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Tackling Obesity in Southeast Asia: A Narrative Review of Emerging Dietary, Digital, and Policy Interventions

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ABSTRACT

Obesity has become a growing public health challenge in Southeast Asia due to rapid urbanization, dietary transitions toward energy-dense foods, and increasingly sedentary lifestyles. The rising prevalence of obesity across Southeast Asian countries has contributed to a greater burden of non-communicable diseases and substantial economic and social costs. This study aimed to synthesize and critically evaluate current evidence on emerging dietary, digital, behavioral, environmental, and policy interventions for obesity prevention and management in Southeast Asia, as well as to identify research gaps and implications for future public health practice and policy development. A narrative review approach was employed through a comprehensive literature search of PubMed, Scopus, Web of Science, ScienceDirect, EBSCOhost, and Google Scholar, supplemented by reports from international health organizations. Eligible publications included peer-reviewed articles and official reports published between 2015 and 2025. Data were collected using keywords related to obesity, overweight, Southeast Asia, dietary interventions, and obesity management strategies, and were analyzed using a descriptive thematic approach. The findings indicate that digital health interventions, personalized nutrition, intermittent fasting, gut microbiome-based approaches, front-of-pack food labeling, food product reformulation, sugar-sweetened beverage taxation, and culturally tailored community-based programs show considerable potential in addressing obesity. The review further highlights that integrated behavioral, environmental, psychological, and policy interventions are more effective than single-component approaches. The conclusion is The findings indicate that combining individual, environmental, and policy-level approaches is more effective than single interventions in reducing obesity risk and improving health outcomes. Therefore, governments, healthcare providers, and communities should strengthen collaboration in implementing evidence-based obesity prevention programs, while future research should focus on evaluating the long-term effectiveness and scalability of these interventions in diverse Southeast Asian populations.

Keywords** : : **obesity, South East Asia, intervention

INTRODUCTION

Obesity has emerged as one of the most pressing global public health challenges of the twenty-first century. The World Health Organization (WHO) estimates that more than 1 billion people worldwide are living with obesity, and the prevalence continues to increase across all age groups and socioeconomic strata. Obesity is recognized as a major risk factor for non-communicable diseases (NCDs), including type 2 diabetes mellitus, cardiovascular disease, hypertension, certain cancers, and premature mortality. Beyond its health consequences, obesity imposes substantial economic burdens through increased healthcare expenditures, reduced workforce productivity, and diminished quality of life. Recent projections suggest that by 2035, more than half of the global population may be overweight or obese if current trends persist, highlighting the urgent need for effective prevention and management strategies[1,2].

The burden of obesity has increased particularly rapidly in low- and middle-income countries, including those in Southeast Asia (SEA), where economic growth, urbanization, and dietary transitions have transformed traditional lifestyles. Countries across the region are experiencing a shift from undernutrition toward a double burden of malnutrition characterized by the coexistence of obesity and micronutrient deficiencies[3]. According to the World Obesity Atlas 2025, adult obesity prevalence exceeds 15% in Malaysia and Brunei, while significant increases have also been reported in Thailand, Indonesia, Vietnam, and the Philippines[2]. Furthermore, obesity-related healthcare costs in Southeast Asia are projected to rise substantially over the next decade, threatening already constrained health systems and national economies[4].

At the national level, several Southeast Asian countries have implemented interventions aimed at reducing obesity, including sugar-sweetened beverage (SSB) taxes, front-of-pack nutrition labeling, public awareness campaigns, and digital health initiatives. Nevertheless, obesity prevalence continues to increase despite these efforts[5]. For example, Malaysia's National Health and Morbidity Survey reported that more than 54% of adults are overweight or obese, representing one of the highest prevalence rates in the region[6]. Similarly, Indonesia has experienced a steady increase in obesity prevalence among adults and adolescents over the past decade, partly attributed to changing dietary patterns, increased consumption of ultra-processed foods, and reduced physical activity[7]. These findings indicate a persistent gap between policy implementation and actual population-level outcomes.

