



Reply

# Reply to Alsarwani, R.M. Comment on “Alghnam et al. The Association between Obesity and Chronic Conditions: Results from a Large Electronic Health Records System in Saudi Arabia. *Int. J. Environ. Res. Public Health* 2021, 18, 12361”

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We genuinely thank Dr. Alsarwani for his insights [1]. Our study is the first large analysis that has utilized electronic sources to examine significant population health predictors and outcomes [2]. Similar to most published studies, it has some strengths, limitations, and some potential bias which we have acknowledged. Our role as researchers is to determine truer estimates and reduce the magnitude of bias.

As for the first point about medications, some medications are indeed used to treat conditions other than diabetes. However, removing all patients with these medications would remove sizeable true diabetic patients and drastically underestimate the true prevalence. This is because ICD-10 coding is not mature enough to locally identify all patients with a specific disease. In addition, many patients come to clinics to treat one condition (i.e., asthma) while also being diabetics. The systems will not capture the primary coding of these patients because it was not the main reason the patients visited the hospital. From the most reliable national study conducted in 2013, we know that the national prevalence rates of diabetes and hypertension are 13.4% and 15.2%, respectively [3,4]. This estimate is about one decade old. We know that with increased risk factors, such as obesity and a sedentary lifestyle, diabetes and hypertension will likely increase in subsequent years. In fact, the recent PURE study, cited in our paper, indicated that the diabetes and hypertension prevalence rates were 25.1% and 30.3%, respectively, among older adults [5]. Finally, as part of the limitations, we have acknowledged that these estimates are based on hospital visits, which reflect those who sought medical treatment. Therefore, even if there was some overestimation of cases, it is likely to be minimal. We are currently working on a study to explore what percentage of diabetes is captured via all available sources such as ICD, medications, HA1C, or even using the progress note (written by the physician) alone. We

hope that such a study will shed more light on the path to better capture all patients with a specific diagnosis with high sensitivity and specificity.

As for the second point, it is unlikely that we missed those with type 1 diabetes because we included all those with a diabetes diagnosis. In fact, this was one of the limitations we stated in our study—we were unable to differentiate between type 1 and type 2 diabetes (page 8).

As for the last point, this study examined the independent association between these variables and the outcome. Although many consider hypertension to be a confounder in obesity–diabetes associations, hypertension is likely also a mediator or a collider in that relationship. Therefore, adjusting for hypertension will bias that association [6].

**Author Contributions:** Study concept and design: S.A. (Suliman Alghnam), M.A. and R.A. Reviewed the literature and interpret the findings: S.A. (Sarah Alzahrani), S.A.A., M.B., A.A., M.A.D. and I.A.A. Statistical analysis and the introduction and methods: S.A. (Suliman Alghnam) and M.B. The result section was written by S.A. (Sarah Alzahrani). Wrote part of the discussion section: S.A.A. and S.A. (Suliman Alghnam). All authors have read and agreed to the published version of the manuscript.

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