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Review

The double burden of childhood malnutrition in the Caribbean: Policy, practice, and public health imperatives

Kamryn Bailey[1,2], Stanley I.R. Okoduwa[3,4*]

[1] Department of Human Nutrition, University of Glasgow, United Kingdom; [2] Social Media Unit, World Nutrition, World Public Health Nutrition Association, United Kingdom; [3] Department of Research Innovation Management, Nigerian Institute of Leather and Science Technology, Zaria, Nigeria; [4] Directorate of Information and Communication Technology, Nigerian Society of Biochemistry and Molecular Biology, Zaria, Nigeria

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Background

The Caribbean faces a growing nutrition crisis marked by the double burden of malnutrition — the simultaneous presence of childhood undernutrition and rising obesity. Despite policy progress, malnutrition persists across socioeconomic lines, threatening long-term public health and development outcomes.

Objective

This narrative review explores the epidemiological trends, biochemical consequences, social determinants, and policy responses to childhood malnutrition in the Caribbean. It highlights barriers and opportunities for public health action, with a focus on equity and sustainability.

Methods

This narrative review was informed by a structured bibliographic search conducted between January and June 2025. Sources were identified through PubMed, Scopus, Web of Science, and Google Scholar using combinations of terms such as 'childhood malnutrition', 'double burden', 'nutrition policy', 'obesity', 'stunting', 'food security', and 'micronutrient deficiencies', each linked to 'Caribbean'. Grey literature was obtained from Food and Agriculture Organization of the United Nations (FAO), the Pan American Health Organization (PAHO), the Caribbean Public Health Agency (CARPHA), the Healthy Caribbean Coalition (HCC), and the Caribbean Food and Nutrition Institute (CFNI).

Results

Undernutrition remains significant in low-income populations, with stunting and micronutrient deficiencies such as anaemia persisting across several countries. Simultaneously, childhood overweight and obesity are increasing rapidly, especially in urban settings. Biochemical evidence reveals an early onset of metabolic dysfunction and hidden hunger (micronutrient deficiencies), both of which contribute to a higher burden of non-communicable diseases (NCDs). Structural drivers include poverty, food insecurity, and ultra-processed diets. Weak health systems exacerbate disparities. While national policies such as sugar-sweetened beverage (SSB) taxes, food fortification, and school-based nutrition programmes show promise, their implementation is often fragmented and under-resourced.

Conclusions

Addressing the double burden of childhood malnutrition in the Caribbean will require multisectoral convergence, stronger data systems, targeted fiscal policies, and equity-driven interventions. Regional collaboration and investment in locally led research will be critical to designing sustainable solutions. The urgency of this crisis demands bold, coordinated action to protect the nutritional well-being of the Caribbean's next generation.

*Corresponding author: okoduwa.sir@nilest.edu.ng; siroplc@gmail.com

INTRODUCTION

Malnutrition remains one of the most pressing public health challenges worldwide. Defined by the World Health Organization (WHO) as the imbalance, deficiency, or excess of energy and nutrients, malnutrition encompasses both undernutrition (e.g., stunting, wasting, and micronutrient deficiencies) and overweight or obesity (WHO, 2024). These manifestations of poor nutritional status are not only prevalent but increasingly coexistent, forming what is now widely referred to as the "double burden of malnutrition," an urgent and complex public health dilemma.

The effects of malnutrition are particularly severe during childhood, a period of rapid growth and neurodevelopment. Undernutrition in early life has been consistently linked to impaired cognitive, motor, and psychosocial functioning, reduced school performance, and increased vulnerability to infections and chronic diseases in later life (Grantham-McGregor et al. 2007; Gaskin et al. 2014). Meanwhile, overweight or obesity in childhood is a strong predictor of early-onset non-communicable diseases (NCDs) such as type 2 diabetes, cardiovascular disease, and obesity-related musculoskeletal conditions (Fruh, 2017). These consequences are magnified in resource-constrained settings where access to quality healthcare, education, and nutritious food is limited.

The Caribbean region serves as a microcosm of this global crisis, where both undernutrition and overnutrition coexist within the same communities – and even within the same children. The region has witnessed substantial improvements in child survival and a decline in infectious diseases over recent decades. However, these gains are now threatened by a growing epidemic of obesity and diet-related NCDs, alongside persistent food insecurity and micronutrient deficiencies (Gaskin et al. 2014; Hennis, 2022). This paradox reflects a broader nutritional transition, characterised by a decline in the consumption of traditional diets rich in legumes, vegetables, and fresh produce, and an increased reliance on ultra-processed, calorie-dense foods high in sugar, fat, and salt (Rakhra et al. 2020). Compounded by sedentary lifestyles, urbanisation, and aggressive marketing of unhealthy foods, this shift is driving alarming increases in childhood obesity across the Caribbean.

Malnutrition in the Caribbean is deeply entwined with systemic issues of poverty, inequality, limited access to health services, and food system vulnerabilities. With food costs in the region being among the highest globally, over 50% of people in the Caribbean cannot afford a healthy diet (FAO, 2023). This economic barrier disproportionately affects children in low-income households, exacerbating both undernutrition and overweight or obesity. Vulnerability is further exacerbated by natural disasters, climate change, and political instability, which disrupt supply chains and compromise household food security (Abdulwaliyu et al. 2023).

Despite increasing recognition of these challenges, regional policy responses remain fragmented and uneven. Although frameworks like the Caribbean Community's (CARICOM) Port-of-Spain Declaration and the Pan American Health Organization's (PAHO) Plan of Action for Childhood Obesity have laid important groundwork, implementation varies widely across nations, with smaller states particularly struggling due to limited capacity and resources (Samuels and Unwin, 2018; Murphy et al. 2018). Public health interventions, such as sugar-sweetened beverage (SSB) taxation, school food regulations, and community-based campaigns, have shown promise in some contexts but lack consistent enforcement, funding, and evaluation mechanisms (Jones et al. 2023; Foster et al. 2022). Meanwhile, biochemical and clinical monitoring, critical to identifying and managing malnutrition, remains underutilised, limiting the ability of health systems to detect and address early-stage nutrition-related disorders (Jones et al. 2022).

