

Modern Alimentary-Dependent Diseases, Hygienic Assessment of Risk Factors

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Abstract: Modern alimentary-dependent diseases represent a major global public health challenge, driven by rapid lifestyle changes, industrial food production, urbanization, and dietary transitions. These diseases include obesity, type 2 diabetes mellitus, cardiovascular disorders, metabolic syndrome, gastrointestinal diseases, micronutrient deficiencies, and certain cancers. Poor dietary patterns, excessive consumption of ultra-processed foods, high sodium intake, low fiber consumption, and inadequate intake of fruits, vegetables, and whole grains significantly contribute to disease development. Additionally, hygienic factors such as food contamination, improper food handling, chemical residues, and microbial exposure intensify health risks. Hygienic assessment of dietary risk factors is essential for evaluating exposure pathways, estimating health impacts, and developing preventive strategies. This article systematically analyzes the etiology, classification, and epidemiology of alimentary-dependent diseases and presents a hygienic framework for risk assessment. Preventive strategies, public health interventions, and evidence-based recommendations are also discussed.

Keywords: Alimentary-dependent diseases, nutrition-related disorders, hygienic risk assessment, food safety, dietary risk factors, public health nutrition.

Introduction: Diet plays a fundamental role in human health, influencing growth, development, immune function, and disease susceptibility. Over the past decades, global dietary patterns have shifted from traditional, minimally processed diets toward energy-dense, ultra-processed foods rich in refined sugars, saturated fats, and sodium. This transition has led to a rapid rise in alimentary-dependent diseases.

According to the Global Burden of Disease (GBD) studies, unhealthy diets account for more than 11 million deaths annually worldwide, surpassing tobacco smoking as a major risk factor. High sodium intake, low consumption of fruits, vegetables, whole grains, and excessive intake of processed foods are dominant contributors to cardiovascular disease, diabetes, obesity, and cancer

Classification of Modern Alimentary-Dependent Diseases

Modern alimentary-dependent diseases (ADDs) represent a heterogeneous group of chronic and acute disorders that develop primarily due to qualitative and quantitative disturbances in nutrition, aggravated by

hygienic and environmental factors. Their classification reflects pathophysiological mechanisms, target organ systems, and risk factor profiles.

1. Metabolic Disorders

Obesity

Obesity is defined as excessive accumulation of adipose tissue resulting from chronic positive energy balance. It is strongly linked to:

- High caloric intake
- Excess refined carbohydrates
- Saturated and trans-fat consumption
- Ultra-processed foods

Pathogenesis includes:

- Insulin resistance
- Chronic low-grade inflammation
- Dysregulation of leptin and ghrelin
- Altered gut microbiota

Health consequences:

- Type 2 diabetes mellitus

- Cardiovascular diseases
- NAFLD
- Certain cancers

Type 2 Diabetes Mellitus (T2DM)

T2DM is a metabolic disorder characterized by chronic hyperglycemia caused by insulin resistance and beta-cell dysfunction.

Dietary contributors:

- High glycemic load
- Sugary beverages
- Refined starches
- Excess animal fat intake

Mechanisms:

- Impaired glucose transport
- Lipotoxicity
- Oxidative stress
- Mitochondrial dysfunction

Metabolic Syndrome

Metabolic syndrome is a cluster of interrelated conditions:

- Abdominal obesity
- Dyslipidemia
- Hypertension
- Hyperglycemia

It represents a pre-disease state that significantly increases cardiovascular risk.

2. Cardiovascular Diseases (CVDs)

CVDs remain the leading cause of mortality worldwide, with dietary factors responsible for nearly 60% of preventable cases.

Major dietary contributors:

- Excess sodium → hypertension
- Saturated fats → dyslipidemia
- Low potassium → arrhythmias
- Low fiber → endothelial dysfunction

Pathogenesis:

- Atherosclerotic plaque formation
- Endothelial damage

- Chronic inflammation
- Oxidative stress

3. Gastrointestinal Diseases

Non-Alcoholic Fatty Liver Disease (NAFLD)

NAFLD is strongly linked to:

- High fructose intake
- Obesity
- Insulin resistance

Pathophysiology:

- Hepatic lipid accumulation
- Inflammation
- Fibrosis progression
- Risk of cirrhosis

Colorectal Cancer

Dietary carcinogenesis is associated with:

- Processed meat
- Nitrosamines
- Heterocyclic amines
- Low dietary fiber

4. Nutritional Deficiency Disorders

- Iron-deficiency anemia
- Iodine deficiency disorders
- Vitamin D deficiency
- Zinc deficiency

Health effects include:

- Cognitive impairment
- Growth retardation
- Reduced immune function
- Increased infection risk

5. Toxicological and Foodborne Disorders

Chronic exposure to:

- Heavy metals (Pb, Cd, Hg, As)
- Pesticides
- Mycotoxins
- Food additives

leads to toxic accumulation, increasing cancer risk, neurological damage, and endocrine disruption.

