Nauru and Mauritius: Barometers of a Global Diabetes Epidemic

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Abstract
Our studies of the secular rises in type 2 diabetes in the Pacific island of Nauru and Indian Ocean island of Mauritius have provided a barometer to predict the epidemic globally.

There has been an almost 6-fold increase in the number of people with diabetes in the last few decades. The International Diabetes Federation (IDF) has reported that the number of people with diabetes will escalate from 285 million to 438 million between 2010 and 2030 and the number of persons with IGT will grow from 344 to 472 million. This means that by 2030, there will be over 900 million people globally with or at high risk of diabetes and its associated 2 to 3-fold cardiovascular risk. Diabetes is now a global epidemic with devastating health, social and economic consequences and one of the largest epidemics in human history. This is now imposing a huge burden on health-care systems and national economies.

Keywords: Type 2 diabetes, epidemic, global, Nauru, Mauritius.

Introduction
The populations of two island nations, one in the Pacific and the other in the Indian Ocean, have set the patterns for the prediction of a global diabetes epidemic. The islands of Nauru, as the first, and Mauritius as the fourth, are in the top few nations in terms of high diabetes prevalence. Until about 30 years ago, type 2 diabetes was very much considered as a ‘Cinderella’ disease. In a 1975 survey in the Micronesian inhabitants of the Central Pacific Island of Nauru, we found a diabetes prevalence of 33%, being the highest national prevalence in the world. Until that time, the highest prevalence had been documented in the Pima Indian community, residents of a reservation near Phoenix, Arizona, USA. In relation to these diabetes rates, the prevalence of diabetes in populations of European origin were very low as they were in China.

Based on the Nauru findings, and those in other Pacific communities we studied, we were able to predict the possibility of a global diabetes epidemic, a scenario that has now become a reality. Not only were the predictions correct but we underestimated the trend. We earlier predicted that by 2010 AD that there would be around 220,000,000 people with diabetes. Well, we were very wrong and the latest predictions by our Institute for the IDF are that there will be 285 million people with diabetes. In fact, the number of persons with diabetes worldwide is set to increase to 438 million by 2030, a 54% increase. Fig. (1) shows these data from the 2009 IDF Diabetes Atlas with the expected increases for the 20 years to 2030 by regions of the globe. Many of these cases of diabetes will remain undiagnosed and untreated particularly in the developing world. So from a disorder that was of relatively low priority in the public health arena very several decades
ago, diabetes has become as one of the major threats to public health in the 21st Century. This is a result of globalisation and its associated dramatic changes in the human environment, behaviour and lifestyle – a phenomenon described by the late Arthur Koestler as ‘Coca-colonisation’.

At the same time type 2 diabetes has reached epidemic proportions in many developing nations and some of the Middle East Gulf states, as well as in disadvantaged minorities in the developed countries e.g., Australian Aboriginal and Torres Strait Islanders, native, African- and Mexican-Americans in the USA, and also in Asian Indians and Chinese. Table 1 illustrates the dramatic rises in diabetes prevalence between two periods in several Asian nations compared to the USA. For example, compared with a 1.5 fold increase in the USA (1978-2000), Korea experienced a dramatic 5.1 fold increase between 1971 and 2001.

If Nauru was the first warning of the global epidemic, our studies in the Indian Ocean nation of Mauritius have provided a further barometer and microcosm of the potential for the global diabetes epidemic. The island of Mauritius lies in the Indian Ocean approximately 800 km East of Madagascar. Its multi-ethnic population of 1.1 million inhabitants is predominantly made up of Asian Indians (68%), Creoles (27%), and Chinese (3%). This diverse ethnic composition reflects the history of migration of slaves, indentured laborers and

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**Table 1. The multiplicative increase in diabetes prevalence in selected Asian nations as compared with the United States of America (Adapted from Yoon et al.16)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Survey Period</th>
<th>Increase in Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>1978-2000</td>
<td>1.5-fold</td>
</tr>
<tr>
<td>Taiwan</td>
<td>1985-1995</td>
<td>1.6-fold</td>
</tr>
<tr>
<td>Singapore</td>
<td>1985-1992</td>
<td>2.1-fold</td>
</tr>
<tr>
<td>China</td>
<td>1986-2000</td>
<td>3.4-fold</td>
</tr>
<tr>
<td>India</td>
<td>1979-2000</td>
<td>4.0-fold</td>
</tr>
<tr>
<td>Korea</td>
<td>1971-2001</td>
<td>5.1-fold</td>
</tr>
</tbody>
</table>

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**Fig. (1). Global projections for the diabetes epidemic: 2010-2030 (millions). [Adapted from Diabetes Atlas 41].**
merchants from India, Madagascar, Africa, and Asia.