This narrative review provides a critical examination of childhood malnutrition in the Caribbean, focusing on the intersection of social, economic, and policy-related determinants. It explores recent epidemiological trends of undernutrition and obesity, highlights the biochemical and clinical implications of malnutrition, assesses the effectiveness of public health and policy interventions, and proposes actionable recommendations for regional governments and stakeholders. By synthesising diverse evidence sources, the review aims to guide more coordinated, equity-driven responses to an urgent and evolving nutritional crisis.

This narrative review was informed by a structured bibliographic search conducted between January and June 2025. Sources were identified through PubMed, Scopus, Web of Science, and Google Scholar using combinations of terms such as 'childhood malnutrition', 'double burden', 'nutrition policy', 'obesity', 'stunting', 'food security', and 'micronutrient deficiencies', each link to 'Caribbean'. Grey literature was obtained from PAHO, the Food and Agriculture Organization of the United Nations (FAO), the Caribbean Public Health Agency (CARPHA), the Healthy Caribbean Coalition (HCC), and the Caribbean Food and Nutrition Institute (CFNI). We included publications from 2000 onwards that addressed childhood undernutrition, overnutrition, or related policy and public health interventions in the Caribbean. Studies were excluded if they did not provide original data, focused solely on adult populations, or addressed nutrition in contexts outside the Caribbean without relevant regional applicability.

EPIDEMIOLOGICAL LANDSCAPE OF CHILDHOOD MALNUTRITION IN THE CARIBBEAN

The Caribbean presents a unique and complex nutritional profile among low- and middle-income regions. On one hand, notable strides have been made in reducing undernutrition in several countries; on the other, escalating rates of childhood overweight and obesity signal a mounting public health crisis. This coexistence – referred to as the double burden of malnutrition – is particularly evident in children under five years of age and reflects shifting socioeconomic, dietary, and environmental conditions across the sub-region.

UNDERNUTRITION: HIDDEN BUT PERSISTENT

According to FAO, the Caribbean has one of the lowest regional averages for childhood wasting (2.9%) and stunting (11.3%) as of 2022 – figures that fall below global averages

of 6.8% and 22.3%, respectively (FAO, 2025). However, these regional figures mask considerable variation between and within countries. For instance, Haiti reports stunting rates exceeding 20%, whereas nations such as Jamaica report rates below 5%. Undernutrition is also strongly correlated with socioeconomic status; children in the lowest wealth quintiles are disproportionately affected (Gassmann et al. 2022).

Micronutrient deficiencies, commonly referred to as "hidden hunger," also remain widespread. Anaemia prevalence among children is particularly high; in some countries, such as Haiti, it exceeds 40%, a threshold considered a severe public health concern by WHO standards (Irizarry et al. 2017). Deficiencies in vitamin A, zinc, and vitamin B12 further compound risks for impaired immunity, poor growth, and developmental delays.

OVERNUTRITION: AN ACCELERATING EPIDEMIC

At the other end of the malnutrition spectrum, childhood overweight and obesity are rising at alarming rates. In 2022, the prevalence of overweight in children under five in the Caribbean reached 6.6% - higher than the global average of 5.6% (FAO, 2025). In some countries, such as Trinidad and Tobago, overweight rates in young children exceed 13%. In comparison, Haiti remains lower at 3.7%, again reflecting stark inequalities tied to food access, urbanisation, and lifestyle changes. As illustrated in Figure 1, the prevalence of overweight among children under five years old varies between nations.

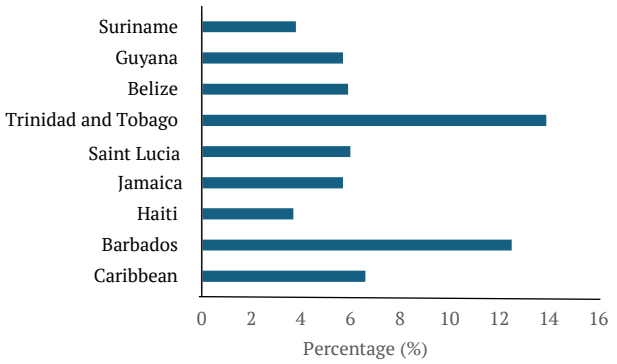

Figure 1. Prevalence of overweight among children under five years of age in the Caribbean. Adapted from FAO, 2025.

Among older children and adolescents (ages 5–19), the situation is even more concerning. Data from the World Obesity Federation (2024) show that several Caribbean nations surpass the global obesity average of 20% for this age group. For example, obesity rates among girls in the Bahamas reach 31.75%, and boys in Saint Kitts and Nevis report 24.62% (Table 1). These statistics exemplify a rising trend in the Caribbean that could lead to long-term health consequences, including early-onset type 2 diabetes and cardiovascular disease (WHO, 2025).

LONG-TERM HEALTH CONSEQUENCES

A growing body of evidence links early-life malnutrition — whether undernutrition or overnutrition — with increased risk of chronic disease in adulthood. This relationship, framed within the Developmental Origins of Health Disease hypothesis, suggests that inadequate nutrition during critical periods of growth can lead to permanent physiological changes

Table 1. Prevalence of obesity (BMI > 30) among children in Caribbean countries.

