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Government Policy Strategies in Developing Healthy Coffee Shops for Community Nutrition-Based Non-Communicable Disease Prevention

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ABSTRACT

The increasing prevalence of non-communicable diseases (NCDs), such as diabetes mellitus, hypertension, and stroke, in Indonesia is closely linked to unhealthy dietary habits, particularly excessive sugar intake. High sugar consumption contributes to metabolic disorders and cardiovascular risk. The purpose of this study is to support province and district/city policymakers in their efforts to prevent non-communicable diseases. With samples of representatives from the Health Office, Tourism Office, Islamic Sharia Office, coffee shop owners, and coffee drinkers in Banda Aceh City. A qualitative approach was used, involving focus group discussions (FGDs) and in-depth interviews conducted between August 29 and September 20, 2023. A total of 17 participants, including government officials, coffee shop owners, and coffee drinkers, were selected through convenience sampling. Data were collected using semi-structured guides and analyzed using thematic analysis. The findings indicate that coffee consumption is a common social practice, characterized by frequent daily intake and easy access to coffee shops. However, awareness of the health risks associated with excessive sugar consumption remains limited, and healthier menu options are not widely available. Social and cultural factors strongly influence consumption behavior, while participants also emphasized the need for improved health education. These findings suggest the need for practical strategies, including reducing sugar content in coffee, providing low-sugar alternatives, and strengthening community-based nutrition education through cross-sector collaboration. Such efforts are important to promote healthier consumption patterns and reduce NCD risk in Aceh.

INTRODUCTION

Non communicable diseases (NCDs) continue to rise worldwide and remain the leading cause of mortality. According to the World Health Organization (2025), over 70% of worldwide fatalities are caused by NCDs such as diabetes mellitus, hypertension, stroke, and cardiovascular diseases. Lifestyle factors, particularly excessive intake of high-calorie foods and sugar-sweetened beverages, play a critical role in accelerating the onset of metabolic disorders. Recent studies indicate that excessive free sugar intake is strongly associated with insulin resistance and early metabolic dysfunction (Chun & Louie, 2026). Although moderate coffee consumption may provide metabolic benefits, such effects are diminished when coffee is consumed with large amounts of added sugar, creamer, sweetened condensed milk, or calorie-dense toppings (Kim & Shin, 2019). This trend contributes to increasing morbidity and mortality from diabetes and hypertension, both of which are major precursors to stroke and cardiovascular complications (Zakir et al., 2023).

Diabetes mellitus is a major contributor to renal failure, stroke, cardiovascular disease, blindness, and lower limb amputation(Koye et al., 2018). Once considered a condition affecting older adults, diabetes is increasingly diagnosed in younger populations (Selvin & Parrinello,

2013). In Indonesia, the DISCOVER study reported that patients with Type 2 Diabetes Mellitus commonly present with elevated BMI, poor glycemic control, and comorbidities such as hypertension and hyperlipidemia, with HbA1c reduction during follow-up remaining below recommended targets (Selvin & Parrinello, 2013). In Aceh, the burden of NCDs continues to increase, reflecting similar national patterns and posing significant public health challenges. At the same time, coffee consumption is a deeply rooted cultural practice in Aceh, where individuals frequently consume coffee multiple times a day, often accompanied by high amounts of added sugar and calorie-dense snacks. This habitual consumption pattern may contribute to excessive sugar intake and increase the risk of developing NCDs, highlighting the need for context-specific interventions targeting dietary behavior within local food environments.

One emerging lifestyle factor contributing to this health trend is the rapid growth of coffee drinking culture, particularly the habit of consuming coffee in local cafés or warung kopi. In many regions, including Aceh, coffee beverages are frequently modified with excessive added sugar, sweetened condensed milk, flavored syrups, creamer, or additional toppings. These sugar-laden beverages significantly increase the risk of obesity, insulin resistance, type 2 diabetes, and cardiovascular complications (Hu & Malik, 2010). This pattern reflects not only increased sugar consumption but also the normalization of sugar-containing foods and beverages as part of everyday social interaction (Manik et al., 2026).

