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Ultra Processed Food Consumption and Chronic Disease Risks: An Interdisciplinary Review

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ABSTRACT: Ultra processed food (UPF) consumption has become a growing public health concern globally due to its association with adverse metabolic outcomes. This narrative review aims to synthesize current evidence regarding the impact of UPF consumption on metabolic health, including obesity, metabolic syndrome, insulin resistance, liver dysfunction, cardiovascular risk, and mental health implications. A structured literature search was conducted using PubMed, Scopus, and Google Scholar databases, incorporating peer reviewed articles published within the last decade. The review included observational studies, systematic reviews, and meta analyses examining UPF consumption and its metabolic effects. Findings reveal that high UPF intake is significantly linked to increased body mass index, waist circumference, and metabolic syndrome components, beginning from childhood. Evidence also points to an elevated risk of type 2 diabetes, non-alcoholic fatty liver disease, and cardiovascular events in populations with high UPF exposure. Psychosocial outcomes, particularly depression and anxiety, are notably higher among frequent UPF consumers. These effects are exacerbated by structural determinants such as food marketing, urban food deserts, and economic barriers. Policy interventions in countries like Mexico and Brazil have shown effectiveness through labeling laws and dietary guidelines aimed at reducing UPF consumption. Overall, reducing UPF intake through policy, education, and reformulation is essential for improving global metabolic health. Future research should address existing gaps with longitudinal, culturally sensitive, and multi sectoral approaches to inform sustainable dietary interventions.

Keywords: Ultra Processed Foods, Metabolic Health, Non Communicable Diseases, Obesity Prevention, Nutrition Policy, Dietary Behavior, Public Health Interventions.

INTRODUCTION

The consumption of ultra processed foods (UPFs) has emerged as a pivotal public health concern worldwide. Over the past two decades, dietary patterns have significantly shifted due to globalization, urbanization, and industrial food production, leading to increased intake of UPFs

across populations. These foods, typically high in added sugars, unhealthy fats, and synthetic additives, are designed for convenience, extended shelf life, and enhanced palatability, often at the expense of nutritional quality. Mounting evidence has linked UPF consumption with adverse metabolic health outcomes, including obesity, insulin resistance, and cardiovascular diseases. In middle income nations, such as Colombia and Brazil, the escalation of UPF consumption has been thoroughly documented. Cediel et al. (2024) reported an upward trend in diet related chronic diseases, supported by national nutritional surveys, while Oliveira et al. (2024) observed a sharp increase in UPF intake during the COVID 19 pandemic in vulnerable regions like the Brazilian Amazon (Cediel et al., 2024; G. Â. L. Oliveira et al., 2024).

These developments align with broader global trends identified in systematic reviews. Araújo et al. (2021) highlighted how UPF consumption accelerates during nutritional transitions, particularly in developing nations (Araújo et al., 2021). Studies conducted in Brazil and Korea further affirm this trend. Barbosa et al. (2023) and Shim et al. (2021) underscored the health implications of UPF heavy diets, particularly in connection to metabolic syndrome(Barbosa et al., 2023; Shim et al., 2021). In Korea, Kim et al. (2023) found a significant correlation between UPF consumption and metabolic syndrome prevalence, emphasizing the vital role dietary patterns play in shaping long term health outcomes (Kim et al., 2023).

The defining characteristic of UPFs lies in their nutritional composition. These food products are often devoid of whole food content and are engineered to be energy dense but nutritionally deficient. Maluf et al. (2022) and Gibney (2019) noted that UPFs are typically low in fiber, essential vitamins, and minerals, while being high in sugars and fats, which substantially increases the risk of diet related diseases such as obesity and type 2 diabetes (Gibney, 2019; Maluf et al., 2022). Monda et al. (2024) reinforced this view, highlighting the excessive caloric content of these products and their potential role in metabolic dysregulation (Monda et al., 2024).

Conversely, minimally processed foods retain much of their original nutritional value and are rich in vital nutrients necessary for metabolic health. These include fruits, vegetables, whole grains, and legumes, all known for their role in preventing non communicable diseases. Oliveira et al. (2024) emphasized the health promoting qualities of these foods and the importance of dietary patterns favoring natural and minimally processed products (G. Â. L. Oliveira et al., 2024). This contrast underscores the critical need for health interventions that discourage UPF consumption and encourage diets based on whole foods.

