Diabetes mellitus: a global epidemic with potential solutions

R N Oputa and S Chinenye

Introduction

The International Diabetes Federation (IDF) estimated in 2011 that 366 million adults, aged 20–79 years, of the world's 7 billion population have diabetes.[1] This gives a comparative prevalence of 8.5%. Since more than 90% of the global cases of diabetes are type 2, it is evident that the epidemic is mainly due to the escalation of the causes of type 2 diabetes.[2–5] Also, up to 50% of cases of gestational diabetes may end up as type 2 diabetes.[6] Secondary causes of diabetes and type 1 diabetes present with features that require treating the cause and insulin therapy respectively.

The United Nations (UN) defines diabetes as a chronic, debilitating, and costly disease associated with severe complications which pose severe risks for families, member states, and the entire world; and serious challenges to the achievement of the internationally agreed developmental goals, including the Millennium Development Goals (MDGs).[1] Chronic hyperglycaemia is known to damage almost all cell types in the body. The prevalence of asymptomatic or undiagnosed diabetes is high (50–85%) in the general population, depending on the country in question.[7–10] Therefore only a small proportion of cases present in health facilities with classical symptoms of polyuria, polydipsia and weight loss.

Often, the causes of most types of diabetes are multifactorial: environmental, lifestyle and/or genetic factors are at play.[1–3,7] Prediabetes: impaired fasting glucose (IFG) and impaired glucose tolerance (IGT) may progress to overt type 2 diabetes. The gradual progression of prediabetes to diabetes may account for the high prevalence of most asymptomatic and undiagnosed diabetes. Diabetes is complicated by recurrent infections, varied eye problems, erectile dysfunction, poor obstetric outcome, skin ulcers and gangrene, renal disease, and acute hyperglycaemic emergencies. All the above complications ensure a high mortality and morbidity. The prevention and the delay in the time of onset of type 2 diabetes, will curtail the current global diabetic epidemic.

R N Oputa, Consultant Physician/Endocrinologist, Federal Medical Centre, Owerri, Imo State, Nigeria and S Chinenye, Consultant Physician/Endocrinologist/Lecturer, University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers State, Nigeria.
Correspondence to: R N Oputa, P O Box 7249, Aladinma, Owerri, Imo State, Nigeria.

Epidemiology

All nations, rich and poor, are suffering the impact of the diabetes epidemic. The impact is worse in those countries that are socially and economically disadvantaged. Diabetes threatens the achievement of the MDGs, increases the risk of developing tuberculosis, and is closely linked with other infections.[1] The International Diabetes Federation (IDF) regional estimates for diabetes in the age group 20 to 79 years in 2011 show significant diabetes prevalence in the seven IDF regions (see Table 1). The burden of undiagnosed diabetes by IDF regions in 2011 is shown in Table 2. The highest undiagnosed cases are in Africa, with up to 80%. Even in Europe and North America up to 35% of cases are undiagnosed.[1]

Table 2 shows that about 80% of Africans with diabetes are undiagnosed. Most of them may be asymptomatic or have mild symptoms which they ignore or attribute to other myths. Some may not present in hospital out of poverty even when symptomatic. Health insurance coverage is less than 5% and mostly the privileged working class have access to it. A state in Nigeria (Imo State) has started 'Health at your door step' and has carried the campaign against diabetes and hypertension to its towns and villages.

In South-east Asia, 20% of the world's population with diabetes live in just seven countries of the region. In the Western Pacific region, 132 million adults have diabetes, the largest number of any region. In North America and the Caribbean, one adult in ten has diabetes – an epidemic fuelled by obesity and junk food. The Middle East and North Africa have six out of the ten countries with the highest prevalence of diabetes in the world.[1] It has been estimated that the 366 million people with diabetes in 2011 may increase to 552 million by the year 2030. In 2011, 12% of deaths in South and Central America were due to diabetes – the commonest cause of death in this region. Globally, diabetes was the cause of death in 4.6 million people in 2011. This is greater than the global mortality for hypertension, AIDS, and tuberculosis.[11–13] The number of people with type 2 diabetes is increasing in every country. About 80% of people with diabetes live in low- and middle-income countries. The greatest number of people with diabetes is between 40 and 59 years of age.