Excessive calorie and sugar intake from coffee shop beverages has been identified as a significant dietary risk (Richardson et al., 2026). Coffee related practices have evolved into routine behaviors embedded in daily life, reinforcing both habitual consumption and social interaction (Dajero et al., 2025). Therefore, public health interventions must extend beyond health facilities to community settings in which dietary choices are made. Evidence suggests that modifying the retail food environment, for example, by labelling calories, restricting sugar quantities, providing healthier menu options, and guiding consumers toward low-sugar alternatives can significantly lower sugar intake (Dhuria et al., 2025)

International public health recommendations highlight regulatory strategies, including mandatory sugar labeling, reduced sugar menu options, and restrictions on promotional incentives for high-sugar beverages as effective approaches to reduce NCD risk (Hashem et al., 2024). When combined with point of purchase education, such as sugar portions guidance or calorie displays, these measurements can encourage healthier consumer choices. Importantly, the interventions do not aim to eliminate coffee culture but to transform it into a healthier and more sustainable practice (Block et al., 2010).

Aceh, widely recognized for its Gayo coffee industry, provides a unique and relevant context for examining the intersection of culture, economy, and public health. Coffee production and coffee shop businesses are not only major contributors to local economic growth but also represent deeply embedded social practices, making coffee shops central to daily community life. This distinctive cultural setting justifies Aceh as an important case study for exploring health-promoting interventions within food environments. However, coffee consumption in this context is frequently accompanied by high levels of added sugar and calorie-dense foods, which may contribute to the long-term burden of non-communicable diseases (NCDs) (Henn et al., 2023). Despite this risk, there is currently a limited policy specifically addressing sugar reduction in food service settings, including coffee shops, at the local level. The absence of clear regulatory frameworks or guidelines to control sugar use highlights a critical gap between public health goals and existing practices. Therefore, aligning economic development with public health strategies, particularly through policy interventions targeting sugar consumption in coffee shops, becomes essential.

Creating the idea of a healthy coffee shop (warung kopi sehat) that offers low-sugar beverage alternatives, calorie labeling, and recommended sugar limits (≤1 teaspoon per serving) can be a smart community-based intervention. Collaboration among government organizations, healthcare facilities, coffee shop owners, and the community is essentially required in redesigning beverage options and consumer behavior. Through this strategy, warung kopi can function not only as business establishments and social spaces but also as active platforms for nutrition education and NCD prevention (Halimatussakdiah & Faisal, 2022). Accordingly, this study aims to examine and analyze government policy strategies in developing healthy coffee shops as a community-based intervention to support the prevention of non-communicable diseases in Aceh.

METHOD

This study employed a qualitative research design to explore government policy strategies in developing healthy coffee shops (warkos) as an approach to prevent non-communicable diseases (NCDs). The study focused on understanding the roles of government stakeholders, coffee shop owners, and consumers in shaping coffee consumption practices and their potential impact on NCD prevention. The objective of this study was to analyze policy-related strategies and identify opportunities for integrating health promotion within the local coffee shop environment.

The study population consisted of three key groups: government officials, coffee shop owners, and coffee consumers in Banda Aceh, Indonesia. Government officials included representatives from the Health Office, Tourism Office, and Islamic Sharia Office, all of whom are involved in policy-making related to healthy coffee shop initiatives. A total of 17 participants were included in this study, comprising three government officials, seven coffee shop owners, and seven coffee consumers. Participants were selected using convenience sampling, based on their availability and relevance to the research objectives, particularly their involvement in coffee consumption practices and policy-related activities.

Data from government officials were collected through a Focus Group Discussion (FGD), while in-depth interviews were conducted with coffee shop owners and consumers. Coffee consumers were recruited from eight subdistricts in Banda Aceh, namely Baiturrahman, Kuta Alam, Meuraxa, Syiah Kuala, Lueng Bata, Kuta Raja, Banda Raya, and Jaya Baru, to capture diverse perspectives across different areas. Inclusion criteria for coffee consumers were: (1) aged between 15 and 60 years, (2) consuming coffee more than three times per day, (3) regularly consuming coffee with added sugar and accompanying snacks, and (4) engaging in habitual coffee consumption as part of daily social or recreational activities. These criteria were used to ensure that participants had relevant experiences related to the study focus.