A growing body of literature consistently associates high UPF intake with a range of chronic health issues. Fardet and Rock (2020) and Zhong et al. (2022) identified links between UPFs and the risk of developing obesity, cardiovascular diseases, and some cancers (Fardet & Rock, 2020; Zhong et al., 2022). Steele et al. (2020) discussed the behavioral and physiological mechanisms underlying these associations, including the role of UPFs in fostering overconsumption due to their hyper palatability (Steele et al., 2020). Gramza-Michałowska (2020) further argued that the addictive qualities of UPFs, coupled with their poor satiety, lead to excessive caloric intake and subsequent metabolic derangements (Gramza-Michałowska, 2020).

As dietary habits globally shift towards greater UPF consumption, the need for targeted public health strategies becomes increasingly urgent. Zupanič et al. (2019) and Abbas et al. (2024) suggested multi-pronged approaches, including enhanced food labeling, public education campaigns, and fiscal measures such as taxation on unhealthy food items (Abbas et al., 2024; Zupanič et al., 2019). These strategies aim to curb UPF consumption and promote healthier alternatives, which are essential for reversing the tide of diet related chronic diseases.

The global proliferation of UPFs has significantly altered dietary landscapes and posed challenges to achieving optimal metabolic health. Their widespread availability, aggressive marketing, and affordability have made UPFs a staple, particularly in urban areas and among low income populations. The complex interplay of nutritional content, socio economic dynamics, and consumer behavior renders the regulation of UPF consumption a formidable task. Nevertheless, understanding this dynamic is vital for informing effective policy interventions that prioritize population health and sustainable food systems.

Despite the wealth of data illustrating the adverse effects of UPFs, substantial gaps persist in the literature. Most existing studies are cross sectional, limiting the ability to infer causality regarding long term health outcomes. Scaranni et al. (2021) and Fonseca et al. (2019) highlighted the need for longitudinal studies that explore the enduring metabolic impacts of UPF consumption (Scaranni et al., 2021). Additionally, methodological limitations such as reliance on self-reported dietary data, as noted by Théodore et al. (2024) and Schmidt and Fang (2021), compromise the accuracy of findings and call for the use of more robust assessment tools (Schmidt & Fang, 2021; Théodore et al., 2024).

The objective of this narrative review is to synthesize existing empirical and theoretical literature to better understand the complex relationship between UPF consumption and metabolic health outcomes. This review aims to elucidate key patterns, explore underlying mechanisms, and identify demographic and socio economic determinants that shape UPF consumption behaviors. Furthermore, the review seeks to examine how UPFs contribute to the development of obesity, metabolic syndrome, insulin resistance, and cardiovascular conditions. By consolidating current knowledge, the review provides a comprehensive foundation for developing informed public health strategies.

The scope of this review encompasses a broad geographical and demographic spectrum, with particular attention to low and middle income countries undergoing rapid dietary transitions. These settings present a unique intersection of traditional dietary practices and increasing UPF availability, offering insight into how structural and behavioral shifts influence public health outcomes. Additionally, the review considers population groups particularly vulnerable to UPF related risks, such as children, adolescents, and socio economically disadvantaged communities. By focusing on diverse populations and settings, the review aims to present a globally relevant perspective on the metabolic consequences of UPF consumption.

METHOD

This study employed a narrative review approach to examine the relationship between ultra processed food (UPF) consumption and metabolic health outcomes. A comprehensive literature search was conducted across multiple academic databases, including PubMed, Scopus, and Google Scholar, targeting studies published from 2013 to 2024. The search strategy utilized pre-defined keyword combinations and Boolean operators to ensure both specificity and breadth of results. Keywords included "ultra processed foods," "metabolic health," "obesity," "dietary intake," "chronic diseases," "cardiovascular disease," and "type 2 diabetes," as well as search qualifiers like "systematic review," "cohort study," and "cross sectional analysis."

