



A Fact File on

FATTY LIVER PROBLEMS IN THE DEVELOPING WORLD: IMPLICATIONS OF THE MODERN DIET



[A Joint Publication of the NAM S&T Centre and JSS Academy of Higher Education and Research, Mauritius]

FROM THE DG'S DESK

Warmest Greetings to all our Esteemed Readers!!

It gives me great pleasure to present this Fact File on **"Fatty Liver Problems in the Developing World: Implications of the Modern Diet"**, a timely publication addressing one of the most pressing and rapidly emerging public health challenges in the Global South. Once considered a relatively uncommon condition, fatty liver disease has become increasingly prevalent due to modern dietary patterns, changing food habits, rapid urbanization, sedentary lifestyles, and the growing burden of obesity, diabetes and other metabolic disorders.

Often referred to as a "Silent Disease" because it may progress without noticeable symptoms, fatty liver disease can lead to serious complications, including liver fibrosis, cirrhosis and liver cancer, if left undiagnosed and untreated.

This Fact File provides an overview of the growing burden of the disease, explains its underlying causes and progression, examines the important role of the gut-liver connection and the microbiome in maintaining liver health, discusses the challenges associated with early detection and also highlights management and treatment strategies, with particular emphasis on lifestyle modification and appropriate clinical care.

I am confident that this publication will serve as a valuable resource for enhancing awareness, encouraging early detection and timely intervention, and supporting efforts to reduce the growing burden of fatty liver disease across the developing world.

We express our sincere gratitude to **Dr. Khayati Moudgil**, Asst. Professor, Faculty of Health Sciences, School of Pharmacy, JSS Academy of Higher Education and Research, Mauritius for her valuable contributions in preparing this Fact File. We also record our appreciation for **Dr. Praveen Mohadeb**, Vice Chancellor & CEO, JSS Academy of Higher Education and Research, Mauritius for his kind support and permission to bring out this joint publication as a collaborative scientific activity between our two institutions. We believe that this Fact File will serve as an important source of knowledge for researchers, policymakers, healthcare professionals and general public in obtaining some basic understanding of this very important and yet often overlooked "lifestyle disease".

(Amitava Bandopadhyay)

1. Introduction

Fatty liver disease [currently called Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD)] is one of the most prevalent non-communicable diseases worldwide and is on the rise, particularly in developing countries. This new terminology reflects a paradigm shift in the way the disease is viewed, as being primarily driven by metabolic dysfunction rather than alcohol consumption. MASLD is diagnosed when hepatic steatosis (fat accumulation in the liver) is present and at least one cardiometabolic risk factor, such as insulin resistance, obesity, type-2 diabetes, dyslipidemia, or hypertension is present [1]. The disease can progress from simple steatosis to metabolic dysfunction-associated steatohepatitis (MASH), which is characterized by hepatocellular damage and inflammation, and may further progress to fibrosis, cirrhosis and hepatocellular carcinoma [2].

2. How Common is Fatty Liver Disease Worldwide?

The global prevalence of MASLD has increased dramatically over the past 30 years to reach approximately one in three adults worldwide. Although more common in high-income countries, developing countries are currently experiencing the fastest growth in the disease burden. This is primarily due to urbanization, industrialization and economic changes that have radically altered dietary habits and behaviors [3]. Asia, Africa and small island developing countries are particularly vulnerable as they are now suffering from both communicable diseases and non-communicable diseases, putting additional burden on healthcare systems. An important and often overlooked and under-discussed aspect of MASLD is the so-called "lean MASLD" (fatty liver disease in individuals with normal body weight). Despite the belief that

fatty liver disease is always associated with obesity, many people in developing countries have normal body mass index yet have metabolic abnormalities, such as visceral adiposity and insulin resistance [4]. This condition is most common in South Asian and African populations where genetic predisposition and body fat distribution differ from those of Western populations. Thus, BMI alone may lead to under-diagnosis and a comprehensive metabolic risk assessment needs to be performed. The rapid development of MASLD in developing countries is strongly associated with the nutritional transition, which involves a shift from the traditional diets to the Western diets rich in ultra-processed foods (UPFs). Traditional diets consisting of whole grains, legumes, fruits and vegetables are being replaced by energy-dense foods high in refined sugars, saturated fats, trans fats and additives. These dietary shifts are further exacerbated because urban lifestyles and sedentary employment are reducing overall physical activity. The Western diet is dominated by refined sugars, saturated fats and ultra-processed foods, whereas Mediterranean diet emphasizes on vegetables, fruits, legumes, whole grains and healthy fats.



Figure 1: Comparison of Mediterranean and Western Dietary Patterns

Adapted from: Finicelli M, et al. The Mediterranean Diet: An Update of the Clinical Trials. *Nutrients*. 2022;14(14):2956
Source: Finicelli M, et al. *Nutrients*. 2022;14(14):2956. doi:10.3390/nu14142956

3. How Does Fatty Liver Develop?

Ultra-processed foods are central to the pathogenesis of MASLD. These foods offer convenience and palatability but are nutrient-poor, lacking fiber and essential micronutrients and have been shown to increase caloric intake, weight gain, and metabolic disorders. High consumption of UPFs has been associated with fat accumulation in the liver [5]. A crucial component is fructose in the form of high-fructose corn syrup and added sugars. In the liver, fructose metabolism bypasses normal regulatory pathways and promotes de novo lipogenesis. As a result, triglycerides accumulate in hepatocytes, which is a marker of fatty liver disease [6].