Data were collected in Banda Aceh, Indonesia, between August 29 and September 20, 2023. A structured questionnaire was used to obtain participants' demographic characteristics, while primary data were collected through a combination of Focus Group Discussions (FGDs) and in-depth interviews. The study population consisted of three key groups: government officials, coffee shop owners, and coffee consumers. Government officials included representatives from the Health Office, Tourism Office, and Islamic Sharia Office, all of whom are involved in policy-making related to healthy coffee shop initiatives. A total of 17 participants were included in this study, comprising three government officials, seven coffee shop owners, and seven coffee consumers. Participants were selected using convenience sampling, based on their availability and relevance to the research objectives.

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Data analysis was conducted using thematic analysis. Transcripts from FGDs and interviews were coded systematically to identify key themes. The data were then categorized into thematic groups and compared across participants to examine similarities and differences in perspectives. To ensure the trustworthiness of the findings, several strategies were employed, including triangulation (across data sources, methods, researchers, and time), member checking with selected participants, peer debriefing among the research team, maintaining an audit trail, and providing thick descriptions to enhance contextual understanding.

This strategic policy research permit is based on the request of the Resource Person by the Director of Poltekkes Kemenkes Aceh, no DP.04.03 / XXVI.11.1 /7065/2023, and a letter of assignment to attend a Focus Group Discussion (FGD) from the Health Office, number 090/244/ST/2023, In addition, the Resource Person who participated in the FGD assignment

from the Islamic Sharia Office with letter no. Peg. 090/11.67/2023. Furthermore, permission to participate in the FGD from the Aceh Tourism Office with permit letter no. 893/1035/2023. This team of officials is an informant regarding the policies of this research activity. The owners of coffee shops and interviewees have given their approval for this study. Coffee consumers who were chosen as respondents, the relevant Head of the Agency, and the coffee shop owners were all briefed on the study's goals. Every respondent signed the informed consent form that the researcher had created.

RESULTS

The results of this study are divided into several sections, including the heads of government agencies that are prioritized in policymaking. Furthermore, data is presented for the next group of respondents: coffee shop owners, and the third group: coffee drinkers who drink coffee according to the criteria outlined in the method above.

Findings from the FGDs with representatives from the Health, Tourism, and Islamic Sharia Offices highlight the need for a coordinated, cross-sectoral policy approach in promoting healthy coffee shop practices. This indicates that existing NCD prevention strategies are still largely fragmented and insufficiently embedded within community-based food environments. Given the central role of coffee shops in shaping dietary behaviors in Banda Aceh, integrating health promotion into this setting represents a strategic opportunity to influence sugar consumption patterns and reduce NCD risk at the population level.

The findings from the focus group discussions (FGDs) were analyzed and organized into key themes to better understand the challenges and opportunities in promoting healthier coffee consumption practices in Banda Aceh. These themes reflect the perspectives of stakeholders and highlight important factors influencing the development of healthy coffee shop initiatives.

Table 1. Thematic findings from focus group discussions (FGDs)

Theme	Key findings	Implications
Cross-sectoral policy integration	Limited coordination among the Health, Tourism, and Islamic Sharia Offices in promoting healthy coffee shop practices. Existing initiatives are fragmented and not fully integrated into community food environments.	Strengthening intersectoral collaboration is essential to ensure effective implementation of NCD prevention strategies.
Health education and behavioral change	Low public awareness regarding the risks of excessive sugar consumption in coffee and accompanying foods. The need for structured education, supervision, and monitoring by health authorities was emphasized.	Enhancing community-based nutrition education can support behavioral change and reduce sugar intake.
Healthy coffee tourism development	Coffee shops are central to Aceh's tourism sector, yet health considerations are not fully integrated into their management. Training for coffee shop owners is needed.	Integrating health principles into coffee tourism can align economic development with public health goals.
Role of religious and cultural institutions	Religious leaders and institutions (mosques, community gatherings) are influential in shaping community behavior and can support health promotion efforts.	Utilizing culturally relevant platforms can improve acceptance of health messages and promote healthier consumption patterns.
Policy advocacy and regulatory coordination	Lack of formal regulations addressing sugar consumption in coffee shops. Stakeholders emphasized the need for coordination with the Governor's Office to develop policy frameworks.	Stronger policy advocacy and regulatory support are needed to create healthier food environments at the local level.

Overall, the themes presented in Table 1 illustrate that promoting healthier coffee consumption requires a comprehensive approach that integrates policy coordination, community education, cultural engagement, and environmental changes. These findings emphasize the importance of aligning health promotion strategies with local socio-cultural contexts to ensure greater effectiveness and sustainability.

