

Global Analysis of Obesity and Physical Activity Rates and their Relation to Diabetes Risk

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Introduction Type 2 diabetes (T2D) rates vary significantly across geographic regions. These differences are sometimes assumed to be driven entirely by differences in environmental exposures between populations. However, there is limited data that support this view.

Objective Reanalyze publicly available data to unravel the relative contribution of obesity and insufficient physical activity (IPA) towards diabetes risk across different populations.

Methods We used estimates from Non-Communicable Disease Risk Factor Collaboration (NCD-RisC) on rates and trends of diabetes (1975-2014) and obesity (1975-2016), in 200 countries. IPA rates were based on 2016 estimates across 168 countries in 2016. Countries were categorized into 9 regions according to NCD-RisC definition. Trends of obesity and diabetes were assessed for each region. Region-specific correlation of diabetes with obesity and IPA was assessed using Pearson correlation test. Joint effects of obesity and IPA on diabetes risk were assessed for 163 countries. All analyses were sex-specific.

Results From 1975 to 2016, obesity rates increased across all populations, with the largest increases in rates observed in Oceania (men, 22.7%; women, 19.6%) and Central Asia Middle East and North Africa (CAMENA) (men, 17.5%; women, 9%) regions. Additionally, these two regions had the strongest correlation of obesity and diabetes in men (Oceania, $R^2=0.83$, $P<0.001$; CAMENA, $R^2=0.75$, $P<0.001$) and women (Oceania, $R^2=0.7$, $P<0.001$; CAMENA, $R^2=0.67$, $P<0.001$). On the other hand, other regions, including Latin America and Caribbean and Central and Eastern Europe, demonstrated a lack of correlation between obesity and diabetes. Similarly, the association of IPA with diabetes was not homogeneous amongst populations. Countries in various regions had very similar rates of diabetes, despite falling on opposite ends of IPA spectrum. The overall joint effect of obesity and IPA highlighted the larger impact of obesity on diabetes risk across populations (Figure 1). Despite that, some countries in various regions deviate from this overall observation, particularly in South Asia and High-income Western countries. Sex differences were observed across all our analyses.

Conclusion These data indicate that different populations, while experiencing similar environmental shifts, are apparently differentially subject to diabetes risk. Sex-related differences observed suggest that men and women are either subject to different risk factor exposures or have different responses to them.