At the community and local levels, obesity is influenced by complex interactions among individual behaviors, food environments, sociocultural norms, psychological factors, and policy contexts. Traditional interventions focusing solely on calorie restriction and physical activity have demonstrated limited long-term effectiveness due to poor adherence and failure to address broader environmental determinants[8]. Recent evidence suggests that innovative approaches such as personalized nutrition, mobile health applications, microbiome-targeted therapies, behavioral interventions, and community-based programs may offer more sustainable outcomes[9,10]. However, most existing evidence originates from high-income countries, raising concerns regarding the transferability of these findings to Southeast Asian populations with distinct cultural, dietary, and socioeconomic characteristics.

Despite the growing body of literature on obesity interventions, important research gaps remain. First, there is a data gap concerning the synthesis of emerging obesity interventions specifically relevant to Southeast Asian populations. Most reviews focus on global evidence without adequately considering regional contexts and implementation challenges[11]. Second, there is a research gap regarding the comparative effectiveness of newer approaches, such as digital health technologies, microbiome-based interventions, and culturally tailored behavioral programs within Southeast Asian settings[12]. Third, there is a theoretical gap between traditional biomedical models that emphasize individual responsibility and contemporary ecological frameworks that recognize obesity as a product of interconnected biological, behavioral, environmental, and policy factors[13]. The persistence of obesity despite conventional interventions suggests that more integrated and context-specific approaches are needed. This study aimed to synthesize and critically evaluate current evidence on

emerging dietary, digital, behavioral, environmental, and policy interventions for obesity prevention and management in Southeast Asia, as well as to identify research gaps and implications for future public health practice and policy development.

METHODS

This study employed a narrative review design to synthesize and critically evaluate current evidence regarding emerging interventions and strategies for obesity prevention and management in Southeast Asia. To enhance methodological rigor and transparency, the review adopted a structured literature search and study selection process adapted from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A comprehensive literature search was conducted between May 2024 and January 2026 using six electronic databases, namely PubMed, Scopus, Web of Science, ScienceDirect, EBSCOhost, and Google Scholar. Additional evidence was obtained from reports and policy documents published by the World Health Organization (WHO), World Obesity Federation, World Bank, and national health agencies within Southeast Asian countries.

The search strategy combined Medical Subject Headings (MeSH) and free-text keywords related to obesity and intervention strategies. The primary search string used was: ("obesity" OR "overweight") AND ("Southeast Asia" OR "ASEAN") AND ("intervention" OR "management" OR "prevention" OR "dietary intervention" OR "digital health" OR "policy intervention" OR "community-based intervention"). Equivalent search strings were adapted to the indexing systems and search requirements of each database. Eligible studies included peer-reviewed journal articles and official reports published between January 2020 and December 2025, written in English, and focused on obesity prevention, management, treatment, or policy interventions among populations in one or more Southeast Asian countries. Studies were required to report measurable outcomes related to obesity, body weight, body mass index (BMI), dietary behavior, physical activity, or health policy implementation. Editorials, commentaries, conference abstracts, letters, opinion articles, duplicate publications, studies conducted outside Southeast Asia without separate regional analyses, and studies with insufficient methodological information or inaccessible full texts were excluded.

All retrieved records were exported into a reference management software and screened for duplicate entries. Titles and abstracts were reviewed to determine their relevance to the review objectives, followed by a full-text assessment based on the predefined eligibility criteria. The initial search identified 612 records, of which 148 duplicate articles were removed. The remaining 464 records underwent title and abstract screening, resulting in the exclusion of 337 records that were not relevant to the review topic. Subsequently, 127 full-text articles were assessed for eligibility. Of these, 59 articles were excluded due to irrelevance to obesity interventions or management strategies (n = 24), inappropriate population or setting (n = 16), unsuitable study design or publication type (n = 11), and insufficient outcome data (n = 8). Ultimately, 68 studies met the inclusion criteria and were included in the final narrative review. The study selection process is illustrated in Figure 1.

Data extraction was performed manually using a standardized extraction form to collect information on authors, year of publication, country, study design, sample characteristics, intervention type, duration of intervention, and key findings. To ensure consistency and accuracy, all extracted data were reviewed and verified by the authors. The findings were subsequently synthesized using a thematic analysis approach and categorized into six major themes: digital health and personalized nutrition; dietary interventions, including intermittent fasting; microbiome-targeted approaches; food environment interventions, front-of-pack labeling, and food reformulation; fiscal and regulatory policies, including sugar-sweetened beverage taxation; and culturally tailored community-based interventions. The evidence from each theme was critically compared and synthesized to identify emerging trends, implementation challenges, research gaps, and implications for obesity prevention and management in Southeast Asia.