Caribbean Country	Childhood Obesity Percentage (%)	
	Boys	Girls
Antigua and Barbuda	23.76[a]	25.50[a]
Bahamas	22.45[a]	31.75[a]
Barbados	22.94[a]	23.34[a]
Belize	21.82[a]	21.88[a]
Dominica	17.43[a]	20.02[a]
Grenada	19.59[a]	18.38[a]
Guyana	11.70[a]	15.64[a]
Haiti	4.00%[b]	2.80[b]
Jamaica	13.63[a]	17.51[a]
Saint Kitts and Nevis	24.62[a]	21.50[a]
Saint Lucia	20.04[a]	19.00[a]
Saint Vincent and the Grenadines	15.89[a]	21.27[a]
Suriname	20.87[a]	15.46[a]
Trinidad and Tobago	23.28[a]	15.95[a]

Note: Data adapted from World Obesity Federation 2024[a] and Institut Haïtien de l'Enfance & ICF, 2018[b].

during critical periods of growth can lead to permanent physiological changes. These include impaired glucose metabolism, higher risk of type 2 diabetes (Marroquí et al. 2012), reduced nephron cell numbers, higher blood pressure (Bagby, 2007), and increased susceptibility to metabolic syndrome and cardiovascular disease (Yao et al. 2022). These effects are often mediated through epigenetic mechanisms, such as DNA methylation, which can alter gene expression linked to metabolism, immune function, and endocrine health (Alam et al. 2016). Notably, the combination of early stunting followed by rapid weight gain, a common pattern in the Caribbean, has been shown to dramatically increase NCD risk later in life (Ferreira et al. 2018).

BIOCHEMICAL AND CLINICAL IMPLICATIONS OF CHILDHOOD MALNUTRITION

While the visible signs of malnutrition, such as stunting or overweight, are important indicators, biochemical and clinical assessments can provide a more nuanced understanding of a child's nutritional status (Park, 2009; Elizabeth, 2016). These markers detect hidden deficiencies, metabolic risks, and early physiological changes that cannot be captured through anthropometry alone (Galicia et al. 2016). In the Caribbean, where both undernutrition and overnutrition are prevalent, integrating biochemical monitoring into national health systems could facilitate early diagnosis, effective intervention, and long-term prevention (Henry,2012; Valdés-Sosa et al. 2018).

Biochemical monitoring offers a critical window into the underlying health consequences of childhood malnutrition (Fischer and Galler, 2015). From micronutrient deficiencies to early signs of metabolic dysfunction, these markers can enhance early detection and guide targeted interventions

(Olga et al. 2024).

UNDERNUTRITION AND MICRONUTRIENT DEFICIENCIES

Undernourished children often present with deficiencies in protein, iron, zinc, vitamin A, and other essential nutrients. Biochemical markers such as serum prealbumin, transferrin, and retinol-binding protein are commonly used to assess protein-energy malnutrition (Evans et al. 2021). Among these, prealbumin is particularly responsive to short-term changes in dietary intake due to its short half-life (Lee et al. 2016).

However, these markers can be influenced by inflammation or infection, limiting their diagnostic reliability. As a result, biochemical data must be interpreted in conjunction with inflammatory markers such as C-reactive protein (CRP) and white blood cell count (Keller, 2019). Other functional indicators such as haemoglobin concentration, total lymphocyte count, and insulin-like growth factor 1 provide broader insights into a child's immune function, growth capacity, and overall nutritional status (Widjaja et al. 2024; Hawkes and Grimberg, 2015).

OVERNUTRITION AND METABOLIC DYSFUNCTION

Children who are overweight or obese often exhibit early signs of metabolic disease, which can be detected using specific biochemical markers. These include elevated levels of CRP, ferritin, leukocyte count, along with other inflammatory markers associated with adiposity and systemic low-grade inflammation (Mindru et al. 2025; Hertiš Petek et al. 2025).

Additionally, hormonal and lipid profiles offer critical insights into cardiometabolic risk. Elevated fasting insulin and insulin resistance, commonly assessed using the Homeostasis Model Assessment, are early indicators of metabolic syndrome and type 2 diabetes risk in children (Luo et al. 2024). Abnormal levels of triglycerides, elevated low-density lipoprotein, and reduced high-density lipoprotein are also predictive of future cardiovascular disease (Klop et al. 2013).

These biochemical changes often begin well before physical symptoms appear. Therefore, routine screening of at-risk children, particularly in communities with high rates of childhood obesity, could offer a valuable tool for early intervention.

DRIVERS OF THE DOUBLE BURDEN

The dual burden of undernutrition and obesity is not accidental – it is shaped by intersecting socioeconomic and structural determinants. In 2022, FAO reported that over 131 million people across Latin America and the Caribbean could not afford a healthy diet, including roughly half of the Caribbean population (FAO, 2023; World Food Programme, 2023). Furthermore, countries like Haiti, Belize, and Trinidad and Tobago report some of the highest levels of food insecurity, the condition of having limited access to safe, nutritious food, with up to 80% of people unable to access nutritious diets.

This inequity is compounded by the region's rapid nutritional transition. Traditional diets, once rich in legumes, fruits, and root crops, have been increasingly replaced by ultra-processed, energy-dense foods that are more accessible and affordable but nutritionally poor (The Lancet Regional Health–Americas, 2023). These shifts are exacerbated by urbanisation, increased screen time, limited physical activity, and aggressive marketing of SSBs and fast food, particularly among youth (Wright et al. 2015).

The Caribbean faces a highly uneven but deeply concerning nutrition landscape. While some countries have achieved progress in reducing undernutrition, rising rates of childhood overweight and obesity threaten to reverse these gains. Addressing this epidemiological paradox requires both short-term responses to food insecurity and long-term reforms in food systems, public health infrastructure, and policy enforcement.

