

Background

The prevalence of diabetes is rapidly increasing worldwide. Type 2 diabetes may remain undetected for many years, leading to severe complications and healthcare costs. IDF first produced estimates of UDM in 2011(1), providing a global quantification of this burden. In 2013, new estimates of the prevalence of UDM were generated (2,3).

Aims and Objectives

To compare estimates for undiagnosed diabetes mellitus (UDM) to other variables relating to health system strength, economics, and mortality

Methods

- Literature search carried out for studies reporting age-specific prevalence of UDM
- Studies systematically selected using the Analytical Hierarchy Process
- Estimates generated for 219 countries and territories
- Data sources included:
 - country-level data sources from peer-reviewed studies,
 - national health statistics reports,
 - commissioned studies on diabetes prevalence,
 - unpublished data obtained through personal communication
- Countries matched on ethnicity, geography, and income group to generate estimates for countries with no data
- Logistic regression used to generate smoothed age-specific prevalence estimates for adults 20-79 years
- Estimates applied to population estimates for 2013 and 2035
- Logistic regression used to generate estimates of the prevalence of UDM
- Estimates of UDM prevalence generated for each data region, and compared to physician density, health expenditure, as well as for the percentage of diabetes-attributable deaths.

Results

Globally, 45.8% (174.8 million) of all diabetes cases in adults were estimated to be undiagnosed. China was the country with the largest number of UDM (Table 1). Across the 15 IDF World-Bank data regions, the lowest proportion of UDM was 24.1%, in middle income countries in the South and Central America region; and the highest proportion was 75.1% in low income countries in the African region (Figure 1, Table 2).