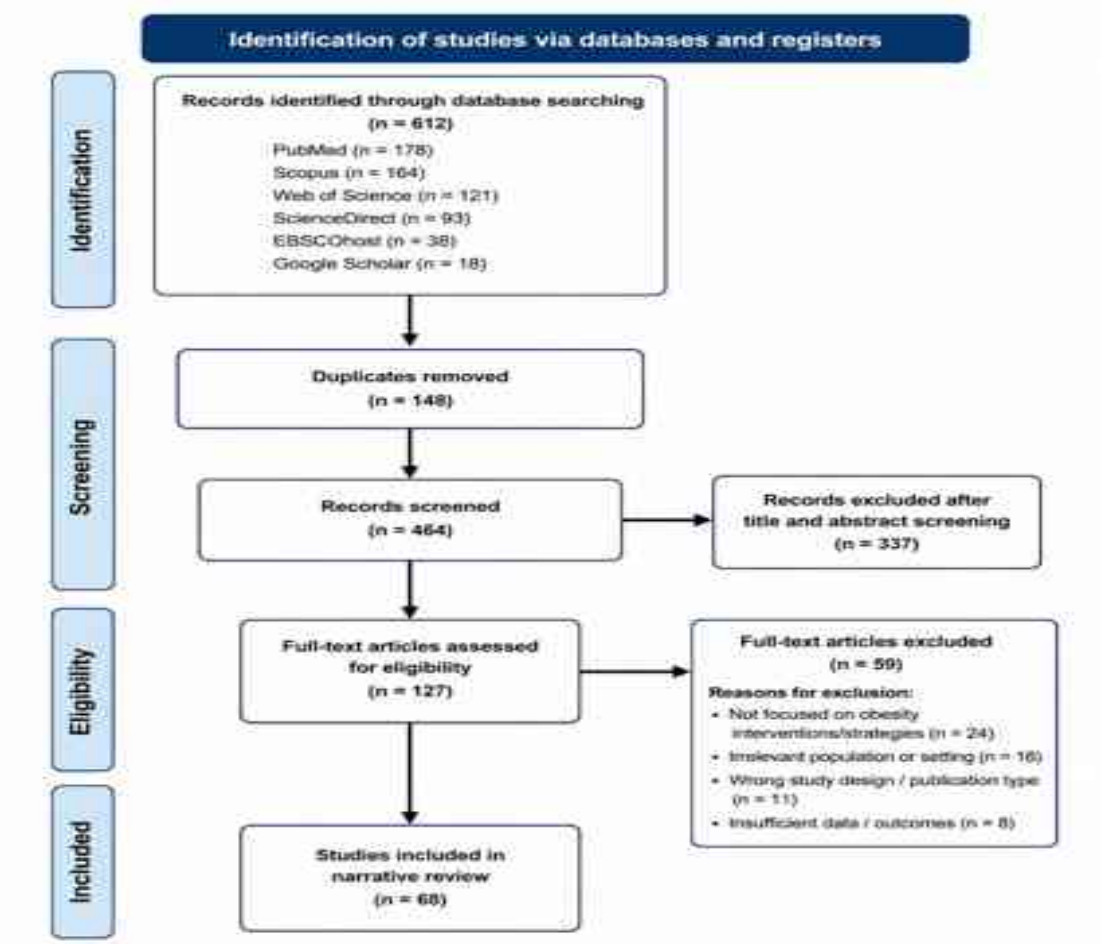

Figure 1. PRISMA-Informed Flow Diagram of Literature Search and Study Selection Process

RESULTS

The literature search identified 612 records from electronic databases and supplementary sources. After removing duplicate records and applying the predefined inclusion and exclusion criteria, 68 studies were included in the final narrative review. The selected studies consisted of systematic reviews, meta-analyses, randomized controlled trials, observational studies, and policy evaluation reports published between 2020 and 2025. Collectively, these studies provide evidence regarding a range of emerging obesity prevention and management strategies relevant to Southeast Asian populations.

