

# **The Heterogeneity of Obesity: A cross-sectional analysis of the UK Biobank cohort**

## **Affiliations:**

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## **Background**

Obesity is a complex, long-term health issue with multiple contributing factors. Its global prevalence has tripled since 1975, leading to increased healthcare costs and heightened risk of diseases like type 2 diabetes, cardiovascular disease, and cancer. Current treatment approaches, including pharmacotherapy, dietary changes, and physical activity, show varied efficacy among individuals due to biochemical, demographic, clinical, environmental, genetic, and socioeconomic factors.

## **Objective**

This study aims to understand the heterogeneity of obesity by examining the interactions and contributions of various factors to health outcomes. Specifically, it focuses on systolic blood pressure, HbA1c, visceral adiposity, and physical activity across different BMI categories.

## **Method**

Data was collected from the UK Biobank, involving 500,000 participants aged 40-69 years. The dataset includes self-reported questionnaires, physical measurements, and biological samples. Descriptive statistics were calculated for demographic and clinical characteristics. ANOVA was used to assess differences in mean values of outcome variables across BMI categories, followed by linear regression to analyse the relationship between BMI and the outcomes, adjusting for age, deprivation index, and ethnicity. The study also addressed issues like normality violations, small sample size, and class imbalance.

## **Results**

Significant differences were observed among BMI categories for systolic blood pressure, HbA1c, and visceral adiposity. A positive correlation between BMI and systolic blood pressure was noted, consistent with existing literature. HbA1c showed a weaker correlation with BMI and age. Visceral adiposity had a strong association with BMI, highlighting the inadequacy of BMI alone in assessing cardiometabolic risk. Physical activity levels varied significantly across ethnicities and BMI categories.

## **Conclusion**

Obesity is a heterogeneous condition influenced by multiple factors. This study emphasizes the need for personalized approaches in obesity management. Future research should focus on longitudinal studies to understand the causal relationships between risk factors and health outcomes, aiding in the development of effective, individualized prevention and treatment strategies.