Figure 1. Prevalence* (%) of undiagnosed diabetes (20 – 79 years), 2013

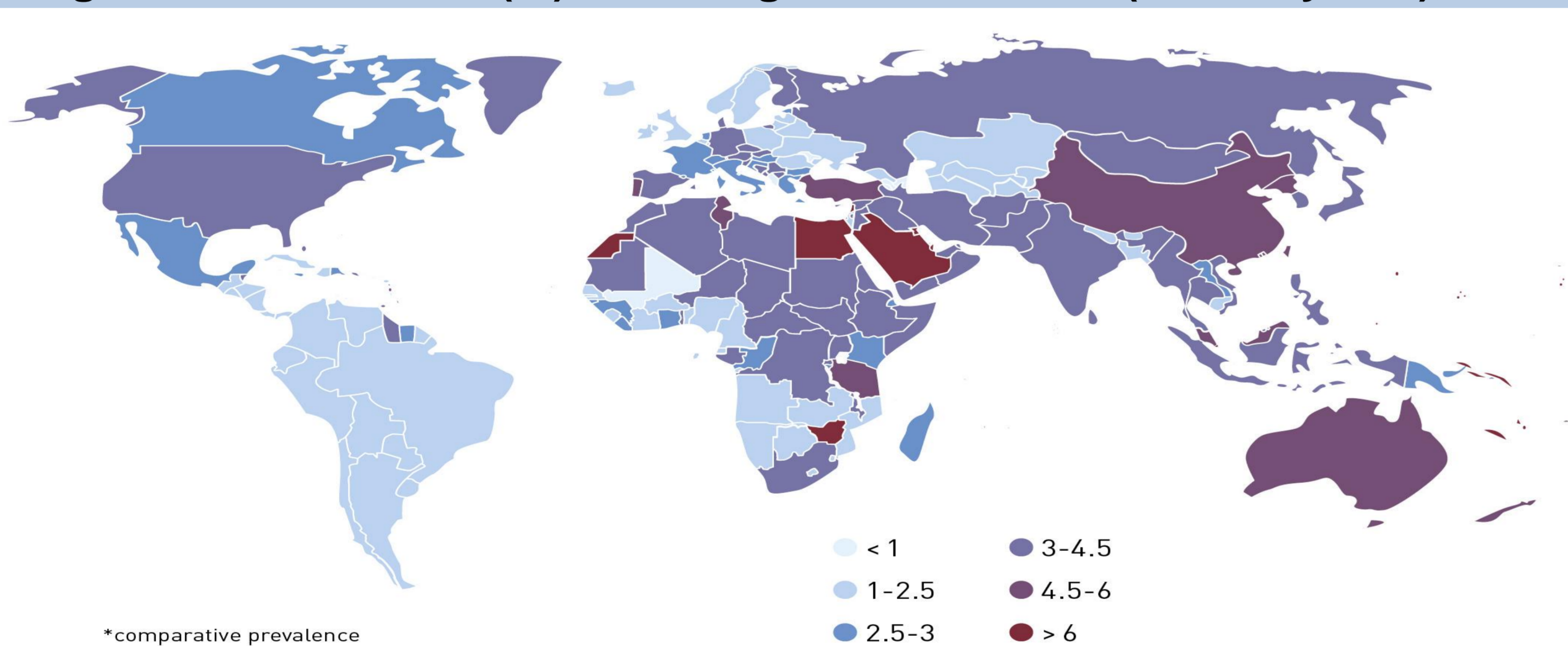


Table1. Top 10 countries/ territories for undiagnosed diabetes (20-79 years), 2013

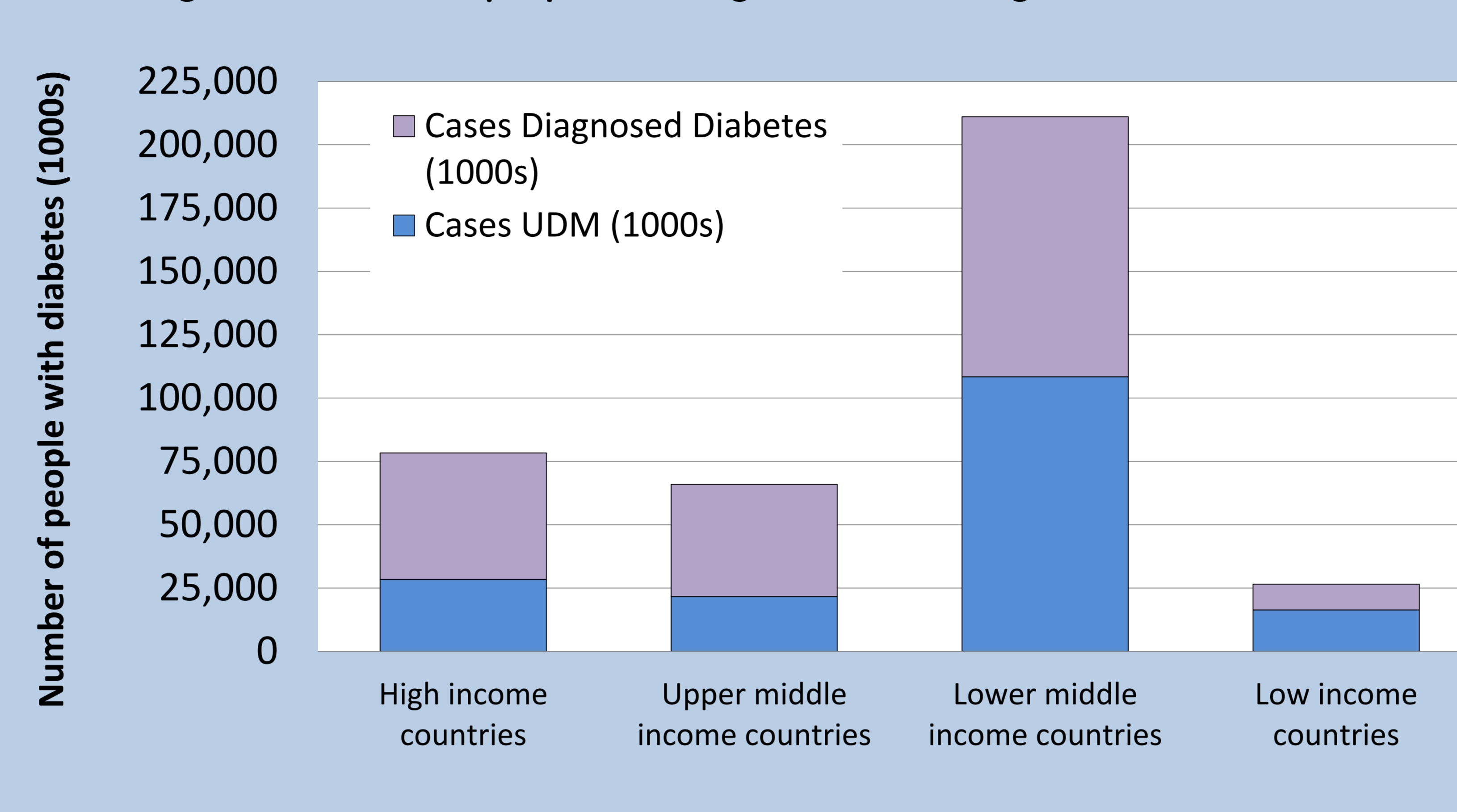
	cases (1000s)
China	53,238
India	31,920
United States of America	6,762
Indonesia	4,628
Russian Federation	3,830
Egypt	3,755
Japan	3,559
Pakistan	3,356
Brazil	2,870
Germany	2,766