The selection criteria focused on peer reviewed articles, systematic reviews, and meta analyses that empirically or theoretically analyzed the metabolic consequences of UPF consumption. Eligible studies were required to investigate associations between UPF intake and specific metabolic health outcomes in human populations, including obesity, insulin resistance, metabolic syndrome, and cardiovascular conditions. Exclusion criteria eliminated studies not published in English, those lacking direct empirical evidence, non-peer reviewed publications, and research conducted on non-human subjects. Grey literature, such as theses or organizational reports, was excluded unless it provided novel methodological insights relevant to the review's objectives. The initial screening process involved reviewing titles and abstracts, followed by a full text evaluation to confirm relevance and methodological rigor.

To enhance reliability, a multi stage screening process was implemented. Four independent reviewers assessed each study for consistency with the inclusion criteria. Thematic synthesis was conducted to identify recurrent patterns in how UPF consumption impacts metabolic health outcomes. This analytical process provided insight into the complex pathways through which UPFs influence energy intake, nutrient profiles, and metabolic disease risk, ultimately contributing to a holistic understanding of their role in public health.

RESULT AND DISCUSSION

Metabolic Syndrome and Obesity

The empirical evidence linking ultra processed food (UPF) consumption to metabolic syndrome components is increasingly clear and concerning. Multiple longitudinal studies have highlighted a positive association between UPF consumption and the development of obesity, hypertension, and dyslipidemia. A notable study conducted as part of the Brazilian Longitudinal Study of Adult Health (ELSA Brasil) found that higher intake of UPFs correlates with significant increases in body weight and waist circumference over time, reinforcing the link between UPF consumption and the prevalence of obesity (Canhada et al., 2019). The study's analysis demonstrated a progressive relationship between the quantity of UPF consumed and various metabolic syndrome components, including elevated blood pressure and adverse lipid profiles.

A comprehensive meta-analysis indicated that UPF consumption is positively associated with the amount of body fat during childhood and adolescence, emphasizing the escalating risks of metabolic syndrome beginning at a young age (González et al., 2023). This is echoed by research examining Korean adults, where a significant correlation was observed between higher UPF intake and the incidence of metabolic syndrome components across various age groups (Kim et al., 2023). Moreover, a study involving children from low and middle income countries revealed that the rising availability of UPFs is associated with increased obesity rates and components of metabolic syndrome, as these foods often displace more nutritious, minimally processed options in their diet (Barbosa et al., 2023). This trend underscores the critical need for addressing UPF consumption in childhood as a predictive factor for later health challenges.

Research indicates that varying levels of UPF consumption significantly impact body mass index (BMI) and waist circumference across diverse demographic groups. For instance, a longitudinal analysis demonstrated that children with high UPF consumption had markedly higher BMI and waist circumference compared to their peers consuming minimal UPFs (Chokor et al., 2024). This supports findings that underscore the role of UPFs as energy dense foods that contribute to excess caloric intake, highlighting their direct association with increased obesity rates. In adults, a study revealed that individuals who regularly consumed UPFs showed an upward trajectory in both BMI and waist circumference, regardless of age or gender (Canhada et al., 2019). More specifically, individuals categorized in the highest quartile of UPF consumers recorded a more pronounced increase in waist circumference an important marker of visceral fat than individuals in lower consumption groups. The study suggested that the high energy density of UPFs, combined with a low satiety factor due to the lack of fiber, leads to increased consumption and therefore weight gain over time (Scaranni et al., 2021).

Additionally, large scale surveys, such as NHANES conducted in the United States, have established a correlation between the percentage of dietary energy derived from UPF consumption and the likelihood of being classified as overweight or obese. Findings indicated that adults who derived over 50% of their caloric intake from UPFs had higher BMI and waist circumference measurements, thus elevating their risk for metabolic syndrome (Neri et al., 2019). Differences across demographic groups are noteworthy; for instance, studies show that children and adolescents exhibit a more significant impact on their BMI from UPF consumption compared to adults, likely due to the developmental context of their diets and relative physical activity levels (Fardet & Rock, 2020). Consequently, interventions aimed at reducing UPF intake could vastly improve dietary quality and reduce the prevalence of obesity related health issues among susceptible populations.