SOCIAL AND ECONOMIC DETERMINANTS OF CHILDHOOD MALNUTRITION

The dual burden of childhood malnutrition in the Caribbean is driven not only by individual dietary choices but by more profound, systemic inequities. Social, economic, and structural factors such as poverty, food insecurity, inadequate health systems, cultural norms, and market forces interact in complex ways to shape nutritional outcomes (Melville et al. 1988; Massé, 2007; Hagley, 1993). Addressing childhood malnutrition in the region requires confronting these upstream determinants that underpin both undernutrition and obesity, through comprehensive and multisectoral interventions (Bárcena, 2010).

POVERTY AND FOOD INSECURITY

Economic constraints are a major barrier to healthy eating across the Caribbean (Taylor, 2023). In 2022, an estimated 50% of the region's population could not afford a healthy diet, and in countries such as Haiti (as shown in Figure 2), that figure approaches 80% (FAO, 2025). Rising food prices, reliance on imported foods, and income inequality have made it difficult for many families to access affordable, nutrient-dense meals. This has led to diets that are energy-rich but nutrient-poor, contributing to nutrient deficiencies, stunting, and excess weight gain. Children in poorer households are especially vulnerable. Studies show that stunting and anaemia are significantly more prevalent among children in the lowest wealth quintiles (Gassmann et al. 2022). At the same time, low-cost, calorie-dense processed foods have become the default for many families facing food insecurity, leading to early-onset overweight and associated metabolic risks (Rakhra et al. 2020).

Beyond formal policy and institutional interventions, grassroots community initiatives — such as women's agricultural cooperatives, indigenous farming networks, and neighbourhood community gardens — play an "important" though often under-recognised role in enhancing food security across the Caribbean (HCC, 2022). These groups, typically operating outside of formal government or donor frameworks, contribute to household dietary diversity, preserve traditional cultivation practices, and provide informal safety nets during climate-related and economic shocks (Barry and Gahman, 2021; FAO, 2023). Community gardens and subsistence farms, for example, can reduce dependence on imported foods, foster intergenerational knowledge transfer, and promote culturally relevant diets

(Turnšek et al. 2022). While case studies and grey literature highlight their value, peer-reviewed research systematically evaluating their scale, nutritional impact, and sustainability remains limited. Strengthening such grassroots efforts through targeted technical support, seed funding, and integration into local food and nutrition policy could bolster resilience, promote dietary diversity, and complement formal food security initiatives in the region (HCC, 2022; Mohammadi et al. 2022; Abdulwaliyu et al. 2023a).

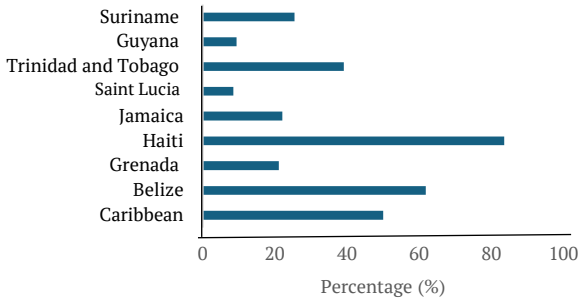

Figure 2. Percentage of people unable to afford a healthy diet across the Caribbean. Adapted from FAO, 2025.

FOOD ENVIRONMENT AND NUTRITIONAL TRANSITION

The Caribbean's nutritional landscape has undergone a dramatic transformation. Traditionally based on ground provisions — an umbrella term that includes starchy, tubular root vegetables — legumes, and fruits, local diets have increasingly shifted toward highly processed foods. This transition is shaped by globalisation, urbanisation, and trade policies that favour the importation of ultra-processed foods at the expense of local, nutritious staples (The Lancet Regional Health – Americas, 2023). Supermarkets and fast-food chains now dominate urban food environments, often displacing community markets and home-grown agriculture.

This shift is particularly harmful to children. SSBs, salty snacks, and processed meats are widely available and aggressively marketed—particularly through digital platforms—to children and adolescents in low- and middle-income countries (Fretes et al., 2025; Bailey and Okoduwa, 2025). These foods are often more affordable than fresh produce and traditional meals. At the same time, urban infrastructure provides little support for physical activity. Children often face limited access to safe parks, walkable communities, or structured exercise opportunities within their school curricula (Wright et al. 2015).

HEALTH LITERACY, CULTURAL NORMS, AND CARE PRACTICES

Sociocultural perceptions of health, body image, and child feeding also influence nutrition outcomes. In some communities, overweight children are perceived as well cared for, while normal thinness may be mistakenly associated with illness or poverty. These beliefs may undermine public health messaging around healthy weight and dietary moderation (Samuels and Unwin, 2018).

At the household level, caregivers may lack access to accurate, culturally relevant nutrition education, limiting their ability to make informed dietary choices for their children (Henry, 2016). Time constraints, particularly in single-parent or low-income households, further reduce the ability to prepare home-cooked meals or supervise physical activity, often due to juggling multiple jobs while lacking support systems (Schuler et al. 2024). In many cases, public awareness campaigns are insufficient to shift behaviour in the absence of enabling environments such as affordable healthy food options or effective school-based nutrition support systems (Mohammadi et al. 2022; Henry, 2012).

STRUCTURAL VULNERABILITIES AND INEQUALITY

Malnutrition in the Caribbean is exacerbated by broader structural vulnerabilities. Small island developing states are uniquely exposed to economic volatility, climate change, and natural disasters, which can disrupt food supply chains and inflate food prices. High dependence on food imports — up to 80% in some countries — further limits national food sovereignty and resilience (FAO, 2023). Structural constraints for governments with small, low-income populations limit the reach and sustainability of national nutrition programmes.

In addition, fragmented social protection systems and under-resourced health services hinder early detection and treatment of malnutrition, particularly in underserved populations (Melville et al. 1988; Henry, 2012). Nutritional surveillance data are often outdated or inconsistently collected, making it difficult to track progress or target interventions effectively (Mohammadi et al. 2022). In rural and remote communities, health and education systems often lack the capacity to address malnutrition holistically due to inadequate infrastructure, staffing shortages, and insufficient training (Henry, 2016).