** Adjusted prevalence

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Low- and middle- income countries bear 83.8% of UDM cases worldwide, and the highest number of UDM cases occur in lower-middle income countries (Figure 2).

Figure 2. Number of people with diagnosed and undiagnosed diabetes



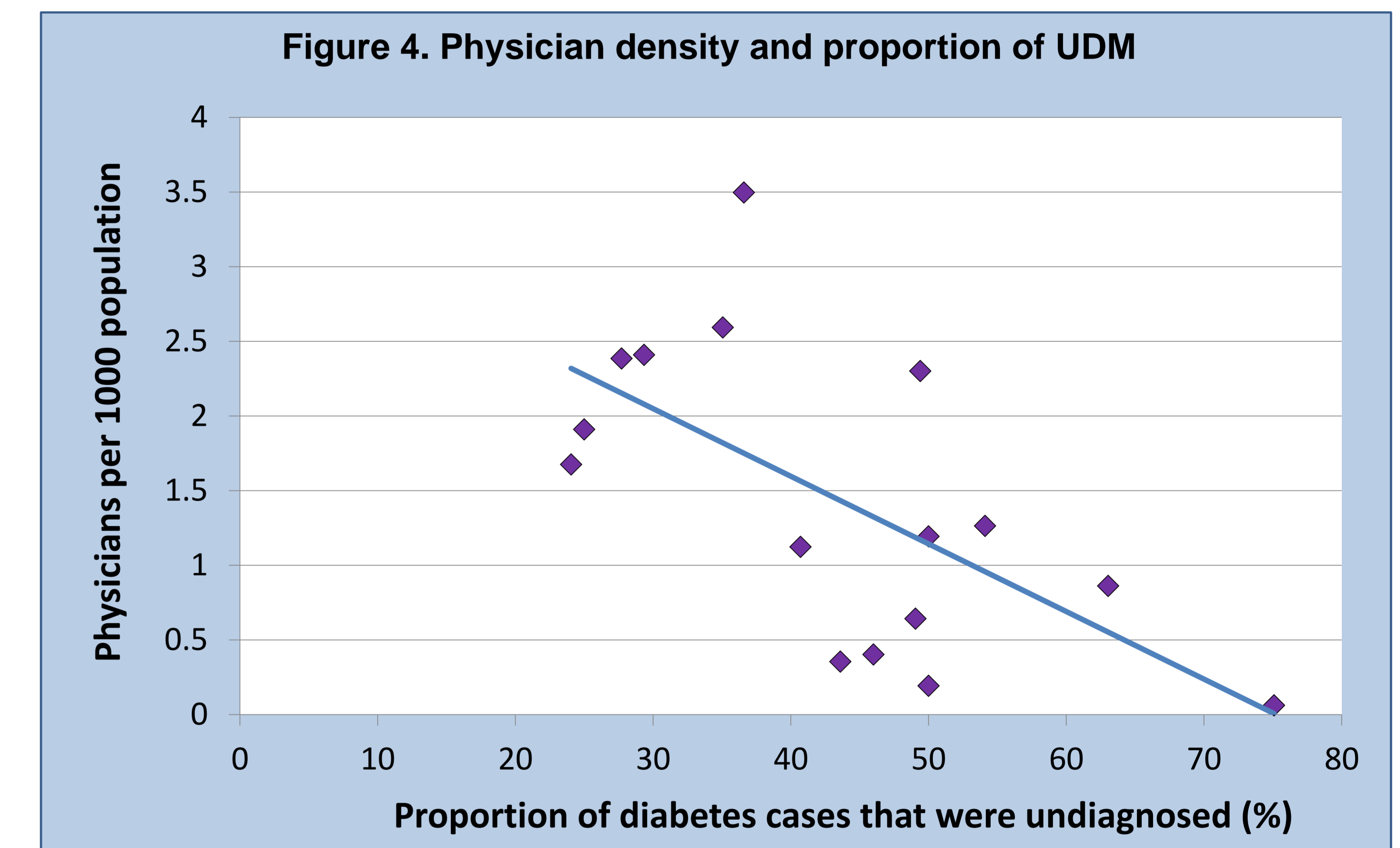
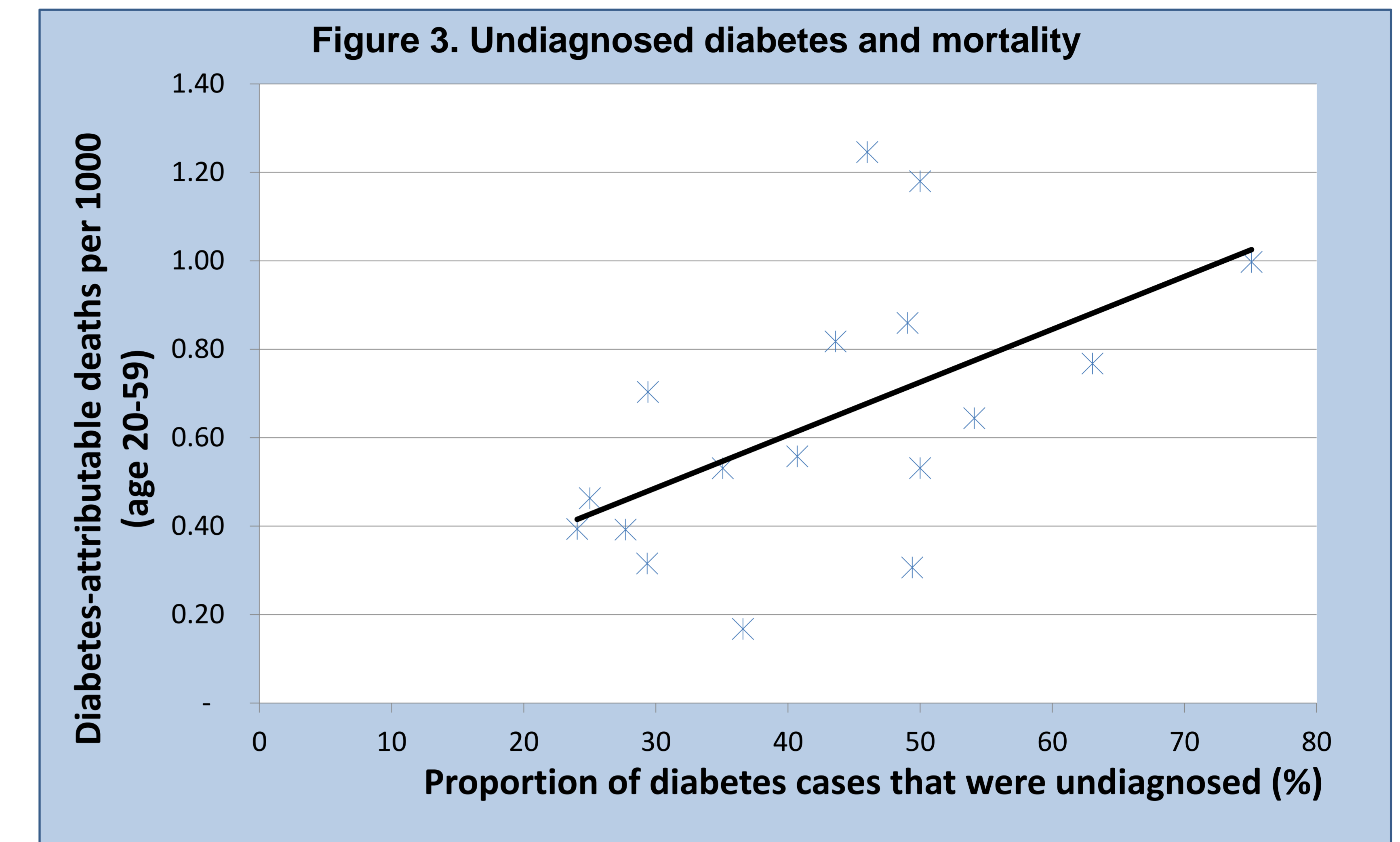
When grouped by IDF region and income group, the proportion of diabetes cases that were undiagnosed had a moderate positive correlation with under-60 diabetes mortality ($r = 0.52$; Figure 3) and a moderately strong inverse correlation with physician density ($r = -0.63$; Figure 4). With regard to diabetes-attributable health expenditures, an inverse correlation with the proportion of diabetes cases that were undiagnosed was observed within all income groups, with moderately strong correlation across high-income countries ($r = 0.77$), strong correlation across middle-income countries ($r = 0.92$), and moderate correlation across low-income countries ($r = 0.45$) (data not shown).