Insulin Resistance and Liver Health

The relationship between ultra processed food (UPF) intake and the prevalence of insulin resistance and type 2 diabetes has been increasingly substantiated by various studies across different populations. Empirical evidence suggests that higher consumption of UPFs is positively associated with the development of insulin resistance and type 2 diabetes in both children and adults. A systematic review addressing non communicable diseases demonstrated that diets high in UPFs correlate significantly with increased risks of developing insulin resistance and type 2

diabetes (Araújo et al., 2021). Notably, UPFs often contain high levels of added sugars and unhealthy fats, which are critical contributors to insulin resistance (Lee et al., 2024). In children, a study utilizing data from the National Health and Nutrition Examination Survey (NHANES) from 2009 to 2014 revealed that a higher percentage of caloric intake from UPFs was linked to increased prevalence rates of obesity and insulin resistance among adolescents. The study reported that excessive intake of added sugars and refined carbohydrates from UPFs was significantly associated with elevated insulin resistance metrics (Neri et al., 2019). Furthermore, a cross sectional analysis in Brazil highlighted that adolescents consuming UPFs were more likely to meet the diagnostic criteria for insulin resistance compared to their peers consuming fewer UPFs (Srour et al., 2019).

Adults are also affected by these detrimental effects. A study involving adult cohorts illustrated that high UPF consumption increased the likelihood of developing type 2 diabetes by a significant margin compared to those with lower UPF consumption (Gering et al., 2024). This effect was attributed to the energy density and high glycemic index of many UPFs, which not only contribute to weight gain but also interfere with normal glucose metabolism (Kim et al., 2023). Longitudinal outcomes further indicate that individuals who maintain high UPF diets exhibit worsening insulin sensitivity over time, raising significant public health concerns (Ruiz-Roso et al., 2020).

Ultra processed food consumption significantly influences the development and severity of non-alcoholic fatty liver disease (NAFLD) and metabolic dysfunction associated steatotic liver disease (MASLD). These dietary patterns are characterized by high levels of added sugars, trans fats, and refined carbohydrates all associated with fatty liver accumulation (Araújo et al., 2021). Recent research supporting this association found that higher UPF intake was correlated with an increased prevalence of NAFLD among adults and children, indicating a concerning trend in liver health correlated with dietary behaviors (Lane et al., 2022). A study analyzing dietary patterns across different countries found that participants with the highest UPF intake exhibited higher levels of liver fat and associated metabolic disturbances, even in the absence of significant alcohol consumption (Maluf et al., 2022). The mechanisms behind this association may include increased liver fat deposition due to excessive fructose intake, often found in sugar sweetened beverages, a common component of UPF diets (Lee et al., 2024). Fructose, when consumed in excess, directly contributes to lipogenesis (fat creation) in the liver, leading to increased risks of NAFLD and subsequent liver complications (Juul et al., 2021).

Furthermore, a longitudinal cohort study tracked the dietary habits of participants over several years and observed that those with consistent UPF consumption experienced a greater increase in liver fat percentage compared to those adhering to more naturally processed foods (Lorek et al., 2025). This study highlights that the severity of NAFLD is exacerbated not only by the quantity but also by the quality of dietary fats consumed through UPFs. Importantly, socio economic factors also play a role in UPF consumption and resulting health outcomes. Research has shown that lower socio economic status communities often have higher access to and consumption rates of UPFs, correlating with poorer liver health outcomes and increased prevalence of MASLD (Romaguera et al., 2021). The intersection of socio economic status and dietary patterns necessitates comprehensive public health strategies aimed at improving access to healthier food options and reducing reliance on UPFs in vulnerable populations.

Cardiovascular Risk Factors

A high intake of ultra processed foods (UPFs) has been shown to negatively impact several cardiovascular risk factors, including lipid profiles, blood pressure, and markers of inflammation. Studies indicate that diets rich in UPFs are associated with increased levels of low density lipoprotein (LDL) cholesterol and triglycerides, as well as decreased high density lipoprotein (HDL) cholesterol (Srour et al., 2019). Research conducted as part of the NutriNet Santé cohort demonstrated that individuals with higher UPF consumption had poorer lipid profiles, as reflected by elevated lipid levels that substantially elevate cardiovascular disease (CVD) risk. Moreover, UPFs are typically high in calories and often rich in added sugars, unhealthy fats, and salt, components linked to elevated blood pressure. A longitudinal analysis within the ELSA Brasil study indicated that participants with higher UPF consumption had significantly higher systolic and diastolic blood pressure readings over time (Canhada et al., 2022). These findings align with evidence suggesting that the high sodium content found in many UPFs exacerbates hypertension, putting individuals at greater risk for developing cardiovascular related complications.

