedite the decline in smoking prevalence and improve their populations' health greatly. For any policy to achieve its intended goals, the stakeholders and parties involved need to be educated on the said policy. It is imperative to identify the relevant factors contributing to the level of knowledge and awareness of smoke-free policy in designated areas, especially food premises. Hence, in this review, we aim to present and systematically review the factors associated with knowledge and awareness on smoke-free policy at food premises.

METHODS

This systematic review is prepared in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta Analyses) updated guidelines. The objective of this review is to identify the factors associated with knowledge and awareness on smoke-free policy at food premises. The components of mnemonic PEO (population, exposure, outcome) were established as follows:

- Population: food premises owners and customers
- Exposure: Factors, determinants
- Outcome: knowledge and awareness of smoke-free policy.

Searching Strategy

The literature search was conducted in from 1st November 2022 to 30th November 2022, using EBSCOhost (MEDLINE), and Scopus databases. The

following are keywords used in searching for related articles: “smoke free*” AND “food premise*” OR “restaurant*” OR “café*” OR “stall*” OR “eateries” AND “factor*” OR “determinant*”. All retrieved articles were imported into Microsoft Excel version 2211, and duplication by title and author was done by conditional formatting.

Eligibility Criteria

The inclusion criteria were: (1) publication in the English language; (2) original articles including cohort, case-control, and cross-sectional studies which investigate the associated factors on smoke-free policy at food premises. In contrast, mixed methods and qualitative studies as well as non-original articles, such as conference proceedings, perspective, commentary, opinion, reports, systematic review, and meta-analyses, were excluded. It was decided that the publication period shall be from year 2000 onwards.

Study Selection

Two pairs of independent reviewers screened the titles and abstracts of the retrieved materials against the inclusion and exclusion criteria. The potential articles identified during the main screening were kept, and the full texts of the articles were reviewed carefully and independently by the same reviewers according to the inclusion and exclusion criteria. The third reviewer was assigned to resolve any disagreements that arose between each pair of reviewers.

Critical Appraisal and Data Extraction

Quality appraisal was conducted using the Mixed Method Appraisal Tool (MMAT). The MMAT evaluates the quality of articles. It focuses on methodological criteria and includes five core quality criteria for each of the selected articles⁹. One reviewer extracted the data, which were then assessed independently by the second reviewer. Eligible articles were analyzed in detail using the content analysis method without performing any statistical tests.

RESULTS

The search yielded 272 articles from EBSCOHOST, and 60 articles from SCOPUS, resulting in 332 unique hits. Only four articles were included in the full-text assessment after rigorous selection screening, as shown in the PRISMA flow diagram (Figure 1). A descriptive summary of the studies included in this review regarding study location and design is presented in Table 1. The findings from the four studies were included in this systematic review, as shown in Table 2. One eligible article was from Taiwan, one from Vietnam, one from Ghana, and one from the United States of America (USA). The analyzed articles were published between the years 2000 and 2022.

Table 1. Summary of study location and study design.

Authors	Study Location	Study design
Chen et al. (2009) ¹⁰	Taiwan	Cross-sectional study
Dang et al. (2018) ¹¹	Vietnam	Cross-sectional study
Singh et al. (2021) ¹²	Ghana	Cross-sectional study
Linnan et al. (2010) ¹³	North Carolina, USA	Cross-sectional study

Knowledge and awareness on smoke-free policy at food premises

In this article, the four studies focused on knowledge and awareness of smoke-free policy at food premises. Factors that facilitate the knowledge and awareness of smoke-free policy at food premises are divided into age, education level, smoking status, attitude towards smoking, and location. Most of the studies included in this review show positive effects to smoke-free policy at food premises.

Age

Interestingly, out of the four studies included in this review, only one study investigated the relationship between age, and knowledge and awareness on smoke-free policy. Study in Taiwan showed that respondents aged less than 19 years old are more likely to have awareness on smoke-free restaurants (OR=1.6, 95% CI:1.0, 2.6)¹⁰.

Education level

Education level is one of the fundamental factors that can affect an individual's knowledge and awareness. However, only one of the four articles included in this review explores the association between education level and knowledge and awareness of smoke-free policy at food premises. Again, Study in Taiwan found that respondents with education level of lower than high school level are 0.5 times less likely to have smoke-free restaurant awareness (OR=0.5, 95% CI:1.0, 2.6)¹⁰.