With the ethnic distribution of Mauritius reflecting approximately two thirds of the world population, the results from this small island population suggested that with modernisation, the impact on diabetes rates in both China and India would be serious. This has turned out to be the case. Our serial studies in Mauritius apart from demonstrating a high diabetes prevalence and incidence have demonstrated a notable secular prevalence increase from 12.8% in 1987, to 15.2% in 1992, and 17.9% in 1998. This and evidence that prevalence of type 2 diabetes doubled between 1984 and 1992 in Singaporean Chinese, and the high prevalence in Taiwan, provided alarming indicators of the size of a potential future epidemic in the People’s Republic of China. In fact, from a very low prevalence of diabetes in 1980 in Shanghai where the prevalence of type 2 diabetes was less than 1%. Recent studies show a three-fold increase in prevalence in certain areas of China within the last 2 decades. Recent reports from China indicate dramatic secular increases in Qingdao in prevalence and China has the second highest number of people with diabetes in the world after India.

A similar large secular increase in diabetes has occurred in India and, indeed, other Asian nations. India now leads the world with largest number of diabetic subjects and in doing so, has earned the dubious distinction of being the world ‘capital’ for diabetes. In an urban national study reported in 2001, the age standardized prevalence of type 2 diabetes was 12.1 per cent. The highest rates were seen in the southern part of India with 13.5% in Chennai and 16.6% in Hyderabad. A more recent study showed a dramatic secular increase in diabetes from 13.9% in 2000 to 18.6% in 2006.

Currently, it is not possible to predict when the prevalence increases will end, particularly in developing nations undergoing increased modernization. Although type 2 diabetes in Europeans is usually characterized by onset (often asymptomatic) after 50 years of age, in Pacific islanders and other high-prevalence groups such as Southern Asians, onset in the 20-30-year age group is now increasingly common. The socioeconomic and public health impact of this downward shift in disease onset on society is much greater through effects on the workforce as a result of premature morbidity and mortality. This trend to a younger onset of type 2 diabetes highlights the critical importance of the initiatives that have demonstrated that type 2 diabetes can be prevented by lifestyle measures. This has been clearly demonstrated in the USA, Finland, Japan and India.

**Diabetes in Children and Adolescents**

Type 2 diabetes was formerly considered as a disease of adults but there now is a major concern now about a new aspect of the epidemic, the appearance of type 2 diabetes in children, teenagers and adolescents. This is certainly an emerging public health problem of significant proportions. While until now, type 1 diabetes has been the major form in children but it seems likely that type 2 diabetes is set to be the predominant form within 10 years in many ethnic groups and potentially also in Europid children. Type 2 diabetes has already been reported in children from Japan and other Asian nations, the USA, Pacific Islands, Hong Kong, Australia and the United Kingdom. Among children in Japan, type 2 diabetes is already more common than type 1 diabetes, accounting for 80 percent of cases of diabetes in childhood. The incidence almost doubled in Japan between 1976-80 and 1991-5.

This fall in the age of onset of type 2 diabetes is an important factor influencing the future burden of the disease. Onset in childhood heralds many years of disease and an accumulation of the full range of both micro- and macro-vascular complications.

**A Future Perspective**

It will take a much more integrated and international approach to have a significant impact on the diabetes epidemic. Type 2 diabetes is not just a disease but it is a
symptom of a much larger global problem – the effect on human health of environmental and lifestyle changes. An important area of research that is still in the development phase is that relating to the role of the intra-uterine environment and how it influences the risk of developing type 2 diabetes in later life. This may provide new opportunities for prevention with the recognition that prevention of type 2 diabetes starts very early in life.

References

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