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Errors in meta-analysis on prevalence of non-alcoholic fatty liver disease (NAFLD)

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Dear Editor

We read with interest the meta-analysis on global prevalence of non-alcoholic fatty liver disease (NAFLD) by Younossi *et al.* (1) published ahead of print in *Hepatology*. We commend the authors for undertaking such a task given the fractured state of the literature. However, their selection of studies for the meta-analysis seems to be incorrect. Specifically, Fig. 3e, which depicts NAFLD prevalence in North America based on non-invasive imaging, includes data from 13 published articles. Nine of these studies are from the same cohort (NHANES III), however, only one of these should have been included (2).

Furthermore, the study by Church *et al.* (3) contained participants selected by nine categories of body mass index (BMI) and fitness with equal number of participants per category, and cannot be used to calculate prevalence of NAFLD, which is strongly correlated

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with BMI. In fact, any samples where the sampling frame was based on risk factors correlated with the outcome (NAFLD), such as BMI, diabetes mellitus, hypertension, dyslipidemia, or other components of the metabolic syndrome, should not be combined with population-based samples in a meta-analysis because clinical heterogeneity is too large to derive meaningful pooled estimates (2).

With regard to Fig. 3b, the study by Kim *et al.* (4) was conducted among patients who received a liver transplant and thus cannot be used to estimate prevalence in the general population. The study by Hong *et al.* (5) had a 16.3% prevalence of NAFLD per Supplementary Table A (1), which is correct, but in Fig. 3b the prevalence was incorrectly calculated at 24.77%. Finally, we identified at least 10 more studies from Asia (Japan and China in particular) that were not included in the meta-analysis by Younossi *et al.* (1).

We have not checked other results presented; however, based on the above errors, we have concerns about the validity and meaningfulness of the study as a whole.

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