Smoking status

In this review, two out of four studies proposed that smoking status was associated with knowledge and awareness of the smoke-free policy^{11,13}. Study in Vietnam showed that those who have high awareness of smoking are among the non-smokers (p=0.03) and this was consistent with the findings of other study in North Carolina, USA which reported that those who never smoke have higher odds of having smoke-free policy indoors^{11,13}.

Belief towards smoking

Another factor found to have an impact on the smoke-free policy was the belief toward smoking. Study in Taiwan found that those who were pro-tobacco free were more likely (OR=2.0, 95% CI:1.3,3.1) to have greater knowledge of smoke-free policy¹⁰. Meanwhile, study in North Carolina, USA yielded several findings in relation to the belief towards smoking, whereby restaurants with

25% or fewer employees who smoke have 1.78 times higher odds of having smoke-free policy indoors and those restaurants with a liquor license were 0.26 (95% CI, 0.17-0.42) times as likely as restaurants without a liquor license to have a smoke-free policy indoors¹³.

Location

Surprisingly, it was found that knowledge and awareness on smoke-free policy at food premises vary according to the location of the food premises. One study in Ghana showed that restaurant owners and staff from a city called Tamale have significantly higher knowledge on ban on tobacco advertising and promotion, smoke-free places, and display of no-smoking signs¹². However, awareness regarding restriction of smoking in public places is significantly higher among respondents from the city of Accra¹². This study also found that respondents from the city of Accra have 3.08 times more knowledge on smoke-free policy compared to respondents from the city of Tamale (OR=3.08, 95% CI:1.10, 8.60)¹².

Knowledge and awareness of smoke-free policy may be inferred from the presence of smoke-free policy at food premises, as smoke-free policy cannot be implemented without knowledge and awareness. Study in North Carolina, USA found that the odds of having indoor-smoking policy is higher in restaurants that are located in low or medium tobacco production counties compared to restaurants located in a high tobacco production counties¹³. They also found that the odds of having indoor-smoking policy is lower if the restaurants are in the first (OR=0.46, 95% CI: 0.25, 0.88), second (OR=0.52, 95% CI 0.28, 0.97) and third (OR=0.48, 95% CI: 0.25, 0.91) quartile of the county per capita income compared to restaurants located in the fourth quartile per capita income¹³.

Risk of Bias

The authors conducted quality appraisal of all four studies using the Mixed Method Appraisal Tool (MMAT). The methodology quality of qualitative studies can be appraised using this tool. Five criteria are used to assess the quality of the studies⁹. The details of this assessment for the selected studies are set out in Table 3.

