

NAFLD Distribution

Subjects: Health Care Sciences & Services | Gastroenterology & Hepatology

Contributor: Juan Manuel Pericas

Non-alcoholic fatty liver disease (NAFLD) is considered the liver manifestation of metabolic syndrome. Nowadays, its prevalence is 25% worldwide and it is projected to reach the 30% in 2030, making NAFLD an important public health issue. NAFLD prevalence can vary according to the region and the social group under study. In fact, NAFLD distribution shows large inequalities by social group: Males have higher NAFLD prevalence, although if only postmenopausal women are taken into account, the prevalence is similar between genders. In the US, the Hispanic population has the highest NAFLD prevalence and African-American the lowest. Finally, higher NAFLD prevalence has been found among individuals with lower socioeconomic positions and food-insecure households.

Keywords: non-alcoholic fatty liver disease ; health inequalities

1. Introduction

Non-alcoholic fatty liver disease (NAFLD) is considered the liver manifestation of metabolic syndrome ^[1]. Nowadays NAFLD worldwide prevalence is 25% ^[2], although its distribution can differ according to the region and the social group under study. Overall, Europe has an average NAFLD prevalence of 23.5%^[2], in the US is estimated to be 24.5%^[2]; in South America, a 30.45% ^[2]; Asia a 25% of prevalence ^[3], and Africa an estimated prevalence of a 13% ^[3].

As well as other metabolic diseases, such as obesity and diabetes, NAFLD prevalence is progressively increasing: it is projected to reach 30% of prevalence among the adult population in 2030 ^[4]. The increasing prevalence, as well as the derived clinical and economic burden, makes the NAFLD an important public health issue that needs to be addressed through the development of accurate diagnostics, effective treatments, and the implementation of preventive methods for high NAFLD risk individuals ^[3].

2. Gender/Sex

In the general population, NAFLD is more prevalent among men than women ^{[5][6][7]}. Specifically, in China, there is a NAFLD prevalence of 26.5% in men and 20.1% in women ^[6], and among US citizens, men comprise 58% of the total population with NAFLD ^[5]. However, this prevalence disparity is not conserved when models are adjusted for body mass index and age. Among lean or non-overweight populations, women seem to have a higher prevalence than men ^[8], while when only postmenopausal women are taken into account, NAFLD prevalence seems to be the same between males and females ^{[7][9]}. Additionally, men tend to have a NAFLD onset sooner than women. Younger men (≤ 45 years) have a higher prevalence than older men (30% vs. 24%) ^[6]. Conversely, women have a higher prevalence at an older age. In the Chinese population, women aged less than 45 years have a lower prevalence of NAFLD compared to women aged more than 45 years (15% vs. 22.8%) ^[6], and in the US population, elderly females are more likely to have NAFLD than younger females (28–14%) ^[10]. Further, it has also been described that increased age is associated with a decreased risk of having NAFLD in men (OR 0.87) and increased risk in women (OR 1.22) ^[6].

Therefore, although NAFLD seems to affect more males than females, age and menopausal status play an important role in sex inequalities in NAFLD prevalence. Moreover, even though several studies refer to this SDH as gender, the analyses are based on biological sex (male vs. female) only.

3. Ethnicity/Race

The exact prevalence of ethnicity differs according to the methodology employed and the population investigated. Overall, the prevalence of NAFLD appears to be higher among Hispanics, followed by non-Hispanic Whites and Asians, and lastly, African Americans in the US population ^{[5][9][11][12]}. Furthermore, this ethnic disparity has also been observed in hospitalized patients ^[13] and lean-NAFLD patients ^[8].

In the US population, NAFLD prevalence is higher in Mexican-Americans (21.2%) followed by non-Hispanic Whites (12.5%), and lower in African Americans (11.6%) [11]. Even so, a recent prospective study suggests that NAFLD prevalence among the Hispanic population might be much higher (40%) [7][9]. Additionally, Hispanic ethnicity is a risk factor to develop NAFLD [8][14], whereas African Americans have lower odds to develop fatty liver disease (OR 2.03 vs. 0.42) [14].

In addition, there are substantial differences in the mean age of NAFLD onset by race. Although it seems that Mexican Americans have an earlier NAFLD onset (36.7 years) [11], it is not clear whether African Americans or non-Hispanic Whites have the latest onset. Schneider et al. observed that the mean age for Non-Hispanic Whites is 43.1 years, while the mean age for African Americans is 39.5 years [11]. Another study suggested that African Americans with NAFLD were significantly older than other racial or ethnic groups [12].