The social and economic drivers of childhood malnutrition in the Caribbean are deeply interconnected. Poverty, high food costs, aggressive food marketing, and entrenched cultural norms all contribute to dietary patterns that foster both undernutrition and obesity (Henry, 2016; Massé, 2007). A comprehensive public health response must address these root causes through policy reform, health education, and investment in food-system resilience (Bárcena, 2010).

CURRENT POLICY LANDSCAPE

In response to the rising burden of childhood malnutrition, several Caribbean nations have adopted public health and policy strategies aligned with global nutrition targets. However, while regional frameworks and national initiatives demonstrate growing political interest, implementation remains inconsistent, and many interventions are hampered by limited resources, regulatory gaps, and structural inequalities (Samuels and Unwin 2018; Murphy et al. 2018; Foster et al. 2022).

REGIONAL POLICY FRAMEWORKS

CARICOM has played a central role in shaping the region's health and nutrition agenda. The 2007 Port-of-Spain Declaration on NCDs marked a turning point in regional advocacy, committing member states to tackle poor diet and childhood obesity as part of broader NCD prevention strategies (Samuels and Unwin, 2018).

Building on this momentum, PAHO introduced a Plan of Action for the Prevention of Obesity in Children and

Adolescents (2014–2019), which was endorsed by all member states. The plan outlines key areas for action, including transforming food environments, promoting physical activity, implementing fiscal and regulatory policies, and enhancing surveillance (PAHO, 2014).

In tandem, CARPHA and HCC have advocated for comprehensive school nutrition standards, food labelling regulations, and taxes on unhealthy products. Despite these frameworks, most Caribbean countries continue to struggle with policy implementation, monitoring, and enforcement.

NATIONAL POLICY INTERVENTIONS

Some countries have taken important steps toward tackling childhood malnutrition through fiscal and institutional reforms:

- Barbados implemented a 10% excise tax on SSBs in 2015, which was later increased to 20%. Early evaluations showed a modest reduction in SSB purchases and a corresponding increase in water consumption (NCD Alliance, 2022);
- Trinidad and Tobago, the Bahamas, and Jamaica have enacted school-based nutrition standards restricting the sale of sugary beverages and promoting healthier food environments (HCC, 2022);
- Guyana and Barbados have developed more comprehensive school nutrition policies, incorporating nutrition education, marketing restrictions, and annual student health assessments (Global Food Research Program, 2023).

However, other countries lag behind (Table 2). As of the latest PAHO survey conducted in 2019, fewer than half of Caribbean countries had implemented fiscal policies to reduce sugar intake. Interventions such as SSB taxation lack effective enforcement mechanisms, which limits their sustainability and scalability (PAHO, 2022).

Table 2. Overview of Excise Taxes on SSBs in the Caribbean Sub-Region. Adapted from PAHO, 2022

Caribbean Country	Applies Excise Taxes on SSBs	Tax Structure
Antigua and Barbuda	No	-
Bahamas	No	-
Barbados	Yes	Ad valorem
Belize	Yes	Amount – specific
Dominica	Yes	Combined
Grenada	No	-
Guyana	No	-
Haiti	MD	MD
Jamaica	No	-
Saint Kitts and Nevis	Yes	Ad valorem
Saint Lucia	No	-
Saint Vincent and the Grenadines	Yes	Ad valorem
Suriname	Yes	Amount – specific
Trinidad and Tobago	No	-

Note: MD indicates missing data from the 2019 PAHO SSB Tax Survey, the source of the information in this table

ROLE OF INTERNATIONAL PARTNERS AND CIVIL SOCIETY

International and regional non-governmental organisations (NGOs) continue to play a critical role in policy development and technical support. CARPHA and PAHO have provided policy templates, surveillance tools, and training to assist governments in strengthening their national plans. Civil society groups, such as HCC, have also been instrumental in holding governments accountable, advocating for stronger front-of-package labelling, and restrictions on marketing to children (Hassell et al. 2020).

Despite this support, many national policies remain aspirational rather than operational, often hindered by bureaucratic fragmentation, political turnover, and competing economic priorities (Galicia et al. 2016). The absence of consistent data collection and evaluation frameworks impedes efforts to assess effectiveness or make evidence-based adjustments (Simeon et al. 2024).

GAPS AND OPPORTUNITIES

While policy frameworks are in place, several key gaps persist, such as lack of coordination between health, education, agriculture, and trade sectors (Román-Acosta, 2023), limited fiscal space to fund interventions or enforce regulations (Powers, 2011), insufficient public communication and community engagement to build buy-in (Cortés et al. 2020), and inequitable reach of programmes, particularly in rural or marginalised communities (Galicia et al. 2016). Opportunities exist to build on existing initiatives by expanding successful policies like SSB taxation to more countries (Samuels and Unwin, 2018); strengthening school-based interventions through dedicated funding and national curriculum integration (Murphy et al. 2018); establishing regional surveillance systems to monitor trends, identify disparities, and track outcomes; and leveraging regional partnerships for shared food procurement and regulatory enforcement (Foster et al. 2022).

The Caribbean has made important policy strides in addressing childhood malnutrition, particularly through fiscal tools and school-based interventions. However, the effectiveness of these strategies is undermined by weak enforcement, limited funding, and fragmented implementation (Powers, 2011). Strengthening cross-sector collaboration, investing in surveillance, and scaling successful models are essential next steps for regional progress.

PUBLIC HEALTH STRATEGIES AND INTERVENTIONS

Tackling childhood malnutrition in the Caribbean requires more than policy declarations. It requires coordinated, evidence-informed public health strategies that are integrated into schools, communities, and food systems. While regional policies provide a framework, implementation at the programmatic level varies widely. This section examines key public health interventions implemented in the region, ranging from fortification to school-based campaigns, and highlights their successes, limitations, and opportunities for scaling up.

