Forecasting the burden of type 2 diabetes mellitus in Qatar to 2050: a novel modeling approach

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INTRODUCTION

- Prevalence of diabetes mellitus and obesity in Qatar are reported at 16.7% and 41.4%, respectively.
- It is critical to assess the future burden of type 2 diabetes mellitus (T2DM) in Qatar and its risk factor drivers for the purpose of informing public health policy and programming as well as resource allocation.

OBJECTIVE

To develop and demonstrate a novel mathematical modelling approach to forecast the burden of T2DM and to investigate its epidemiology.

METHODS

- A population-level deterministic compartmental mathematical model was constructed to describe the development of T2DM in a given population—in this case, the Qatari population.
- The model was stratified by sex, age group, risk factor status, and T2DM status, and was parameterized using nationally-representative population-based data, including demographic, epidemiological, and cost data.

RESULTS-Figure 2

- Prevalence of obesity was projected to increase from 41.4% to 51.0% by 2050 (Fig. 2A).
- The proportion of T2DM incidence attributed to obesity was estimated at 57.5% in 2012, and 65.7% by 2050 (Fig. 2B).

RESULTS-Figure 1

- T2DM prevalence was projected to increase from 16.7% in 2012 to at least 24.0% by 2050.
- Factoring in different scenarios for the trends in T2DM-related risk factors, T2DM prevalence could potentially reach as high as 37.7% by 2050.

RESULTS-Figure 3

- T2DM health expenditure was estimated to increase by 200-600% and to account for up to 32% of total health expenditure by 2050.

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CONCLUSIONS

- T2DM prevalence in Qatar was predicted to increase in the next three decades, driven by population growth, ageing, and adverse trends in risk factors.
- Obesity was found to be the principal risk factor explaining over half of T2DM incidence.
- T2DM is a national priority that should be addressed with expanded preventive and therapeutic interventions targeting T2DM and its modifiable risk factors.
- The model was applied to Qatar, a high-burden T2DM country, but the approach is general and can be applied broadly to other countries.