Although Hispanic ethnicity has the highest NAFLD prevalence, Japanese Americans have a greater susceptibility to intra-abdominal adiposity, which is a risk factor for NAFLD [7]. Even though Hispanics have a higher visceral fat mass, once the total mass is accounted for, their visceral fat mass proportion is similar to that of Whites [7]. There are also differences in liver enzymes such as aspartate and alanine transaminases levels, which are used as NAFLD biomarkers. Although AST and ALT levels are the highest among Hispanics, African Americans have significantly higher mean AST levels compared to non-Hispanic Whites [11]. Hence, although the adiposity body distribution and AST/ALT levels differ between ethnicities, they do not follow the same prevalence pattern as NAFLD.

Hispanics appeared to have a higher NAFLD prevalence, a sooner onset, and a worse metabolic profile than other ethnicities. Of note, all the studies that analyze ethnic disparities were performed among the US population.

4. Socioeconomic Position/ Status

Overall, NAFLD prevalence seems to be higher among individuals with lower socioeconomic position in Western countries [14][15]. However, data coming from Eastern countries is not so consistent [16][17]. A study conducted in South Korea found that people with a low socioeconomic status have a significantly higher risk of developing NAFLD (OR 1.7) [17]. A Chinese study also found that people with a higher median income had a 1.96 higher risk of developing NAFLD than the low-income population [16]. However, this study had a notable selection bias that limits external validity [16].

In the field of NAFLD, the socioeconomic position has been particularly studied by addressing how it relates to food insecurity and the limited or uncertain access to nutritionally adequate and safe foods [14][15]. Approximately 29% of US adults in low-income households with NAFLD live in food-insecure households [14]. Subjects who live under food insecurity have higher odds of developing NAFLD (OR 1.38) [14]. Similarly, in the Iranian population, the prevalence of food insecurity is much higher among the NAFLD population (56.8%) than among individuals without NAFLD (26.1%) [15].

References

1. Peter Dietrich; Claus Hellerbrand; Non-alcoholic fatty liver disease, obesity and the metabolic syndrome. *Best Practice & Research Clinical Gastroenterology* **2014**, 28, 637-653, [10.1016/j.bpg.2014.07.008](https://doi.org/10.1016/j.bpg.2014.07.008).
2. Zobair, Younossi; Quentin M, Anstee; Milena, Marietti; Timothy, Hardy; Linda, Henry; Mohammed, Eslam; Jacob, George; Elisabetta, Bugianesi.; Global burden of NAFLD and NASH: trends, predictions, risk factors and prevention. *Nat Rev Gastroenterol Hepatol* **2018**, 15(1), 11-20, <https://doi-org.sare.upf.edu/10.1038/nrgastro.2017.109>.
3. Zobair M. Younossi; Non-alcoholic fatty liver disease – A global public health perspective. *Journal of Hepatology* **2018**, 70, 531-544, [10.1016/j.jhep.2018.10.033](https://doi.org/10.1016/j.jhep.2018.10.033).
4. Chris Estes; Homie Razavi; Rohit Loomba; Zobair Younossi; Arun J. Sanyal; Modeling the epidemic of nonalcoholic fatty liver disease demonstrates an exponential increase in burden of disease. *Hepatology* **2017**, 67, 123-133, [10.1002/hep.29466](https://doi.org/10.1002/hep.29466).
5. Christopher D. Williams; Joel Stengel; Michael I. Asike; Dawn M. Torres; Janet Shaw; Maricela Contreras; Cristy L. Landt; Stephen A. Harrison; Prevalence of Nonalcoholic Fatty Liver Disease and Nonalcoholic Steatohepatitis Among a Largely Middle-Aged Population Utilizing Ultrasound and Liver Biopsy: A Prospective Study. *Gastroenterology* **2011**, 140, 124-131, [10.1053/j.gastro.2010.09.038](https://doi.org/10.1053/j.gastro.2010.09.038).
6. Xianghai Zhou; Yufeng Li; Xiuying Zhang; Ying Ying Guan; Yindra Puentes; Fang Zhang; Elizabeth K. Speliotes; Linong Ji; Independent markers of nonalcoholic fatty liver disease in a gentrifying population-based Chinese cohort. *Diabetes/Metabolism Research and Reviews* **2019**, 35, e3156, [10.1002/dmrr.3156](https://doi.org/10.1002/dmrr.3156).