Health expenditure is astronomical in diabetes. In 2011, the disease caused at least US$465 billion dollars in healthcare expenditure. This constitutes about 11% of the total health expenditure in adults. Nigeria with

Table 1 Regional estimates of diabetes (20–79 years) in 2011

Region	Total population (millions)	Adult population (millions)	Number with diabetes (millions)	Diabetes prevalence	Number of countries in region
Africa	832	387	14.7	4.5%	56
Europe	899	653	52.8	6.7%	54
Mediterranean/ North Africa	634	356	32.6	11.0%	21
North America/ Carribean	481	322	37.7	10.7%	15
South/Central America	463	298	25.1	9.2%	20
South-east Asia	1446	856	71.4	9.2%	7
Western Pacific	2217	1544	131.9	8.3%	39
World	7 billion	4407	366.2	8.5%	

Table 2 Undiagnosed diabetes by IDF regions in 2011

Region	Total cases (millions)	Number undiagnosed (millions)
Africa	14.7	11.6 (80%)
Europe	52.8	19.0 (35%)
Middle east/ North Africa	32.6	19.2 (55%)
North America/ Carribean	37.7	11.9 (35%)
South/Central America	25.1	11.2 (45%)l
South-east Asia	71.4	36.2 (50%)
Western Pacific	131.9	73.5 (60%)

less than 5% health insurance presents a difficult picture for its 3.1 million people with diabetes – the highest in Africa.[14,15] The country has a population of about 150 million, of which 76 million are adults. Diabetes-related deaths in Nigeria in 2011 accounted for 63 340 people. The diabetes prevalence of 4.9% has more than doubled when compared with the 2.2% prevalence of the Professor Akinkugbe-led National Survey Report of 1997.[16]

Diabetes has been linked to tuberculosis, HIV/AIDS, Malaria, poverty, undernutrition, lost productivity, human capital, health system cost, maternal and child health, mental health, life changes, food security, climate changes, urbanisation, cancer, chronic respiratory diseases, and cardiovascular disease. It is very significant that the UN has accorded diabetes a right of place as a global jeopardy and chronic killer.[17–19]

Type 2 diabetes

The diabetes epidemic is centred on type 2 diabetes. Only half a million people have type 1 diabetes globally, and only 78 000 children develop the disease every year.[1] Type 2 diabetes is associated with many preventable risk and causative factors such as obesity, hypertension, dyslipidaemia, poor diet, physical inactivity, and lack of regular exercise. Other risk factors such as increasing age, family history of diabetes, history of impaired glucose tolerance (IGT) and impaired fasting glucose (IFG), history of gestational diabetes (GDM), and large babies and ethnicity could be anticipated and taken care of by regular screening, national guide lines, the expansion of health insurance, and regular national surveys.

Prevention of the global diabetes epidemic must include regular national surveys (every 5 years at least), diabetes health education in schools, emphasis on nutrition and exercise, abstention from tobacco, and a national plan for a good and balanced diet and a healthy lifestyle. Since life expectancy is low in Nigeria (48 years), people aged 30 years and above should ideally check their blood glucose at least once a year.[14,15] This should be accompanied by blood pressure checks. Increasing incidence of metabolic syndrome also entails regular checks for serum lipids and renal function.[20,21]

Ideally, people with diabetes should receive intensive education on diet, drugs, and insulin, close adjustments if indicated, self-monitoring, risk factor avoidance, and foot care. Patient groups and local or national organisations are helpful. At a national level, a national policy and guidelines are mandatory. This will guide medical personnel at the grass roots (primary and secondary care) and provide direction. Funding, research, and development will be at all levels of care. All involved in diabetes care should keep abreast of development and technology. This will include the provision of fellowships at the primary, secondary, and tertiary care levels.

In 2011, the Diabetes Association of Nigeria (DAN), spearheaded the development of National Clinical Practice Guidelines for Diabetes Management in Nigeria. DAN is a member of the IDF. It was launched in Port Harcourt, Rivers State, Nigeria in June 2012.[20] Nigeria's Federal Ministry of Health, Novartis Pharma, and Bayer HealthCare are supportive of this contribution towards stemming the tide of diabetes in the country. There is a need to get the guidelines to the grass roots and teach those that will use them. It is not enough to hand them over to health workers – they should be empowered to know the guidelines and show commitment in using

them. The Federal Ministry of Health in Nigeria should conduct another National Survey after so many decades have passed since the 1990s.