COMBATING MICRONUTRIENT DEFICIENCIES THROUGH FOOD FORTIFICATION

Food fortification, the addition of commonly deficient vitamins and/or minerals to staple foods, is a globally recognised, cost-effective strategy to reduce hidden hunger, particularly among children. In the Caribbean, anaemia rates remain above 20% in many countries and exceeds 40% in

Haiti, highlighting persistent deficiencies in program reach, dietary diversity, and enforcement (Irizarry et al. 2017). Mandatory wheat flour fortification with iron, folic acid, and B vitamins has been implemented in several countries, including Jamaica, Barbados, and Saint Lucia (Simmons, 1990; López de Romaña et al. 2015).

There is growing interest in rice fortification as a complementary strategy, particularly given rice's status as a dietary staple that contributes up to 47% of caloric intake in some Caribbean populations. Pilot programmes and feasibility studies are exploring the viability of integrating fortified rice into school feeding schemes and national procurement systems (Irizarry et al. 2017).

However, significant challenges persist. Many smaller Caribbean states lack the large-scale milling operations needed for centralised fortification. Moreover, weak regulatory systems and limited laboratory capacity constrain quality assurance. Addressing these challenges will require regional cooperation, investment in technical infrastructure, and greater private-sector engagement.

SCHOOL-BASED INTERVENTIONS: A CRUCIAL ENTRY POINT

Schools are a powerful setting for influencing dietary habits, physical activity, and health behaviours early in life. Recognising this, several Caribbean governments have implemented school-based nutrition standards and obesity prevention programmes:

- Jamaica Moves in Schools, launched by the Ministry of Health and Wellness, integrates physical activity and nutrition education into the national school curriculum (Turner, 2018);
- The Bahamas and Grenada have implemented bans on SSBs in schools;
- Barbados adopted a comprehensive National School Nutrition Policy, mandating nutrition standards, health assessments, and physical education across public and private schools (Global Food Research Program, 2023).

Despite these initiatives, challenges persist. Many schools lack the infrastructure or funding to consistently offer nutritious meals (Irizarry et al. 2025). Enforcement of SSB bans and healthy food standards is uneven. Disparities in implementation across rural and urban settings reflect broader inequities in education and health systems.

COMMUNITY-BASED HEALTH PROMOTION CAMPAIGNS

Several mass media and community campaigns have been launched to shift health-related behaviours and raise awareness:

- Jamaica Moves, a national movement targeting physical activity and healthy eating, includes school outreach, public events, and digital messaging. Its school-based arm has led to initiatives such as "Water and Fruits Day," which encourages students to make healthy choices (Dixon, 2024);
- Caribbean Moves, developed by CARPHA, scales this model regionally and aims to promote healthier lifestyles across member states (CARPHA, 2022);
- The My Healthy Caribbean School platform, developed by the HCC, uses digital tools to assess school food environments and advocate for improved policies (HCC, 2017; Hassell et al. 2020).

These campaigns are promising but remain vulnerable to funding constraints and insufficient integration with broader policy frameworks. Without parallel investments in nutrition-sensitive infrastructure, training, and community capacity-building, behavioural change is likely to be short-lived. Public health interventions in the Caribbean are addressing both undernutrition and overnutrition through food fortification, school-based programmes, and community education campaigns. While there are encouraging signs of progress, many programmes continue to face implementation challenges due to weak infrastructure, limited funding, and fragmented coordination. Strengthening these interventions requires sustained political commitment, community engagement, and cross-sector collaboration.

POLICY EFFECTIVENESS: SUCCESSES AND CHALLENGES

Public health and policy interventions aimed at addressing childhood malnutrition in the Caribbean are increasingly shaped by regional coordination, fiscal measures, and school-based strategies. While several policies show promise — particularly in reducing sugar consumption and promoting a healthy school environment — their effectiveness is often undermined by weak implementation, uneven monitoring, and limited scalability. This section assesses the outcomes of key initiatives and identifies critical enablers and barriers to success.

FISCAL POLICIES: MODEST GAINS, UNREALISED POTENTIAL

Taxation of SSBs has emerged as a leading fiscal tool to discourage unhealthy consumption. The Barbados 10% ad valorem SSB tax, introduced in 2015, was the first of its kind in the Caribbean and has become a regional benchmark. An evaluation by the NCD Alliance found that the tax resulted in a 4% reduction in SSB consumption within one year, alongside a 7.5% increase in water purchases, indicating a significant shift in consumer behaviour (NCD Alliance, 2022). In 2022, in alignment with WHO guidance, the Government of Barbados increased SSB taxation to 20% ad valorem. Despite a lack of policy evaluation, WHO suggests that "fiscal policies that lead to at least a 20% increase in the retail price of sugary drinks would result in proportional reductions in the consumption of such products" (WHO, 2016).

Dominica, Belize, and Saint Kitts and Nevis have subsequently implemented SSB excise taxes; however, the tax designs differ, ranging from amount-specific to ad valorem structures (PAHO, 2022). While these taxes generate revenue, only some countries earmark funds for health or nutrition programmes, and few have robust monitoring systems to evaluate long-term health impacts.

Evidence from Latin America reinforces the potential of these policies: In Mexico, a similar tax introduced in 2014 reduced SSB purchases by 7.6% annually and is projected to prevent over 100,000 cases of type 2 diabetes by 2030 (Barrientos-Gutierrez et al. 2017). In Chile, a tiered SSB tax led to a 3.4% reduction in household purchases (Caro et al. 2018). These cases underscore the importance of effective tax design, robust enforcement, and comprehensive public education. Caribbean nations could benefit from

harmonising fiscal policies and investing revenue in nutrition-sensitive initiatives.