The findings were synthesized into six major thematic categories: (1) digital health and personalized nutrition, (2) dietary interventions including intermittent fasting, (3) microbiome-targeted approaches, (4) food environment interventions and food reformulation, (5) fiscal and regulatory policies, and (6) culturally tailored community-based programs. These themes represent the most frequently reported and potentially scalable approaches for addressing obesity within the diverse socioeconomic and cultural contexts of Southeast Asia. Table 1 summarizes the characteristics of the key studies included in this review, while subsequent sections present a thematic synthesis of the evidence and discuss the implications of each intervention category for obesity prevention and management in the region.

Table 1. Characteristics of Key Studies Included in the Narrative Review

Author(s)	Year	Study Design	Intervention/Focus	Main Findings
Alamnia et al.	2022	Systematic Review & Meta-analysis	SMS-based weight-loss interventions	SMS interventions produced modest but significant weight reduction in LMIC populations.
Andreyeva et al.	2022	Systematic Review & Meta-analysis	Sugar-sweetened beverage taxation	SSB taxes were associated with reduced purchases and consumption of sugary beverages.
Chew et al.	2022	Systematic Review & Meta-analysis	Smartphone applications	Mobile applications improved adherence to weight management and supported sustainable weight loss.
Comşa et al.	2020	Meta-analysis	Cognitive Behavioral Therapy (CBT)	CBT improved weight reduction outcomes and long-term behavioral change.
Hongsanun et al.	2021	Cross-sectional Study	Thailand sugar tax policy	Sugar content in beverages decreased following implementation of sugar taxation.
Lawlor et al.	2020	Systematic Review & Network Meta-analysis	Third-wave CBT interventions	ACT and mindfulness approaches enhanced long-term weight management.
Madigan et al.	2022	Systematic Review & Meta-analysis	Primary care weight-management interventions	Clinically meaningful weight reduction was achieved through structured primary care programs.
Mohamed Nor et al.	2021	Economic Modelling Study	SSB taxation in Malaysia	Demand for sugary beverages decreased as prices increased.
Patikorn et al.	2021	Umbrella Review	Intermittent fasting	Intermittent fasting reduced body weight and obesity-related risk factors.
Pettigrew et al.	2022	Policy Review	Front-of-pack nutrition labeling	Improved consumer awareness and healthier food choices.
Phulkerd et al.	2020	Prospective Cohort Study	Thailand SSB tax	Significant reduction in consumption of taxed beverages.
Rasaei et al.	2024	Umbrella Review	Probiotics, prebiotics, synbiotics	Small but significant reductions in body weight and BMI.
Semnani-Azad et al.	2025	Network Meta-analysis	Intermittent fasting strategies	Comparable effectiveness to continuous energy restriction.
Shin et al.	2023	Randomized Trial	Nutri-Grade food labeling	Reduced sugar purchases among consumers.
Siles-Guerrero et al.	2024	Systematic Review & Meta-analysis	Fasting versus calorie restriction	Similar effectiveness in weight loss and metabolic outcomes.
Ufholz & Werner	2023	Review Study	Mobile health applications	Mobile health tools improved dietary adherence and self-monitoring.

Table 1 summarizes the key studies included in this narrative review. The reviewed literature consisted primarily of systematic reviews, meta-analyses, randomized controlled trials, cohort studies, and policy evaluation studies published between 2020 and 2025. The studies examined a broad range of obesity prevention and management strategies, including digital health interventions, intermittent fasting, microbiome-targeted approaches, front-of-pack nutrition labeling, sugar-sweetened beverage taxation, and community-based behavioral programs. Most studies reported positive outcomes in reducing body weight, improving dietary behaviors, enhancing self-monitoring, and supporting healthier food environments. The evidence also suggests that policy-based interventions and culturally tailored behavioral approaches can complement individual-level interventions to achieve more sustainable obesity prevention and management outcomes.