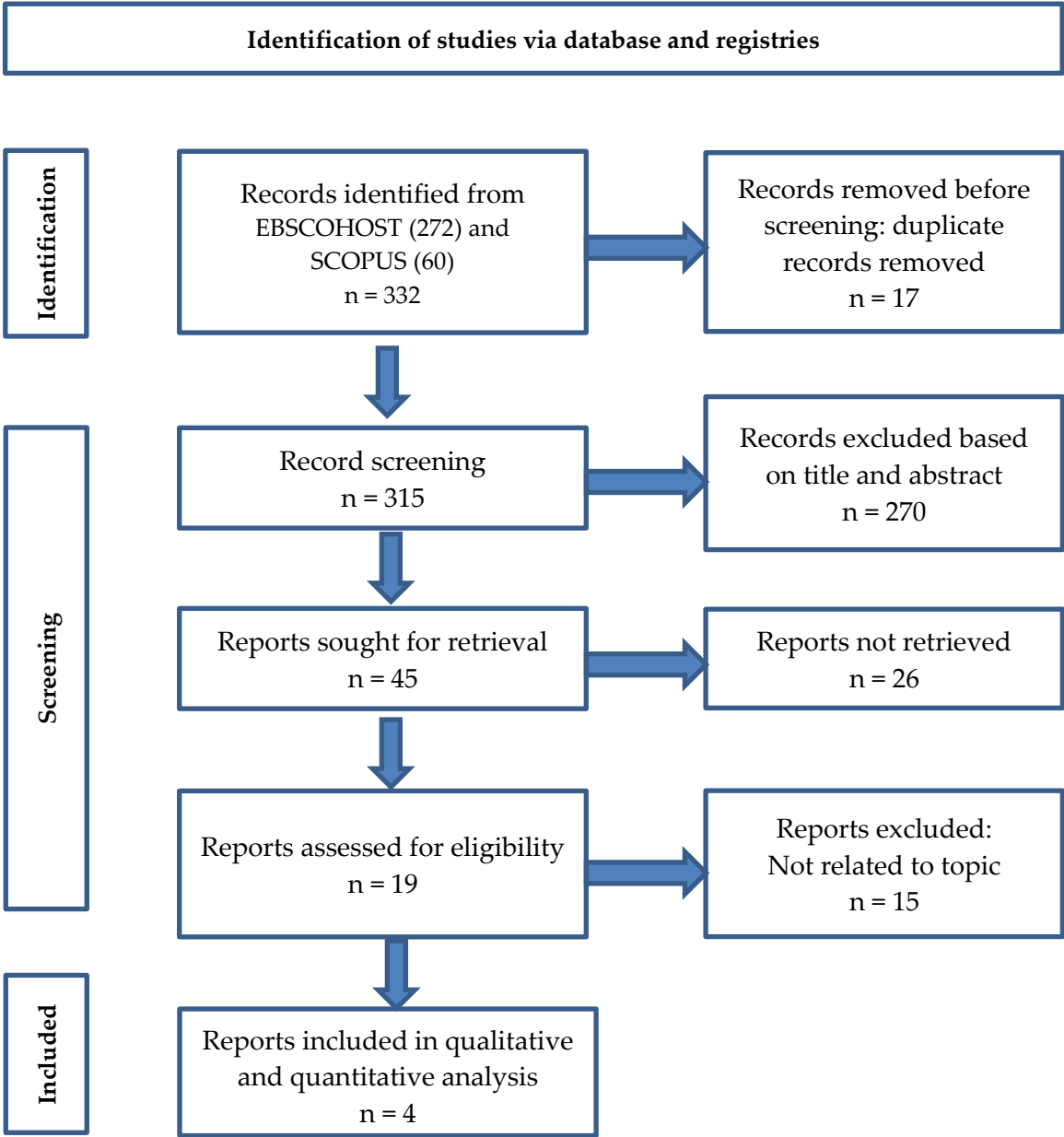


Figure 1. PRISMA flow diagram for the systematic review.

Table 2. Summary of accepted articles.

Author (Year)	Title	Study Design	Sample Size	Study population	Study Outcome	Factors associated with knowledge and awareness on smoke-free policy
Chen et al. (2009) ¹⁰	Moving towards people's need for smoke-free restaurants: Before and after a National Promotion Program in Taiwan, 2003 - 2005	Cross-sectional	8,504	Taiwan's population aged 12 and above from 25 counties	smoke-free restaurant legislation	<ol style="list-style-type: none"> Age (years): <ul style="list-style-type: none"> Below 19 years: OR 1.6 (1.0- 2.6), $p < 0.05$ >60 years: OR 0.6 (0.4 - 1.0), $p < 0.05$ Education: <ul style="list-style-type: none"> Less than high school: OR 0.6 (0.4 - 1.0), $p < 0.001$ Pro tobacco-free: <ul style="list-style-type: none"> Strong: OR 2.0 (1.3 - 3.1), $p < 0.01$
Dang et al. (2018) ¹¹	Customers' Perceptions of Compliance with a Tobacco Control Law in Restaurants in Hanoi, Vietnam: A Cross-Sectional Study	Cross-sectional	1,746	Customers in 176 communes in Hanoi, Vietnam	This study highlighted a low level of perceived compliance with the smoke-free law in Vietnamese restaurants.	<ol style="list-style-type: none"> Smoking status: Restaurant non-smokers have a significantly higher awareness of regulations on the prevention of smoking in restaurants as compared to restaurant smokers ($p = 0.03$)
Singh et al. (2021) ¹²	Adherence to smoke-free policies in Ghana: Findings from a cross-sectional survey of hospitality venue owners and staffs	Cross-sectional	142	Owners and staff from 154 randomly selected hospitality venues (including bars, pubs, restaurants, hotels and nightclubs)	Knowledge, opinions and compliance related to Ghana's smoke-free policy among owners and staff of hospitality venue	<ol style="list-style-type: none"> Owners and staff from Tamale have significantly higher knowledge on: <ul style="list-style-type: none"> ban on tobacco advertising and promotion ($p = 0.001$) smoke-free places ($p = 0.011$) display of no-smoking sign ($p = 0.001$) sale and display of tobacco and tobacco products ($p = 0.047$) Owners and staff in Accra have significantly higher knowledge on: <ul style="list-style-type: none"> awareness of restrictions of smoking in public places ($p = 0.014$) Knowledge of smoke-free policy is 3.08 times higher among restaurant owners/ staff in Accra compared to Tamale (OR=3.08, 95% CI: 1.10, 8.60)