Interview results with coffee shop owners

The interview data were analyzed using thematic analysis, generating several key themes that reflect coffee shop owners' perspectives on consumption patterns, health awareness, and business practices. The analysis reveals both opportunities and challenges in promoting healthier coffee consumption within community settings. A summary of the main themes and their interpretations is presented in Table 2.

Table 2. Thematic analysis of interviews with coffee shop owners

Theme	Subtheme	Key findings	Illustrative insight
Coffee shops as central social spaces	High customer volume and accessibility	Coffee shops are widely available and consistently crowded, reflecting their central role in daily social life in Banda Aceh.	Coffee shops are present along main roads and frequently filled with customers throughout the day.
Limited exposure to health-related training	Lack of formal guidance	Most coffee shop owners have not received training or information on preparing healthier coffee options.	Owners reported no prior participation in health-related training programs.
Awareness of sugar-related health risks	Knowledge of diabetes and NCD risk	Most respondents recognized that excessive sugar consumption in coffee is associated with increased risk of diabetes, hypertension, and stroke.	Participants acknowledged that reducing sugar intake could lower health risks.
The gap between knowledge and practice	Continued provision of sweetened coffee	Despite awareness, coffee is still commonly served with added sugar, reflecting a gap between knowledge and actual practice.	Sweetened coffee remains the dominant serving practice in coffee shops.
Willingness to adopt healthier practices	Interest in training and improvement	Most respondents expressed willingness to participate in training programs on healthy coffee preparation.	Owners showed interest in learning alternative coffee preparation methods with reduced sugar.
Perception of customer health and behavior	Customer habits and expectations	Coffee shop owners perceive their customers as generally healthy and highly accustomed to regular coffee consumption.	Customers are seen as habitual coffee drinkers with strong preferences for sweetened beverages.
Socio-cultural role of coffee shops	Social interaction and norms	Coffee shops function as important spaces for social interaction and information exchange within the community.	Coffee shops are viewed as hubs for communication and daily gatherings.

Interview results with coffee drinkers

Interviews with coffee drinkers were conducted at coffee shops in Banda Aceh. Coffee drinkers were selected based on inclusion criteria and were willing to respond.

Table 3. Thematic analysis of interviews with coffee drinkers in Banda Aceh

Theme	Subtheme	Key findings	Evidence (Illustrative insight)
Coffee culture as a dominant social practice	High prevalence and accessibility	Coffee drinking is deeply embedded in daily life, with coffee shops widely available and consistently crowded.	Coffee shops are easily found on almost every street and serve as key social gathering spaces.
Diverse demographic engagement	Wide age range of consumers	Coffee consumption spans across age groups, from adolescents to older adults, reflecting its role as a cross-generational habit.	Participants reported that coffee drinkers include school-age individuals to elderly populations.
High frequency of consumption	Habitual daily intake	Most participants consume coffee multiple times per day, often between one and five times, depending on daily activities.	Coffee is commonly consumed in the morning and evening as part of daily routines.
Low awareness of sugar-related health risks	Misconceptions about diabetes risk	Many participants do not fully understand the link between sugar consumption and NCDs such as diabetes.	Some participants expressed doubt that sugar in coffee is a major contributor to diabetes.
Limited availability of healthy options	Lack of low-sugar alternatives	Most coffee shops do not provide healthier beverage options or alternative sweeteners.	Only a few shops offer options such as low-calorie sweeteners or palm sugar.
Motivations for coffee consumption	Social and psychological factors	Coffee drinking is driven by social interaction, relaxation, and cultural habits.	Coffee shops function as spaces for meetings, communication, and business activities.
Awareness of the need for health education	Demand for public health intervention	Participants acknowledged the importance of education in reducing sugar intake and improving dietary habits.	Respondents suggested that government-led outreach is needed to increase awareness.

The interview findings are organized into several key themes that reflect coffee consumption behavior in Banda Aceh. First, coffee culture emerged as a dominant social practice, with coffee shops widely available and serving as central gathering spaces, indicating that coffee consumption is deeply embedded in daily life. Second, consumption patterns showed a high frequency of intake, with most participants drinking coffee one to five times per day, typically in the morning and evening. This behavior was observed across different age groups, highlighting coffee consumption as a cross-generational habit.