FOOD FORTIFICATION: PROVEN EFFICACY, IMPLEMENTATION GAPS

Globally, large-scale food fortification has been shown to reduce micronutrient deficiencies and improve child health outcomes. Countries such as Guatemala and Nigeria have utilised fortified flour and oil to reduce anaemia rates and promote child growth (Garcia-Casal et al. 2018). In the Caribbean, however, implementation is inconsistent. Fortification efforts face several challenges. Many island states lack the industrial scale for centralised fortification, regulatory and laboratory capacity (to monitor compliance) is often limited, and informal and imported food markets complicate quality control. Nonetheless, pilot programmes in rice fortification show promise and may offer a scalable, affordable strategy, especially when integrated into school feeding schemes and social protection programmes (Irizarry et al. 2017).

SCHOOL-BASED POLICIES: STRONG FOUNDATION, UNEVEN EXECUTION

School-based interventions are among the most comprehensive and sustained strategies in the region. In Jamaica, revitalisation of the Jamaica Moves in Schools campaign has been well-received by educators, who report improvements in student attentiveness and enthusiasm for health-promoting activities (Dixon, 2024). However, school nutrition policies face critical challenges, including the following: many schools lack the necessary infrastructure to provide safe, nutritious meals; enforcement of standards and bans on unhealthy foods is inconsistent; community vendors often operate outside school grounds, thereby undermining in-school restrictions; and the integration of nutrition and physical education into the curriculum varies widely. The success of these programmes depends heavily on cross-sectoral collaboration, dedicated funding, and integration into broader education and health systems (Sobers et al. 2021).

Caribbean countries have made meaningful progress in developing and piloting public health policies to reduce childhood malnutrition. Fiscal tools, such as SSB taxes and school-based nutrition interventions, show potential, but their long-term success depends on political will, adequate funding, consistent evaluation, and cross-sectoral alignment. Scaling successful models while addressing implementation gaps will be key to accelerating progress across the region.

THE ROLE OF RESEARCH AND NUTRITIONAL MONITORING AND SURVEILLANCE

Effective responses to childhood malnutrition rely not only on well-designed policies and programmes, but also on robust monitoring and surveillance systems, as well as locally relevant research. In the Caribbean, gaps in nutritional data and limited investment in research infrastructure have hindered governments' ability to track progress, identify disparities, and tailor interventions to locally specific needs. Strengthening these systems is crucial to ensuring accountability, targeting high-risk groups, and sustaining long-term impact.

MONITORING AND SURVEILLANCE SYSTEMS: LIMITED, FRAGMENTED, AND INFREQUENT

Many Caribbean countries lack fully functioning, integrated nutrition surveillance systems. Data collection efforts are often infrequent (e.g., conducted every 5–10 years through Demographic and Health Surveys or the United Nations Children's Fund Multiple Indicator Cluster Surveys); fragmented across ministries (e.g., health, education, and agriculture); and lacking standardised indicators, especially for biochemical and micronutrient status. As a result, national and regional progress toward global nutrition targets (e.g., WHO Global Nutrition Targets 2025, Sustainable Development Goal 2.2) is difficult to track, including for stunting, wasting, overweight, and anaemia in children under five. In addition, real-time data on emerging trends such as rising childhood obesity or school food environments is limited. Ministries often rely on cross-sectional surveys rather than continuous, school-based or clinic-based monitoring.

Some promising developments include CARPHA's Caribbean Regional Health Agency Surveillance System, which is working to harmonise data collection tools; PAHO's Nutrient Profile Model, adopted by several countries to assess food environments; and digital platforms such as My Healthy Caribbean School, which allow for grassroots-level data gathering on school health conditions (HCC, 2017). Still, a region-wide nutrition surveillance platform, with real-time, harmonised indicators and shared data protocols, remains a significant need.

BIOCHEMICAL MONITORING: OFTEN UNAVAILABLE, BUT ESSENTIAL

As previously discussed, biochemical assessments can detect hidden hunger, inflammation, and early markers of metabolic diseases. However, access to these diagnostics in the Caribbean is limited to tertiary hospitals or research institutions, and they are often unavailable in primary care or even at district-level health facilities. This leaves significant gaps in identifying and managing nutrition-related health issues early in life (Henry, 2012).

Countries that have conducted national micronutrient surveys, such as Haiti and Jamaica, face challenges in maintaining routine testing due to cost, logistics, and lack of laboratory capacity. For smaller island states, pooled regional laboratory services could offer a cost-effective solution, enabling shared capacity for biochemical testing and quality control (Galicia et al. 2016).

RESEARCH GAPS AND OPPORTUNITIES

Locally driven, policy-relevant research remains underfunded in the Caribbean (Henry, 2012). While international agencies often support data collection and pilot interventions, few studies are designed, led, and disseminated by Caribbean researchers or institutions or funded by Caribbean governments. This creates challenges in ensuring that programmes are culturally relevant, context-sensitive, and grounded in local realities. Critical research gaps include longitudinal studies tracking early-life nutrition and NCD outcomes (Henry, 2012); evaluations of fortification programmes and school-based nutrition

interventions; research on food marketing, the retail environments, and adolescent nutrition; and gender-disaggregated and equity-focused analysis. The continued efforts of institutions such as the University of the West Indies, CFNI, and CARPHA are well-placed to expand regional research networks and academic-policy partnerships, and lead collaborative, cross-country studies that inform best practices and drive regional innovation (Barton, 2012).

Strengthening nutritional surveillance and investing in locally led research is critical to combating childhood malnutrition in the Caribbean. Improved data systems will enable countries to identify gaps, evaluate progress, and tailor interventions more effectively. A coordinated, regional approach to research and monitoring supported by political commitment and the mobilisation of resources will be key to sustaining momentum and closing persistent equity gaps (Ville et al. 2022).