7. Unhee Lim; Kristine R. Monroe; Steve Buchthal; Bo Fan; Iona Cheng; Bruce S. Kristal; Johanna W. Lampe; Meredith A. Hullar; Adrian A. Franke; Daniel O. Stram; et al. Propensity for Intra-abdominal and Hepatic Adiposity Varies Among Ethnic Groups. *Gastroenterology* **2019**, 156, 966-975.e10, [10.1053/j.gastro.2018.11.021](https://doi.org/10.1053/j.gastro.2018.11.021).
8. Zobair M. Younossi; Maria Stepanova; Francesco Negro; Shareh Hallaji; Youssef Younossi; Brian Lam; Manirath Srishord; Nonalcoholic Fatty Liver Disease in Lean Individuals in the United States. *Medicine* **2012**, 91, 319-327, [10.1097/md.0b013e3182779d49](https://doi.org/10.1097/md.0b013e3182779d49).
9. Rosemay A. Remigio-Baker; Matthew A. Allison; Nketi I. Forbang; Rohit Loomba; Cheryl A.M. Anderson; Matthew Budoff; Jeffrey B. Schwimmer; Roger S. Blumenthal; Pamela Ouyang; Michael H. Criqui; et al. Race/ethnic and sex disparities in the non-alcoholic fatty liver disease-abdominal aortic calcification association: The Multi-Ethnic Study of Atherosclerosis. *Atherosclerosis* **2016**, 258, 89-96, [10.1016/j.atherosclerosis.2016.11.021](https://doi.org/10.1016/j.atherosclerosis.2016.11.021).
10. Eric M. Wu; Linda L. Wong; Brenda Y. Hernandez; Jun-Fang Ji; Wei Jia; Sandi A. Kwee; Sumodh Kalathil; Gender differences in hepatocellular cancer: disparities in nonalcoholic fatty liver disease/steatohepatitis and liver transplantation. *Hepatology Research* **2018**, 4, 66, [10.20517/2394-5079.2018.87](https://doi.org/10.20517/2394-5079.2018.87).
11. Andrea L. C. Schneider; Mariana Lazo; Elizabeth Selvin; Jeanne M. Clark; Racial differences in nonalcoholic fatty liver disease in the U.S. population. *Obesity* **2013**, 22, 292-299, [10.1002/oby.20426](https://doi.org/10.1002/oby.20426).
12. Shiobhan R. Weston; Wendy Leyden; Rose Murphy; Nathan M. Bass; Beth P. Bell; M. Michele Manos; Norah A. Terrault; Racial and ethnic distribution of nonalcoholic fatty liver in persons with newly diagnosed chronic liver disease. *Hepatology* **2005**, 41, 372-379, [10.1002/hep.20554](https://doi.org/10.1002/hep.20554).
13. Adeyinka Charles Adejumo; Gbeminiyi Olanrewaju Samuel; Oluwole Muyiwa Adegbola; Kelechi Lauretta Adejumo; Ogooluwa Ojelabi; Olalekan Akanbi; Olumuyiwa Akinbolaji Ogundipe; Lydie Pani; Prevalence, trends, outcomes, and disparities in hospitalizations for nonalcoholic fatty liver disease in the United States.. *Annals of Gastroenterology* **2019**, 32, 504-513, [10.20524/aog.2019.0402](https://doi.org/10.20524/aog.2019.0402).
14. Ilya Golovaty; Phyllis C Tien; Jennifer C Price; Lila Sheira; Hilary Seligman; Sheri D Weiser; Food Insecurity May Be an Independent Risk Factor Associated with Nonalcoholic Fatty Liver Disease among Low-Income Adults in the United States. *The Journal of Nutrition* **2019**, 150, 91-98, [10.1093/jn/nxz212](https://doi.org/10.1093/jn/nxz212).
15. Helda Tutunchi; Maryam Saghafi-Asl; Mehrangiz Ebrahimi-Mameghani; Alireza Ostadrahimi; Food Insecurity and Lipid Profile Abnormalities Are Associated with an Increased Risk of Nonalcoholic Fatty Liver Disease (NAFLD): A Case–Control Study. *Ecology of Food and Nutrition* **2021**, 11, 1-17, [10.1080/03670244.2021.1875453](https://doi.org/10.1080/03670244.2021.1875453).
16. Wen Hu; Ziyu Liu; Hai-Rong Hao; Wei-Nan Yu; Xiao-Qing Wang; Xiao-Juan Shao; Xiao-Juan Wu; Su-Rong Wen; Yun-Qing Fan; Yao-Jun Ni; et al. Correlation between income and non-alcoholic fatty liver disease in a Chinese population. *Annales d'Endocrinologie* **2020**, 81, 561-566, [10.1016/j.ando.2020.07.1109](https://doi.org/10.1016/j.ando.2020.07.1109).
17. Jinkyung Cho; Inhwan Lee; Dong-Ho Park; Hyo-Bum Kwak; Kisuk Min; Relationships between Socioeconomic Status, Handgrip Strength, and Non-Alcoholic Fatty Liver Disease in Middle-Aged Adults. *International Journal of Environmental Research and Public Health* **2021**, 18, 1892, [10.3390/ijerph18041892](https://doi.org/10.3390/ijerph18041892).