Inflammatory markers serve as critical indicators of cardiovascular risk. A study observed that higher UPF intake correlated with elevated C reactive protein (CRP) levels, a well known inflammatory marker associated with cardiovascular events (Dinu et al., 2022). The systemic inflammatory response provoked by the ingestion of low nutrient density foods, combined with obesity and metabolic syndrome, increases the likelihood of endothelial dysfunction an early stage in cardiovascular disease progression (Neri et al., 2019). Overall, the consumption of UPFs has been demonstrated to worsen metabolic health on multiple fronts, including blood pressure and inflammation.

There is an expanding body of longitudinal studies illustrating a dose response relationship between UPF consumption and cardiovascular events. One key study by Qu et al., which included over 1.1 million participants, demonstrated a significant increase in cardiovascular events correlated with higher UPF intake (Qu et al., 2024). The analysis showed that for each additional serving of UPFs consumed per day, there was an associated increase in the risk of both non-fatal cardiovascular events and coronary heart disease (CHD). This systematic review and meta-analysis highlighted a clear gradient, reinforcing the notion that even moderate increases in UPF consumption could lead to substantial health impacts over time. Additionally, a longitudinal study involving Portuguese and Brazilian cohorts reported that increased UPF consumption was linked with a higher incidence of cardiovascular disease over a ten year follow up period (Juul et al., 2021). This research utilized rigorous statistical modeling to demonstrate how consistent high UPF intake led to a significant increase in events such as heart attacks and strokes. Importantly, these findings emphasize that reducing UPF intake can be a powerful strategy for lowering cardiovascular disease risk and enhancing overall health outcomes.

Psychosocial and Mental Health Outcomes

The relationship between ultra processed food (UPF) consumption and mental health disorders such as depression and anxiety has gained increasing attention in recent research. Numerous studies have explored this association, revealing critical insights into how dietary patterns involving

UPFs may contribute to the onset or exacerbation of mental health issues. A noteworthy study by Yuan et al. investigated the associations of UPF intake and its circulating metabolomic signature with mental disorders among 30,059 participants in the UK Biobank. The findings highlighted that higher UPF consumption correlated significantly with increased prevalence of depressive symptoms, suggesting that dietary choices can significantly affect psychological well-being.

Another important study conducted by Pires et al. analyzed the intensity of UPF consumption and its association with mental health during the COVID 19 pandemic. This retrospective analysis found significant links between higher UPF intake and increased levels of psychosocial stress, anxiety, and depressive symptoms in a Brazilian population. Participants reported using UPFs as coping mechanisms during stressful times, illustrating how dietary patterns can interplay with mental health in times of crisis. Additionally, the work of Wiss and Lafata directly addresses the implications of UPF consumption concerning food addiction and the potential for mental health disorders. Their study emphasizes how the high palatability and low nutrient density of UPFs could lead to compulsive eating behaviors, ultimately fostering emotional distress and leading to conditions such as depression and anxiety. This association underscores the complex mechanisms through which UPF consumption may enhance vulnerability to mental health challenges.

Research indicates significant differences in psychosocial outcomes based on both the type and frequency of UPF intake. For instance, certain types of UPFs, such as sugary beverages and snacks, are particularly associated with a more pronounced negative impact on mental health compared to less processed foods. A study conducted by Lane et al. highlighted that the consumption of energy dense UPFs was linked to significantly poorer quality of life and higher insomnia rates among adolescents, indicating that the frequency of high UPF intake may exacerbate psychosocial issues. Furthermore, the frequency of consumption plays a crucial role. Studies have shown that individuals who consume UPFs frequently report more depressive symptoms and greater anxiety than those who consume them less frequently. For example, a cross sectional study among university students illustrated that regular UPF consumers experienced higher levels of anxiety and depressive symptoms compared to those with lower or irregular consumption patterns. This suggests a potential dose response relationship, where increased frequency correlates with increased severity of psychosocial distress.