RECOMMENDATIONS

Childhood malnutrition in the Caribbean is a complex, evolving crisis marked by stark inequalities and the coexistence of undernutrition and obesity. To overcome the double burden of childhood malnutrition in the Caribbean, countries must move beyond fragmented programmes and toward integrated, data-driven, and equity-focused strategies. Regional cooperation, strong governance, and community engagement will be crucial in building resilient food systems, protecting vulnerable children, and achieving long-term health and development goals.

Expanding school-based nutrition programmes is a critical first step. National policies should mandate healthy meals, restrict promotion of ultra-processed foods, and integrate both physical education and nutrition literacy into the curriculum. To make these efforts sustainable, governments must allocate dedicated funding for infrastructure, staff training, and the monitoring of school menus, while engaging parents, teachers, and local vendors to build community ownership.

Fiscal policies play a decisive role in reducing unhealthy food consumption. Well-designed excise taxes on SSBs and ultra-processed foods, with revenue earmarked for health promotion, are proven tools. Scaling these measures across CARICOM states would help close cross-border loopholes and strengthen enforcement. Pairing fiscal action with public awareness campaigns can further shift social norms and encourage healthier consumer choices.

Alongside regulation, micronutrient fortification and diversification strategies should be prioritised. Mandatory fortification of staples such as rice and wheat flour, backed by rigorous monitoring, can address widespread deficiencies. For small island states with limited processing capacity, pooling resources at the regional level can increase efficiency. At the same time, fortification should be complemented by initiatives that promote dietary diversity and local food production, particularly through school and community gardens (Abdulwaliyu et al. 2023b).

Robust nutritional surveillance and biochemical monitoring are crucial for guiding effective interventions. A standardised regional system would enable countries to track child growth, dietary intake, and key biochemical markers, while integration into primary healthcare and school health programmes could expand reach. Leveraging digital and mobile technologies would improve efficiency, and building regional laboratory capacity would ensure access to reliable testing for iron, vitamin A, prealbumin, and metabolic risk markers.

To sustain progress, locally led and equity-focused research must be at the core. Regional academic institutions must receive stable funding to conduct implementation research, longitudinal studies, and community-based evaluations. Prioritising culturally relevant, gender-sensitive, and policy-linked research will ensure that findings directly inform national planning. Strengthening collaborative networks between universities, ministries, civil society, and development partners can also enhance knowledge exchange and capacity-building.

Ultimately, nutrition outcomes depend on robust, sustained governance and cross-sector collaboration. Health, education, agriculture, trade, and finance stakeholders must collaborate to develop integrated strategies that address both undernutrition and obesity. Establishing or revitalising national nutrition councils or inter-ministerial task forces with clear authority and accountability will be crucial to driving and sustaining coordinated action.

CONCLUSION

The double burden of childhood malnutrition observed in the Caribbean mirrors trends in other small island developing states in the Pacific, where high food import dependence, climate vulnerability, and dietary transitions are similarly driving the coexisting undernutrition and obesity (Snowdon et al. 2013). Likewise, in parts of West Africa, rapid urbanisation, changing food environments, and persistent micronutrient deficiencies create comparable challenges. However, differences in agricultural production capacity and regional trade policies influence the scope and nature of interventions (Popkin et al. 2020). Cross-regional learning from these contexts, particularly in areas such as community-based agriculture, culturally tailored nutrition education, and regional trade negotiations could inform more resilient, context-specific solutions for the Caribbean.

The Caribbean is at a critical juncture in its fight against childhood malnutrition. Once dominated by undernutrition and micronutrient deficiencies, the region now faces a dual crisis: the persistence of stunting, anaemia, and food insecurity alongside an accelerating epidemic of childhood overweight and obesity. This double burden of malnutrition, rooted in socioeconomic inequality, food system vulnerabilities, shifting cultural norms, and external factors such as changes occurring in their large neighbour, the United States, demands an urgent, flexible, and coordinated response.

While policy frameworks such as the Port-of-Spain Declaration and national school nutrition strategies signal growing political commitment, their impact has been uneven. Many promising interventions such as SSB taxes, fortified staple foods, and school-based programmes remain underfunded, inconsistently enforced, or disconnected from wider systems of health and education.

A successful regional response requires more than individual interventions. It requires an integrated approach

grounded in equity, informed by evidence, and supported by good governance. Strengthening nutritional surveillance, investing in locally led research, and building resilient public health systems will be critical to closing data gaps and scaling effective practices. Financial and technical sustainability must be given paramount importance, with a particular emphasis on the latter. Technical sustainability relies on broad-based capacity building; however, this is often undermined by donor practices. Rather than implementing activities themselves or through NGOs, donors should prioritise strengthening governments and their institutions, through long-term investment and support. At the same time, tackling the root causes of malnutrition — poverty, poor diets, sedentary lifestyles, and food system inequalities — must be prioritised through multisectoral action.

By embracing these priorities, Caribbean nations have the opportunity not only to reverse current trends but to create healthier, more equitable futures for their children. The time for incremental progress has passed; what is now required is bold, sustained, and regionally unified action.

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The conceptualisation, study design, writing, review, and editing of the manuscript for important intellectual content was done by SIRO. The literature search, synthesis, and drafting of the original manuscript were undertaken by KB. Both authors read and approved the final version of the revised paper and gave consent for its submission and publication.

CONFLICT OF INTEREST

The authors are volunteers working with the journal but played no part in deciding on whether the manuscript would be accepted. It was peer reviewed and edited independently.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN SCIENTIFIC WRITING

The authors declare that no generative AI or AI-assisted technologies were used in the writing, editing, data analysis, or production of this manuscript, unless explicitly acknowledged otherwise. Where AI tools were used, such usage was limited to language refinement and formatting assistance under the direct oversight of the authors, who retain full responsibility for the content and integrity of the manuscript.

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