Third, the findings revealed low awareness of sugar-related health risks, as many participants did not fully understand the relationship between excessive sugar consumption and non-communicable diseases (NCDs), including diabetes mellitus. Misconceptions regarding prevention were also evident, with participants emphasizing general healthy behaviors without specifically addressing sugar reduction. Fourth, limited availability of healthy options was identified, as most coffee shops did not provide low-sugar or low-calorie alternatives, reinforcing existing consumption patterns.

Finally, motivations for coffee consumption were strongly influenced by social and psychological factors, including cultural habits, social interaction, and relaxation. At the same time, participants expressed the need for health education, indicating that greater awareness and community-based outreach are necessary to support healthier consumption practices.

DISCUSSION

Coffee consumption in Banda Aceh is not merely a dietary habit but a deeply embedded socio-cultural practice. The findings of this study show that coffee shops function as central social spaces where people gather for leisure, discussion, and daily activities. This pattern was consistently observed across respondents, indicating that coffee drinking is strongly shaped by cultural norms and social interaction rather than individual preference alone. Such findings reinforce the idea that food and beverage choices are closely linked to social environments.

However, this culturally embedded habit is often accompanied by the consumption of high-sugar beverages and calorie-dense foods. Field findings revealed that sweetened coffee and energy-dense side dishes are commonly consumed together, which may increase the risk of non-communicable diseases (NCDs), including diabetes mellitus, hypertension, and cardiovascular diseases. This observation is in line with previous research showing that dietary patterns high in sugar and fat contribute significantly to the global burden of NCDs (Beigrezaei et al., 2024)

Interestingly, although most respondents were aware that excessive sugar intake can negatively affect health, this awareness did not consistently translate into healthier consumption practices. Sweetened coffee remained the preferred choice, and healthier alternatives were rarely selected. This reflects a gap between knowledge and behavior, where cultural habits and social influences appear to outweigh health considerations. Similar findings have been reported in previous studies, which suggest that providing information alone is often insufficient to change dietary behavior without addressing environmental and social factors (Saraiva et al., 2022).

The study also highlights the role of coffee shops as an important yet underutilized setting for promoting healthier lifestyles. Given their accessibility and popularity, coffee shops have the potential to influence consumer behavior by offering healthier beverage options and modifying food environments. However, current practices show that low-sugar or healthier menu options are still limited, and there is little encouragement for consumers to choose them. This finding suggests that environmental changes, such as menu modification and the availability of healthier choices, are necessary to support behavior change. Evidence from other settings indicates that interventions targeting the food environment, such as menu labeling and product reformulation, can influence purchasing decisions and improve dietary choices (Kremers et al., 2012)

In addition, the findings suggest that coffee consumption in Aceh has evolved beyond a simple habit into a combined cultural and behavioral pattern. Modern coffee consumption is often associated with added sugar, cream, and high-calorie toppings, which may contribute to excessive energy intake and habitual consumption patterns. This trend is consistent with previous studies indicating that the combination of palatable ingredients and caffeine may reinforce repeated consumption behavior (Kim & Shin, 2019)

Another important finding is the need to consider local socio-cultural contexts in promoting healthier behavior. In Banda Aceh, where social cohesion and community values are strong, health interventions are more likely to be effective if they are aligned with local cultural practices. Community-based approaches that involve local leaders and integrate culturally relevant messages may improve acceptance and sustainability of health promotion efforts. This is supported by previous research emphasizing that culturally tailored interventions are more effective in influencing dietary behavior (Saffutra et al., 2025)

Based on these findings, it is clear that efforts to promote healthier coffee consumption should not rely solely on increasing individual awareness. Instead, a more comprehensive approach is needed, addressing behavioral, environmental, and cultural factors simultaneously. This includes improving access to healthier menu options, reshaping social norms around coffee consumption, and strengthening community engagement.