A systematic review by Araújo et al. positioned UPF consumption against the backdrop of non-communicable diseases, including mental health. This review indicated that high frequencies of UPF intake correlate not only with poorer mental health outcomes but also with higher rates of obesity and cardiometabolic disorders, which can further complicate mental health conditions such as anxiety and depression. The distinction between the types of UPFs consumed is relevant; studies suggest that individuals who frequently consume sugary or salty UPFs, as opposed to those consuming whole grain or fiber enriched UPFs, report worse mental health outcomes. The psychological burden linked to dietary patterns involving heavy reliance on sugary drinks and snacks demonstrates how critically intertwined our food choices can be with our mental health. In summary, the literature highlights significant associations between UPF consumption and mental health disorders, with variations based on the type and frequency of consumption. These studies emphasize the need for targeted public health interventions aimed at reducing UPF intake to ameliorate mental health outcomes in vulnerable populations.

The findings from this review indicate a consistent and significant relationship between ultra processed food (UPF) consumption and a wide range of adverse metabolic health outcomes. These associations, however, are not evenly distributed across global populations. The risks associated with UPF consumption are exacerbated by socio economic disparities and modulated by national health policies. In high income countries such as France and the United States, strong associations between UPF intake and metabolic diseases have been demonstrated through well-established cohort studies (Araújo et al., 2021; Srour et al., 2019). Yet these populations often benefit from better healthcare access, consumer awareness, and policy driven interventions that can buffer against dietary risks.

In contrast, in low and middle income countries like Brazil and Malawi, where UPF consumption is rising, the health risks are compounded by structural inequities. In Brazil, Canhada et al. (2019) emphasized the vulnerability of low income communities that face food insecurity and limited access to nutritious foods (Canhada et al., 2019). Here, UPFs often replace traditional diets and become staples, driven by economic constraints and lack of regulatory oversight. National policies play a pivotal role in shaping dietary environments. For example, countries like Mexico and Colombia have implemented robust policy frameworks, including marketing restrictions and front of package labels, to curb UPF consumption and mitigate associated health risks (Cediel et al., 2024). Such measures highlight the importance of policy action in controlling dietary behaviors and preventing chronic disease.

Marketing strategies and food environments are systemic drivers of UPF consumption. Aggressive advertising campaigns by food industries, especially those targeting children and adolescents, significantly influence dietary choices (Petridi et al., 2023; Slater, 2018). These campaigns exploit behavioral vulnerabilities, promoting UPFs as convenient and desirable. The food environments in urban and economically disadvantaged areas often lack access to fresh, affordable produce, contributing to a reliance on shelf stable, calorie dense UPFs (Lorek et al., 2025). This phenomenon is widely observed in urban food deserts across North America, Latin America, and parts of Africa, where local availability heavily dictates dietary patterns.

The affordability of UPFs further entrenches their dominance in low income settings. Studies from Malawi and Canada show that economic constraints consistently drive consumers to select cheaper, high calorie options over nutrient dense alternatives (Kamanga et al., 2024; Woods et al., 2023). This reinforces the link between socio economic status and poor dietary quality. Additionally, systemic inequalities, such as lack of nutrition education and inadequate healthcare infrastructure, limit the ability of individuals and families to make informed and health promoting food choices. Pereira et al. (2023) noted that addressing these structural factors is essential for reducing dietary inequalities (Pereira et al., 2023).

The implications of these findings for public health policy are profound. Regulatory strategies aimed at reducing UPF consumption must be multifaceted. Marketing regulations, especially those targeting children, have shown effectiveness in reducing demand for unhealthy products. Countries with strict marketing controls, like the Nordic nations, report reduced UPF intake among children and adolescents (Paiva et al., 2023). Food labeling reforms, such as Mexico's front

of package warning labels, empower consumers with critical information, encouraging healthier choices and lowering sales of high sugar, high fat items (N. Oliveira & Canella, 2022).

Fiscal tools, such as taxes on sugary beverages and UPFs, offer another avenue for intervention. Evidence from Chile and the UK demonstrates that such taxes can shift consumption patterns while generating revenue for public health initiatives (Zupanič et al., 2019). These strategies are particularly effective when combined with subsidies for healthier foods, thereby improving affordability and accessibility. However, successful implementation requires political will, stakeholder coordination, and public support.