Conclusion

The UN and IDF have provided the necessary information, leadership, advocacy and research towards the fight against the global diabetes epidemic and other non-communicable diseases. It is, therefore, important and necessary for nations and states to accept and implement the applicable components of resolutions, statistics, and information peculiar to each country. For example, every country should have national guidelines on the control, prevention, and management of diabetes and other non-communicable diseases. There should also be a regular National Survey of non-communicable diseases. Every country should ensure that at least 10% of its yearly budget goes into heath and social development.

Health education as a national policy should start early in schools and families. Adopting a healthy lifestyle, balanced diet, and the eradication of poverty will prevent further increase of the diabetes epidemic. Universal basic education should be a global standard – this will impact positively on all aspects of health and social determinants of a safe society. All the components of the MDGs are related directly (five) and indirectly (three) to health indexes of all nations. Diabetes has links with most of the common health challenges in Africa, such as tuberculosis, HIV/AIDS, and malaria. Therefore early diagnosis of diabetes in communities, with appropriate management and lifelong follow-up, will reduce morbidity and mortality.

References

1. *IDF Diabetes Atlas*. Fifth Edition 2011.
2. WHO Expert Committee on the Diagnosis and Classification of Diabetes Mellitus: Report on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care* 1997; 20: 1183–97.
3. WHO Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. Follow up Report on the Diagnosis of Diabetes Mellitus. *Diabetes Care* 2003; 26: 3160–7.
4. Chinenye S, Uchenna DI, Unachukwu CN, Ogbera AO, Ojule AC. The pattern of diabetes mellitus in Rivers State, Nigeria. *Nig Endocrine Prac* 2008; 2: 87–93.
5. Motala AA. Diabetes trends in Africa. *Diabetes Metab Res Rev* 2002; 18: 514–20.
6. American Diabetes Association. Gestational Diabetes Mellitus (Position Paper). *Diabetes Care* 2004; 27(Suppl 1): 588–90.
7. Motala AA, Esterhuizen T, Gouws E, et al. Diabetes and other disorders of glycaemia in a South African community: prevalence and associated risk factors. *Diabetes Care* 2008; 31: 1783–8.
8. Mbanya JC. *IDF Diabetes Atlas*, 4th Edition, 2010.
9. Amoah AGB, Omusu SK, Adjei S. Diabetes in Ghana; a community-based prevalence study in Greater Ghana. *Diabetes Res Clin Pract* 2002; 56: 197–205.
10. Asprey TJ, Mugusi F, Rashid S, et al. Rural and urban differences in diabetes prevalence in Tanzania: the role of obesity, physical inactivity and urban living. *Trans R Soc Trop Med Hyg* 2009; 94: 637–44.
11. Global Report: *UNAIDS report on AIDS epidemic 2010*. UNAIDS 2010
12. WHO. *Global Tuberculosis Control*. WHO, Geneva, 2010.
13. Hu FB. Globalization of diabetes: the role of diet, lifestyle and genes. *Diabetes Care* 2011; 34: 1249–57.
14. Osibogun A. The Medicine for Poverty: an argument for health and development. The Ninth Sir Samuel Manuwa Lecture – 36th Annual General and Scientific Meeting – West African College of Physicians (Nigerian Chapter), Uyo, Nigeria 2012.
15. Health Report, WHO Regional Office. WHO, Brazzaville, 2006
16. Akinkugbe OO (ed). *Non-Communicable Diseases in Nigeria: National Survey (Final Report) on Hypertension, Coronary Heart Disease, Diabetes Mellitus, Haemoglobinopathies, G6PD deficiency and Anaemia*. National Expert Committee on Non-Communicable Disease. Federal Ministry of Health and Social Services, Lagos, 1997.
17. Alberti KG, Zimmet P, Shaw J. International Diabetes Federation: a consensus on Type 2 diabetes prevention. *Diabetes Med* 2007; 24: 451–68.
18. Diabetes Care and Research in Europe: the Saint Vincent Declaration. *Diabet Med* 1990; 7: 360.
19. WHO. *Prevention of Diabetes Mellitus*. Report of a WHO Study Group. WHO, 1994. No 844.
20. Chinenye S, Ofoegbu EN. *National Clinical Practice Guidelines for Diabetes Management in Nigeria*. Port Harcourt, Nigeria: Diabetes Association of Nigeria, 2011.
21. Young F, Critchley JA, Johnstone LK, et al. A review of co-morbidity between infections and chronic diseases in sub Saharan Africa: tuberculosis and diabetes mellitus, HIV and Metabolic Syndrome, and the impact of globalization. *Global Health* 2009; 5: 9–12.