Table 2. Synthesis of Emerging Obesity Interventions and Their Implications in Southeast Asia

Theme	Intervention Examples	Reported Outcomes	Public Health Implications
Digital Health and Personalized Nutrition	Mobile apps, telehealth, SMS coaching	Improved dietary adherence and weight management	Scalable and accessible intervention
Dietary Interventions	Intermittent fasting, time-restricted eating	Reduced BMI and cardiometabolic risk	Effective alternative to calorie restriction
Microbiome-Based Approaches	Probiotics, prebiotics, synbiotics	Improved metabolic profiles and modest weight loss	Emerging complementary therapy
Food Environment Interventions	Food reformulation, nutrition labeling	Improved food choices and consumer awareness	Supports healthier eating behaviors
Fiscal Policies	SSB taxation	Reduced sugary drink consumption	Population-level obesity prevention
Community-Based Programs	CBT, ACT, mindfulness, nutrition education	Improved long-term behavior change	Enhances intervention sustainability

Table 2 presents a thematic synthesis of the major intervention strategies identified in the literature. Digital health technologies and personalized nutrition emerged as promising approaches due to their ability to facilitate self-monitoring and sustained behavior change. Dietary interventions, particularly intermittent fasting, demonstrated effectiveness comparable to conventional calorie restriction. Environmental and policy-based interventions, including food labeling and SSB taxation, were shown to influence food purchasing behaviors and support healthier dietary choices at the population level. Furthermore, community-based and psychologically informed interventions enhanced adherence and long-term maintenance of healthy behaviors. Collectively, these findings indicate that a combination of individual, community, environmental, and policy-level approaches is necessary to effectively address obesity in Southeast Asia.

DISCUSSIONS

The findings of this review highlight that obesity prevention and management in Southeast Asia require a comprehensive approach that extends beyond individual behavioral modification. The evidence suggests that emerging interventions, including digital health technologies, dietary approaches, microbiome-targeted therapies, food environment modifications, fiscal policies, and community-based programs, collectively contribute to addressing the multifactorial nature of obesity. These findings are consistent with the ecological model of obesity, which emphasizes the interaction between biological, behavioral, environmental, and policy-level determinants in shaping obesity risk[14].

Digital health interventions emerged as one of the most promising approaches identified in this review. Unlike traditional face-to-face counseling, mobile applications and telehealth platforms provide continuous support, self-monitoring tools, and personalized feedback that can improve adherence to healthy lifestyle behaviors. This finding is consistent with the systematic review conducted by Chew, Koh, Ng, and Tan (2022), which reported sustained weight loss among users of smartphone-based weight management applications[9]. Similarly, Ufholz and Werner (2023) found that digital health tools enhance self-efficacy and engagement, both of which are critical determinants of long-term behavioral change. The effectiveness of digital interventions may be particularly relevant in Southeast Asia, where smartphone penetration rates continue to increase rapidly. However, disparities in digital literacy and access to technology may limit the effectiveness of these interventions among rural and socioeconomically disadvantaged populations[15].

Dietary interventions, particularly intermittent fasting (IF), also demonstrated considerable potential for obesity management. The findings support previous evidence indicating that IF can achieve weight loss outcomes comparable to continuous calorie restriction when adherence is maintained[12,16]. These results align with behavioral theories suggesting that dietary adherence, rather than the specific dietary pattern itself, is often the primary determinant of successful weight reduction. Nevertheless, some studies have reported

challenges related to long-term compliance and sustainability of fasting regimens[17]. Such inconsistencies may be explained by variations in fasting protocols, participant characteristics, and cultural dietary practices. In Southeast Asia, where communal eating and food-centered social activities are deeply embedded in daily life, maintaining prolonged fasting schedules may present additional barriers that warrant culturally sensitive adaptation.

The review also identified growing interest in microbiome-targeted interventions, including probiotics, prebiotics, and synbiotics. Although the observed reductions in body weight and BMI were generally modest, the findings support emerging evidence linking gut microbiota composition to metabolic regulation and obesity development[10]. These results are consistent with the theory that alterations in gut microbial diversity may influence energy harvest, inflammatory pathways, and appetite regulation. However, the magnitude of the reported effects varied substantially across studies. Differences in bacterial strains, dosages, intervention durations, and participant characteristics likely contributed to this heterogeneity. Consequently, while microbiome-based interventions represent a promising area of research, current evidence remains insufficient to support widespread implementation without further region-specific investigation.