Table2. Undiagnosed diabetes (20-79) by IDF Region and income group, 2013

Data Region	UDM Proportion (%)	Cases (1000s)
Africa		12,400
Middle-income countries	46.0	
Low-income countries	75.1	
Europe		20,100
High-income countries	36.6	
Middle-income countries	35.1	
Low-income countries	29.3	
Middle East and North Africa		16,800
High-income countries	40.7	
Middle-income countries	50.0	
Low-income countries	50.0	
North America and Caribbean		9,900
High-income countries	27.7	
Middle-income countries	25.0	
Low-income countries	29.4	
South and Central America		5,800
Middle-income countries	24.1	
South-East Asia		35,100
Middle-income countries	49.1	
Low-income countries	43.6	
Western Pacific		74,700
High-income countries	49.4	
Middle-income countries	54.1	
Low-income countries	63.0	
World	45.8	174,800

References:

- IDF Diabetes Atlas, 5th Ed. Brussels, Belgium: International Diabetes Federation; 2011.
- IDF Diabetes Atlas, 6th Ed. Brussels, Belgium: International Diabetes Federation; 2013.
- Beagley J, Guariguata L, Weil C, Motala AA. Global estimates of undiagnosed diabetes in adults. Diabetes Res Clin Pract. 2014 Feb;103(2):150-60.



Discussion

Lower-middle income countries have by far the greatest number of cases of UDM, followed by high income countries. The estimates presented here confirm that lack of detection of diabetes persists throughout the world, across all regions and income groups.

A high physician density can be indicative of strong health systems, and is associated with reduced rates of UDM. Lack of diagnosis of diabetes is associated with increased mortality in younger age groups. Higher diabetes-related expenditures may signify greater availability of resources for diabetes, which may lead to a lower proportion of UDM although these results may also be reflective of a higher proportion of UDM leading to lower diabetes-related healthcare expenditure due to undiagnosed cases not being treated. Given the high health-related and financial costs associated with diagnosed and undiagnosed diabetes, accurate estimates of undiagnosed diabetes are vital for the design of effective health policies and programmes



Conclusion

There is an alarmingly high prevalence of UDM globally. Undiagnosed diabetes is harmful and costly; both financially and in terms of complications; for individuals, communities, and health systems. It is imperative that the response to these data should be appropriate to the varying capacities of national health systems.