Linnan et al. (2010) ¹³	Views about secondhand smoke and smoke-free policies among North Carolina restaurant owners before passage of legislation to prohibit smoking.	Cross-sectional 523	North Carolina restaurant owners and managers	Knowledge, attitudes, and beliefs about secondhand smoke and smoke-free policies among North Carolina restaurant owners and managers before passage of House Bill 2.	<ol style="list-style-type: none"> 1. Respondents who never smoked have significantly higher odds to report having smoke-free policy indoors. 2. Restaurants with 25% or less employees who smoke have 1.78 times higher odds of having smoke-free policy indoors. 3. Restaurants with a liquor license were 0.26 (95% CI, 0.17-0.42) times less likely than restaurants without a liquor license to have a smoke-free policy indoors. 4. Restaurants in low tobacco production counties have 2.37 times higher odds of having smoke-free policy indoors. 5. Restaurants in first, second and third quartile of country per capita have half odds of having smoke-free policy indoors compared to fourth quartile.
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Table 3. The details of the MMAT assessment.

Author	Type of Study	1.1 Is the sampling strategy relevant to address the research question?	1.2 Is the sample representative of the target population?	1.3 Are the measurements appropriate?	1.4 Is the risk of nonresponse bias low?	1.5 Is the statistical analysis appropriate to answer the research question?
Chen et al. (2009) ¹⁰	Cross-sectional	Yes	Yes	Yes	Yes	Yes
Dang et al. (2018) ¹¹	Cross-sectional	Yes	Yes	Yes	Yes	Yes
Singh et al. (2021) ¹²	Cross-sectional	Yes	Yes	Yes	Yes	Yes
Linnan et al. (2010) ¹³	Cross-sectional	Yes	Yes	Yes	No	Yes

DISCUSSION

A few factors contributed to the knowledge and awareness of smoke-free policy on food premises. They were classified into three categories: (1) Sociodemographic factors (2) Smoking status and belief towards smoking; and (3) Geographic location.

Sociodemographic factors

This review found that those who are less than 19 years old have higher awareness of smoke-free policy at restaurants compared to those aged from 20 years old to 59 years old¹⁰. Interestingly, this study also found that this age group showed the least support when it comes to smoke-free restaurant legislation, although the difference is not significant¹⁰. This interesting finding can be explained by their beliefs and behavior towards smoking itself. A study on smoking beliefs and behavior among youth showed that although 88%-96.5% of youths believe that smoking is harmful, they still find that those who smoke have more friends or are more attractive¹⁴.

Study in Taiwan also found that respondents with lower education level than high school are 0.5 times less likely to be aware of the smoke-free restaurants compared to those with at least high school education level¹⁰. This finding is likely due to their health literacy, as lower levels of education are associated with lower levels of health literacy^{15,16}.

This review found that smoke-free policy has lower odds of being implemented at restaurants located in a lower per capita income area compared to high per capita income areas¹³. This is probably due to the belief that by having the smoke-free policy at their restaurants, there will be negative economic impact and loss of business¹³. This belief has become a barrier in the implementation of the smoke-free policy although there are multiple studies that have shown evidence against it¹⁷⁻¹⁹.

Smoking status and beliefs towards smoking

In this review, the findings have shown that those who never smoke have a higher likelihood of implementing the smoke-free policy at their workplaces^{11,13}. When an owner or manager smokes, they may choose not to adopt, support, or enforce restrictive smoking policies²⁰. This can be explained as they may perceive a smoke-free policy as a barrier to smoking in public, and as such, the anticipation of future difficulties may reduce their support for smoke-free policies²¹.