Brazil provides a compelling model through its dietary guidelines that prioritize minimally processed foods and discourage UPF consumption. This approach, embedded in national nutrition policy, emphasizes food sovereignty, cultural dietary traditions, and community engagement (Cediel et al., 2024). Educational campaigns, cooking workshops, and school based interventions have further reinforced these messages, especially among children and their caregivers (Fonseca et al., 2019; Salazar et al., 2025).

Community led programs have proven to be particularly impactful. Initiatives that blend education with practical skills such as cooking demonstrations and nutrition literacy workshops enhance awareness and shift food preferences. These grassroots strategies can be particularly effective in low resource settings, where large scale policy interventions may be harder to implement. They build trust and agency within communities, enabling sustainable dietary improvements over time.

Beyond community and consumer focused interventions, reformulating food products presents an opportunity for industry collaboration. Partnerships between governments and food producers can incentivize the development of healthier, lower sugar, and lower fat alternatives. Encouraging such reformulations through recognition programs, subsidies, or procurement policies can help reshape the food supply toward healthier norms (Neri et al., 2019; Zupanič et al., 2019).

Ultimately, addressing the systemic drivers of UPF consumption requires a coordinated and comprehensive approach. Combining policy, education, regulation, and community engagement is essential for shifting consumption patterns. The burden of diet related chronic diseases can be reduced by tackling root causes such as economic inequality, information asymmetry, and food system imbalances. The success of such strategies will depend on sustained efforts across sectors and levels of governance, from international health organizations to local communities.

Limitation

This review is subject to several limitations that warrant careful consideration. First, the reliance on narrative synthesis may introduce subjectivity in the interpretation of the literature, as opposed to systematic or meta analytic approaches that offer more quantitative precision. Additionally, the heterogeneity in study designs, populations, and outcome measurements across the included research limits the generalizability of findings. The review also focuses primarily on peer reviewed literature published in English, which may exclude relevant studies from non-English speaking regions, potentially introducing publication and language bias. Moreover, while a thematic

approach was used to identify consistent patterns, causal relationships cannot be firmly established due to the observational nature of many of the studies reviewed.

Implication

The limitations outlined above highlight the need for future research to adopt more rigorous and standardized methodologies, including longitudinal and experimental study designs. Future investigations should aim to include diverse populations across socio economic and cultural contexts to better understand differential vulnerabilities to UPF related health risks. There is also a need for improved dietary assessment tools that minimize recall bias and allow for accurate quantification of UPF intake. Furthermore, more research is needed to examine the long term psychological and behavioral consequences of UPF consumption, including potential addictive patterns. Finally, interdisciplinary studies that bridge nutrition science, public policy, and behavioral economics could provide more holistic insights and inform comprehensive public health strategies to mitigate the global rise in UPF consumption.

CONCLUSION

This review has demonstrated a compelling and multidimensional link between ultra processed food (UPF) consumption and adverse metabolic health outcomes, including obesity, metabolic syndrome, insulin resistance, non-alcoholic fatty liver disease, cardiovascular risk factors, and mental health issues. The findings consolidate growing evidence that UPFs, due to their energy dense composition and poor nutritional profile, are key contributors to the global burden of diet related chronic diseases. These risks are further intensified among socio economically disadvantaged populations, where access to minimally processed and nutritious foods is often limited.

The discussion underscores the systemic and structural determinants of high UPF consumption, notably aggressive marketing strategies, inadequate food environments, and economic inequities. These factors highlight the urgent need for integrated and evidence based policy responses. Effective measures include regulating UPF marketing, implementing taxation on unhealthy food items, and enhancing access to whole foods through subsidies and educational campaigns. Countries like Mexico and Brazil exemplify how front of package labeling and culturally contextual dietary guidelines can shift consumption patterns.

Future research should prioritize longitudinal studies, culturally inclusive approaches, and refined dietary assessments to address current knowledge gaps. Furthermore, interdisciplinary collaborations can strengthen the evidence base needed to inform comprehensive strategies. Addressing UPF consumption must become a central focus of global health agendas, particularly in light of its long term implications for public health systems. Reducing UPF intake, especially in early life stages, should be recognized as a fundamental strategy to improve metabolic outcomes, reduce disease burdens, and promote sustainable, equitable food systems.

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