Environmental and policy-based interventions were also found to play an important role in obesity prevention. Front-of-pack nutrition labeling and food reformulation initiatives demonstrated positive effects on consumer awareness and healthier purchasing decisions. These findings are consistent with the randomized trial conducted by Shin, Puri, and Finkelstein (2023), which demonstrated that Singapore's Nutri-Grade labeling system significantly reduced sugar purchases[18]. Similar findings have been reported by Pettigrew et al. (2022), who argued that interpretive nutrition labels are more effective than information-only labels because they simplify decision-making processes[5]. From a behavioral economics perspective, such interventions function as "nudges" that facilitate healthier choices without restricting consumer autonomy. The success of these approaches suggests that modifying food environments may be more sustainable than relying solely on individual motivation and self-control.

Fiscal policies, particularly sugar-sweetened beverage (SSB) taxation, were consistently associated with reductions in sugary drink consumption. The findings support the conclusions of Andreyeva et al. (2022), who reported that SSB taxes lead to meaningful declines in purchases of taxed beverages[19]. Evidence from Thailand and Malaysia further demonstrates that taxation not only influences consumer behavior but also encourages product reformulation by manufacturers[20,21]. These findings are consistent with economic theories of demand elasticity, which propose that increasing product prices reduces consumption. Nevertheless, the long-term effectiveness of taxation policies depends on the magnitude of tax increases, industry responses, and complementary public health measures. Therefore, taxation should be considered one component of a broader obesity prevention strategy rather than a standalone solution.

Finally, culturally tailored community-based interventions emerged as a critical element for achieving sustainable behavioral change. The findings indicate that programs integrating cultural values, social support, and behavioral counseling are more likely to achieve long-term success. This observation is consistent with previous evidence showing that cognitive behavioral therapy (CBT) and mindfulness-based approaches improve motivation, self-regulation, and weight maintenance[22,23]. Unlike standardized interventions, culturally adapted programs acknowledge local dietary customs, social norms, and health beliefs, thereby enhancing participant engagement and acceptability. Given the cultural diversity of Southeast Asia, the effectiveness of obesity interventions may depend substantially on their ability to accommodate local contexts and traditions.

Overall, the findings of this review suggest that no single intervention is sufficient to address the obesity epidemic in Southeast Asia. Consistent with ecological and systems-based theories of obesity, the most effective approach involves integrating individual-level behavioral interventions with supportive environmental and policy changes. Future research should focus on evaluating the long-term effectiveness, cost-effectiveness, and scalability of emerging interventions within diverse Southeast Asian populations. Such

evidence will be essential for informing public health policies and developing sustainable obesity prevention strategies across the region.

CONCLUSION AND RECOMMENDATIONS

The findings of this narrative review indicate that a variety of emerging interventions show significant potential for the prevention and management of obesity in Southeast Asia. Of the 612 records initially identified, 68 studies met the eligibility criteria and were included in the thematic synthesis. The evidence was categorized into six major intervention areas: digital health and personalized nutrition, dietary interventions including intermittent fasting, microbiome-targeted approaches, food environment modifications and nutrition labeling, fiscal policies such as sugar-sweetened beverage taxation, and culturally tailored community-based programs. Digital health interventions were found to improve adherence to healthy lifestyle behaviors through continuous self-monitoring and personalized support, while intermittent fasting demonstrated effectiveness comparable to conventional calorie restriction in reducing body weight and body mass index. Furthermore, front-of-pack nutrition labeling and sugar-sweetened beverage taxation contributed to healthier dietary choices and reduced consumption of high-sugar products at the population level. Overall, the review highlights that integrated interventions combining individual, community, environmental, and policy-level strategies are more effective than single-component approaches in addressing obesity and promoting sustainable public health outcomes in Southeast Asia.

The conclusion is The findings indicate that combining individual, environmental, and policy-level approaches is more effective than single interventions in reducing obesity risk and improving health outcomes. Therefore, governments, healthcare providers, and communities should strengthen collaboration in implementing evidence-based obesity prevention programs, while future research should focus on evaluating the long-term effectiveness and scalability of these interventions in diverse Southeast Asian populations.

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