In this context, policy interventions remain important but should be viewed as supportive mechanisms rather than the primary focus. Strategies such as nutrition labeling, regulation of sugar content, and public education campaigns have been shown to influence consumer behavior and reduce NCD risk (Samoggia & Riedel, 2019). However, their implementation in Indonesia, particularly in Banda Aceh, must be carefully adapted to local conditions to ensure cultural relevance and public acceptance (Halimatussakdiah et al., 2020)

Furthermore, specific dietary factors identified in this study, such as high sugar intake and the consumption of salty and low-fiber side dishes, also require attention. While reducing sugar consumption is widely recognized as a key strategy in preventing NCDs, addressing salt intake and promoting fiber-rich local foods may provide additional benefits. For example, encouraging the inclusion of locally available high-fiber foods such as cassava and corn in coffee shop menus could support healthier dietary patterns (Andarwulan et al., 2021). At the same time, challenges in monitoring salt intake at the population level remain, as accurate assessment often requires clinical measurement (Hawkes & Webster, 2012).

Overall, this study suggests that addressing the health risks associated with coffee consumption in Banda Aceh requires an integrated approach that combines cultural understanding, environmental modification, and supportive policy measures. By positioning coffee shops as potential agents of change and aligning interventions with local values, it may be possible to promote healthier consumption patterns and reduce the long-term burden of non-communicable diseases (Doustmohammadian & Bazhan, 2021). To further illustrate the relationship between cultural practices, consumption behavior, and health risks identified in this study, a conceptual model is proposed (Figure 1).

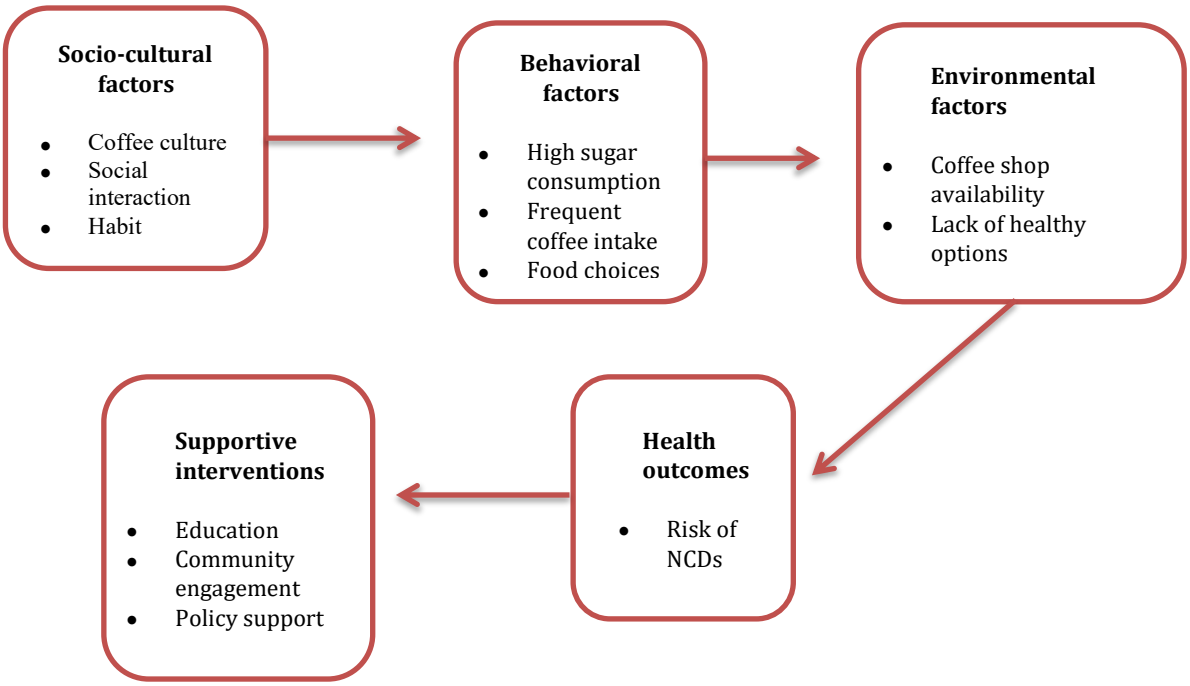

Figure 1. Conceptual model of coffee consumption behavior and NCD risk in Banda Aceh

The model demonstrates that coffee consumption behavior in Banda Aceh is shaped by the interaction between socio-cultural, behavioral, and environmental factors. Policy and educational interventions are positioned as supporting mechanisms to influence these factors and promote healthier consumption patterns. In line with the findings of this study, preventive strategies should focus on modifying dietary behavior within everyday social environments such as coffee shops. Reducing sugar consumption and promoting healthier beverage choices are essential steps in lowering the risk of non-communicable diseases (NCDs), as supported by previous research highlighting the role of dietary patterns in NCD prevention (Cheng et al., 2025)