It can be argued that smoking belief is a predictor of knowledge and awareness of smoke-free policies. Favorable beliefs were seen among the restaurant workers and increasingly comprehensive smoke-free policies were held up²². It seems crucial to promote the availability of free or low-cost smoking cessation programs and resources among owners and managers and their employees who smoke, since those with fewer than 25% smoking employees are more likely to implement smoke-free policies¹³.

Generally, it is a well-known public concern that both alcohol and smoking always co-exist^{13,23}. Surprisingly discovered that restaurants with alcohol licenses are less likely to have a smoke-free indoor policy. This finding was consistent with study in Texas that found restaurants with bars were less likely than those without bars to have restrictive smoking policies²⁴.

Geographic Location

In this review we found that knowledge and awareness of the smoke-free policy at food premises are significantly associated with the location of the food premises, either geographically or demographically. Geographically, Study in Ghana found there to be significant differences of knowledge levels among restaurant owners or staff in the cities of Accra, Kumasi, and Tamale¹². These three cities are the largest and fast-growing cities in Ghana, with Accra being the capital city of Ghana and also the largest city, followed by Kumasi and Tamale²⁵. Level of knowledge on the smoke-free policy is

generally low across all three cities. However, study from Accra was found to be 3 times more likely to have more knowledge compared to the respondents from Tamale¹². This may be due to Accra being the capital city of Ghana and Greater Accra (the region of the city of Accra) has the highest proportion of literacy among the population aged 6 years and above²⁶.

The study in North Carolina, USA showed that restaurants located in low and medium tobacco production areas have higher odds of having indoor smoke-free policy¹³. Similar findings are also seen in Indonesia where high tobacco production showed a strong inverse association with smoke-free policy adoption²⁷. Tobacco production may indirectly affect the availability and access to the tobacco that may become a barrier in implementing the smoke-free policy in the restaurants²⁸.

Recommendations

Based on the identified factors associated with knowledge and awareness of smoke-free policy on food premises, it is crucial that the policy reaches its targeted population which transcends across all ages and education background. Preventive strategies such as health promotion on smoke-free policy have the potential to alter the perception towards smoking, which ultimately helps to increase the level of knowledge and awareness of the community. Other than that, both geographical and demographic location proved to be key components in tackling the issue of smoking. Hence, it is strongly suggested that a more focused approach be taken in terms of the location of population, in order to extend awareness regarding smoke-free policy. To contribute to the current body of knowledge, more research needs to be done on factors associated with knowledge and awareness of smoke-free policy at food premises.

Limitations

As with any other research, this systematic review is not without limitations. The role of publication bias in this systematic review must be acknowledged, as grey literature was not included. Furthermore, language bias should also be considered as we only included articles published in English, although our search strategy resulted in literature sourced from several countries where English is not the primary language. Thus, future studies could include articles published in multiple languages or employ translation services to broaden the scope of the literature review and ensure a more comprehensive understanding of the global perspective. In this review, some of the literature incorporated in the final review did not include statistical likelihood measures to predict the chances of certain factors affecting the knowledge and awareness of smoke-free policy in food premises. However, the significant factors were able to be determined and analyzed. Despite

these limitations, this systematic review synthesizes research evidence regarding the factors associated with the knowledge and awareness on smoke-free policy at food premises, which may serve as a guide to improving service delivery strategies and policy implementation. Future research should explore interventions aimed at addressing smoke-free policy implementation, such as identifying effective strategies for increasing compliance among food premises and assessing the impact of educational campaigns on policy adherence.

CONCLUSIONS

Smoking imposes a significant public health issue and economic burden. The onus of implementing measures such as smoke-free policy to alleviate the affliction of smoking falls onto the shoulders of all countries worldwide. Therefore, understanding the factors influencing the knowledge and awareness of smoke-free policy at food premises, as highlighted in this review, is critical. These findings may be utilized to improve the enactment of smoke-free policy not limited to only food premises. Designing more sustainable policies to maximize the health outcome and to elevate the health status of communities should include relevant components and factors related to the subject matter.

Author Contributions:

Conceptualisation: RD, MRH, NCD, SSSAR

Methodology: MFHAK, MM, NHR, KTM, RD, MRH, NCD, SSSAR

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Writing—review & editing: MFHAK, MM, NHR, KTM, RD, MRH, NCD, SSSAR

Funding: This research received no external funding

Data Availability Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest: The authors declare no conflict of interest.

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