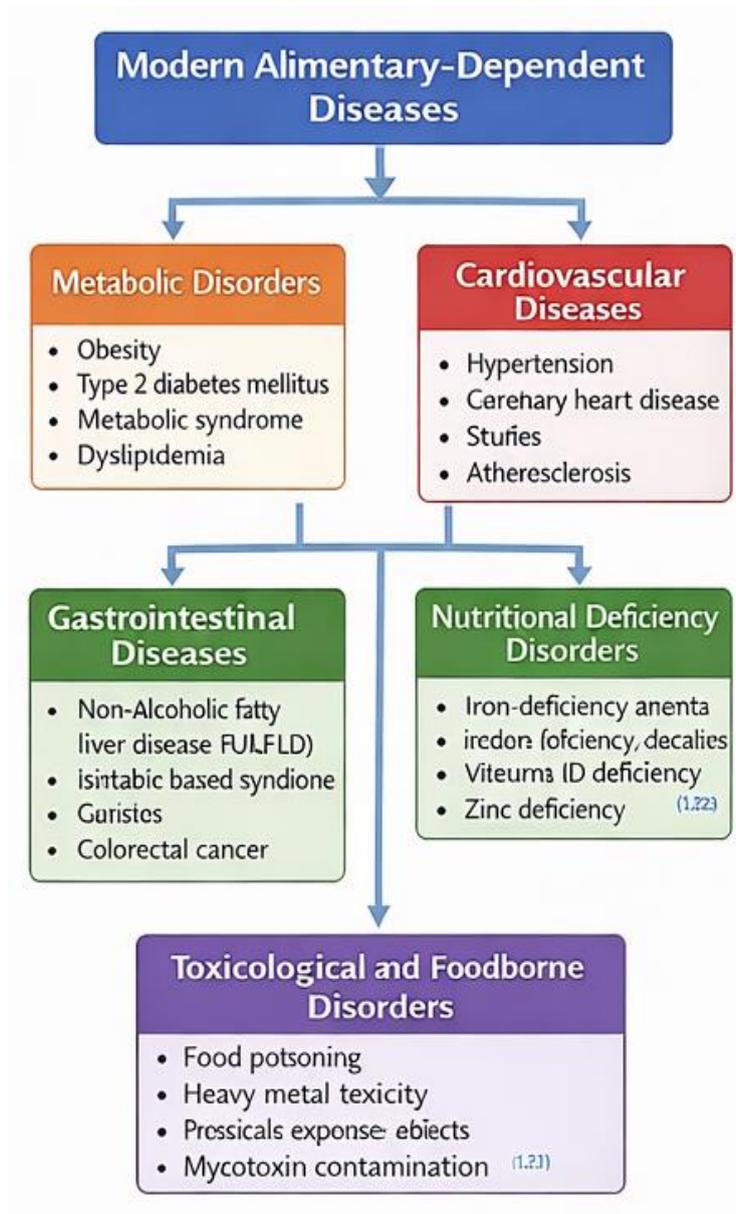


Figure 1. Classification of modern alimentary-dependent diseases

Major Dietary and Hygienic Risk Factors

1. Dietary Risk Factors

Key dietary determinants include:

- Excessive consumption of ultra-processed foods
- High sodium intake
- Low fiber intake
- Insufficient fruits and vegetables
- Excess saturated and trans fats

Ultra-processed foods have been strongly linked to obesity, diabetes, cardiovascular disease, depression, and premature mortality.

2. Hygienic Risk Factors

Hygienic determinants include:

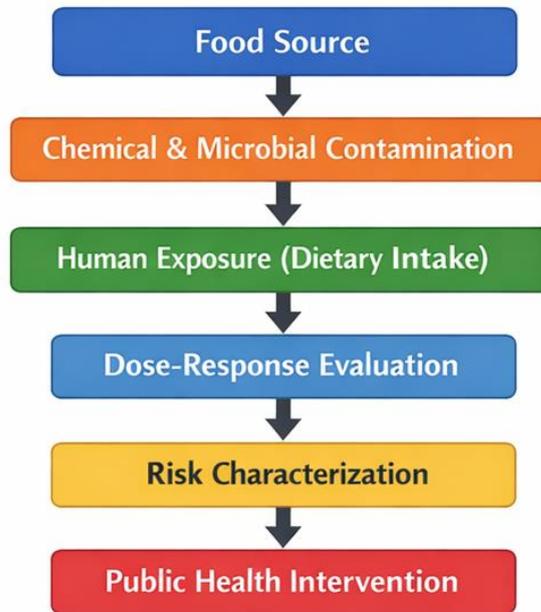
- Microbial contamination (Salmonella, E. coli, Listeria)
- Chemical contaminants (pesticides, heavy metals, food additives)
- Improper food handling and storage
- Poor sanitation and water quality