This study utilized Focus Group Discussions (FGDs) and in-depth interviews as complementary qualitative methods. The use of these two approaches facilitated methodological triangulation, allowing for cross-validation of data and a deeper exploration of participants' perspectives. The findings of this study suggest that interventions to reduce NCD risk in Banda Aceh should be closely aligned with local coffee consumption practices. As coffee shops serve as important social spaces, efforts to promote healthier behavior need to be integrated into these everyday environments. For instance, reducing sugar content in coffee and increasing the availability of healthier menu options may directly address the behavioral patterns identified in this study.

Although previous studies have shown that excessive coffee consumption and high sugar intake may contribute to increased blood pressure and cardiovascular risk (Mendoza et al., 2023). The present findings indicate that the issue is not solely related to coffee itself, but also to how it is consumed within a specific cultural context. In Banda Aceh, coffee is frequently accompanied by sugary and high-calorie foods, reinforcing unhealthy dietary patterns.

Furthermore, the study highlights that environmental factors, particularly the limited availability of healthier options in coffee shops, play a significant role in shaping consumer behavior. Similar evidence suggests that modifying the food environment can support healthier choices without relying entirely on individual awareness (Ziso et al., 2022).

Therefore, rather than focusing solely on broad policy measures, context-specific strategies that involve coffee shop owners, community leaders, and local institutions may be more effective. These approaches can help shift consumption patterns gradually while remaining consistent with local cultural practices.

Based on the findings of this study, several potential strategies can be identified to support healthier coffee consumption practices in Banda Aceh. These strategies are derived from observed behavioral patterns, environmental conditions in coffee shops, and the socio-cultural context influencing consumption habits.

Table 4. Strategic policy recommendations for promoting healthy coffee consumption in Banda Aceh

No	Strategy Focus	Description	Potential Stakeholders
1	Health education	Strengthening public awareness of healthy coffee consumption, including reducing sugar intake and choosing healthier food accompaniments	Health Office, BPOM
2	Food environment improvement	Encouraging coffee shops to provide healthier menu options, such as low-sugar beverages and more nutritious side dishes	Health Office, Tourism Office
3	Community engagement	Promoting collaboration between community leaders, religious institutions, and local organizations to support behavior change	Health Office, Islamic Sharia Office
4	Product reformulation	Encouraging the gradual reduction of sugar content and the use of alternative sweeteners in coffee beverages	Health Office, BPOM, Coffee shop owners

The strategies outlined in Table 4 reflect practical implications derived from the study findings and emphasize the importance of integrating behavioral, environmental, and socio-cultural approaches. Rather than relying solely on regulatory measures, these strategies highlight the potential role of local stakeholders and everyday social settings, particularly coffee shops, in supporting sustainable changes toward healthier consumption patterns.

CONCLUSION

This study shows that coffee consumption in Banda Aceh is strongly influenced by socio-cultural practices, with coffee shops serving as key spaces for social interaction. However, these habits are often accompanied by high sugar intake and calorie-dense foods, while both consumers and coffee shop owners have limited understanding of the associated risks of non-

communicable diseases (NCDs). The findings also indicate limited availability of healthier menu options, although coffee shop owners are generally open to adopting healthier practices through appropriate support and training. Therefore, promoting healthier coffee consumption in this context requires not only increasing awareness but also addressing environmental and socio-cultural factors, particularly by optimizing the role of coffee shops as accessible settings for encouraging reduced sugar intake and healthier choices within the community.

AUTHOR'S DECLARATION

Authors' contributions and responsibilities

All authors contributed substantially to this study. **HH:** was responsible for conceptualization, manuscript preparation, visualization, and funding acquisition; **AA:** contributed to drafting the manuscript and funding support; **II:** supervised the study, validated the findings, assisted with visualization, and reviewed and edited the manuscript critically; **SS:** contributed to formal analysis and conceptual development of the study; **IW:** participated in supervision, validation, and visualization. All authors read and approved the final manuscript.

Availability of data and materials

All data are available from the authors.

Competing interests

The authors declare no competing interest

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