4. The Gut-Liver Connection and Microbiome

Apart from fat accumulation, the modern diet also impacts the gut-liver axis. A low-fiber diet and the increased consumption of processed foods containing additives disrupt the gut microbiota, resulting in dysbiosis (an imbalance in gut bacteria). This weakens the intestinal barrier and increases intestinal permeability, allowing endotoxins such as lipopolysaccharides to enter the portal circulation. Once in the liver, these endotoxins activate inflammatory pathways, leading to hepatocellular injury and the

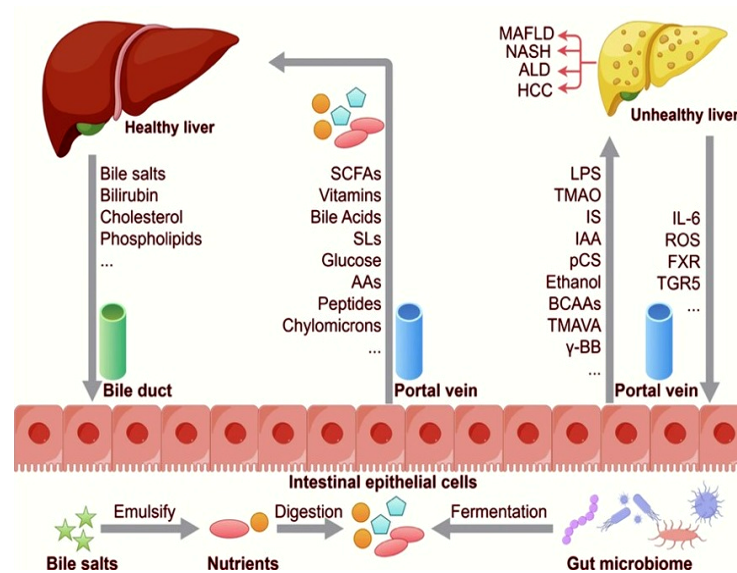


Figure 2: Gut-Liver Crosstalk and its Role in MASLD Progression

Source: Che, H., Gao, Y., Xu, Y. et al. Organ cross-talk: molecular mechanisms, biological functions, and therapeutic interventions for diseases. *Sig Transduct Target Ther* 11, 8 (2026). <https://doi.org/10.1038/s41392-025-02329-1>

progression from simple steatosis to steatohepatitis [7]. This interaction among diet, gut microbiota, and liver inflammation is central to the development of MASLD. Insulin resistance is the key link to hepatic disease. In insulin-resistant states, adipose tissue releases an increased amount of fatty acids into the circulation, which are subsequently taken-up by the liver. This influx of fatty acids, together with increased lipid synthesis and impaired lipid export, results in excessive fat in liver cells. Furthermore, oxidative stress and mitochondrial dysfunction contribute to liver injury, hepatic fibrosis, and disease progression [2]. Figure 2 illustrates bi-directional communication between the gut and the liver, showing how dietary disruption triggers inflammatory signals that drive liver damage.

5. Why is Fatty Liver Hard to Detect?

Despite the growing prevalence of MASLD, early detection remains a major challenge in developing countries. Early stages of the disease are often asymptomatic, and the liver function tests may not accurately reflect the disease's severity. Even in patients with advanced fibrosis, liver enzyme levels may remain normal or only mildly elevated, placing them at risk of remaining undetected or undiagnosed. Non-invasive tools for assessing liver fat and fibrosis, such as transient elastography (FibroScan) and imaging procedures such as ultrasound are very useful; however, the availability of these tools remains limited in resource-constrained settings [4]. Figure 3 illustrates liver elastography, which is the most commonly used method for measuring liver stiffness and fibrosis.



Figure 3: The Examination Procedure for Liver Elastography (FibroScan)

Source: Dietrich CF, et al. EFSUMB Guidelines on Interventional Ultrasound. *Ultraschall Med.* 2017;38(4):e1–e15.

6. Management and Treatment Strategies

Most of the MASLD management involves lifestyle modification because of the limited availability and high cost of pharmacological treatments in developing countries. Diet is the crux of therapy, with emphasis on reducing excessive intake of highly processed foods with added sugars and promoting consumption of whole, nutrient-dense foods. Eating fruits, vegetables, whole grains, nuts and healthy fats has a lot of beneficial effects on liver fat and metabolic well-being [8]. The Mediterranean diet, in particular, is known to decrease hepatic steatosis and increase insulin sensitivity. Physical activity is also important in MASLD management. Regular aerobic exercise improves insulin sensitivity and can boost weight loss, while resistance training increases muscle mass and improves glucose metabolism. Even a modest weight reduction of 7-10% has been shown to improve liver histology and may reverse early fibrosis [1]. Such lifestyle interventions are not only for individuals with obesity but also for those with lean MASLD.

Key Facts at a Glance

- *MASLD affects approximately 1 in 3 adults globally and is one of the fastest-growing liver conditions worldwide.*
- *It is often silent - most people have no symptoms in the early stages, making it easy to miss without testing.*
- *It can occur in non-obese individuals - known as “lean MASLD” - especially in South Asian and African populations.*
- *Strongly linked to ultra-processed foods, sugary drinks, and diets high in refined sugars and saturated fats.*
- *Reversible in early stages - lifestyle changes such as improved diet and regular physical activity can significantly reduce liver fat.*
- *If untreated, it can progress to serious liver damage, including cirrhosis (severe scarring) and liver cancer.*

7. References

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