Dietary chemical exposures significantly contribute to long-term carcinogenic and non-carcinogenic risks, particularly from pesticide residues and heavy metals.

Hygienic Risk Assessment Framework

Hygienic risk assessment systematically evaluates exposure pathways and health impacts.

Hygienic Risk Assessment Process



Interaction of Dietary and Hygienic Risk Factors



Figure 2. Hygienic and dietary risk interaction

Epidemiological Evidence

Large-scale epidemiological studies confirm the association between poor diet and disease burden. In China alone, dietary risk factors caused 1.7 million deaths and 38 million DALYs in 2021, primarily from cardiovascular diseases, cancer, and diabetes.

Globally, high sodium intake, low whole-grain intake, and insufficient fruit consumption account for over 50% of diet-related mortality.

Preventive Strategies and Public Health Interventions

1. Nutritional Interventions

- Promotion of balanced diets

- Reduction of ultra-processed food intake
- Increased fiber and micronutrient consumption

2. Hygienic Measures

- Food safety monitoring systems
- Hazard Analysis and Critical Control Points (HACCP)
- Improved sanitation and hygiene education

3. Policy Measures

- Nutritional labeling
- Sodium reduction programs

- Public awareness campaigns

CONCLUSION

Modern alimentary-dependent diseases constitute one of the most significant global public health challenges of the 21st century, driven by complex interactions between dietary habits, lifestyle changes, environmental exposures, and hygienic conditions. The rapid global transition from traditional dietary patterns toward energy-dense, ultra-processed foods rich in saturated fats, refined sugars, and sodium has substantially contributed to the rising prevalence of obesity, type 2 diabetes mellitus, cardiovascular diseases, gastrointestinal disorders, and nutrition-related cancers. These pathological processes are further intensified by hygienic risk factors, including microbial contamination, chemical residues, heavy metals, mycotoxins, and inappropriate food handling practices, which collectively increase cumulative toxic load and exacerbate chronic disease development.

The findings of this review highlight that alimentary-dependent diseases are not solely the consequence of excessive caloric intake, but rather represent the outcome of multifactorial exposures involving nutritional imbalance, food safety deficiencies, environmental pollutants, and socioeconomic determinants. Hygienic risk assessment provides a robust scientific framework for identifying critical exposure pathways, quantifying health risks, and prioritizing intervention strategies. By integrating hazard identification, exposure assessment, dose-response evaluation, and risk characterization, this approach allows for comprehensive evaluation of both acute and chronic health risks associated with dietary and environmental exposures.

Preventive strategies should focus on the promotion of balanced dietary patterns, particularly those rich in whole grains, fruits, vegetables, legumes, and unsaturated fats, while simultaneously reducing the consumption of ultra-processed foods, excess sodium, trans fats, and added sugars. Strengthening food hygiene and safety systems through the implementation of Hazard Analysis and Critical Control Points (HACCP), Good Manufacturing Practices (GMP), and continuous laboratory surveillance of food contaminants is essential for minimizing exposure to biological and chemical hazards. Furthermore, public health policies aimed at food labeling, fiscal regulation of unhealthy foods, nutritional education programs, and environmental protection can significantly contribute to reducing disease burden at the population level.

Importantly, an integrated, multi-sectoral approach involving healthcare professionals, food industry

stakeholders, policymakers, and community organizations is required to effectively address the growing epidemic of alimentary-dependent diseases. Investment in preventive nutrition, hygienic control systems, and population-wide health promotion programs represents a cost-effective strategy capable of substantially decreasing healthcare expenditures, improving quality of life, and enhancing life expectancy.

In conclusion, modern alimentary-dependent diseases should be recognized as preventable conditions arising from modifiable nutritional and hygienic risk factors. Comprehensive hygienic risk assessment combined with evidence-based nutritional interventions provides a scientifically grounded pathway for mitigating disease risk, enhancing public health resilience, and achieving sustainable improvements in population health outcomes.

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