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The Growing Prevalence of Type 2 Diabetes: Increased Incidence or Improved Survival?

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Abstract Approximately 347 million persons were estimated to have diabetes worldwide in 2008, an increase of 194 million cases from 1980. Diabetes now affects both high- and low-income countries, with low-income countries bearing the majority of the burden. The epidemiologic transition from traditional health risks, such as poor hygiene, to modern health risks, such as sedentary lifestyle, has facilitated the increase in incidence in diabetes, especially in developing countries. The effect of these risk factors may be especially pronounced in some racial and ethnic populations. Increased surveillance for diabetes has contributed to increased diabetes prevalence in higher-income countries. Survival with and some risk factors for diabetes have improved in developed countries, but global diabetes mortality has increased by 20 % since 1990. Population growth and aging will only increase the burden of diabetes, and public health interventions are needed to address diabetes risk factors to stem the tide of this epidemic.

Keywords Type 2 diabetes · Incidence · Prevalence · Survival · Risk factors

Introduction

The Global Burden of Metabolic Risk Factors of Chronic Disease Collaborating Group (Blood Glucose) estimated that 347 million adults worldwide had diabetes in 2008 based on fasting plasma glucose (FPG) >7 mmol/L, an increase of approximately 194 million cases since 1980 [1••]. One third of this increase was attributed to factors other than aging and population growth [1••]. Based on aging and urbanization, this global prevalence is projected to rise by more than 50 % by 2030 [2].

From 1980 to 2008, FPG and diabetes rose or were stable in the vast majority of regions across the globe, but trends in FPG and prevalence of diabetes did vary across regions [1••]. By 2008, 40 % of cases were in China and India [1••]. Diabetes prevalence was highest in Oceania (>15 %) but also high (>8 %) in most other regions, and diabetes prevalence was lowest in 2008 in the high-income region of Australasia, North America, and Western Europe (women) and in the high-income Asia-Pacific region [1••]. FPG and diabetes prevalence increases were most substantial in Oceania and were flat in east/southeast Asia, central/eastern Europe and sub-Saharan Africa (men). Central Asia, central and eastern Europe, and sub-Saharan Africa were underrepresented in the Global Burden of Metabolic Risk Factors of Chronic Disease Collaborating Group analysis [1••], but prevalence data from other analyses completed for 2000 and 2010 do suggest increases in prevalence in these regions [2, 3].

This continuing rise in the global burden of diabetes does not alone tell us about the relative contributions of increasing incidence of diabetes and increased survival to this epidemic. Increasing incidence clearly plays a role given the high prevalence of diabetes in populations essentially devoid of this condition previously [4]. However, diabetes care has changed considerably in developed countries likely improving survival for at least a subset of patients with diabetes [5]. This review describes the contribution of the following to the increasing global epidemic of diabetes: (1) increasing incidence; (2) changing epidemiology of risk factors for type 2 diabetes; (3) increased surveillance for type 2 diabetes; and (4) improvements in survival for persons with type 2 diabetes. We assume that more than 90 % of cases of diabetes in adults identified by observational studies are type 2 diabetes consistent with prior knowledge of the epidemiology of diabetes mellitus.

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Trends in the Incidence of Type 2 Diabetes

It is reasonable to assume that dramatic increases in diabetes incidence have led to the increased global prevalence of type 2 diabetes [4, 6, 7]. However, while multiple separate analyses have provided consistently large global prevalence estimates and projections [1••, 2], evidence on trends in the incidence of diabetes is more limited and mostly available from a few regions.

Compared with developed countries, the prevalence of diabetes has risen more sharply in developing countries on average and is higher in persons between the ages of 20 and 59 [2].

Developed Countries

In developed countries, incidence rates for diabetes among adults have been characterized by marked, preserved increases since the 1980s, intermittent plateaus, and possible stabilization in the mid- 2000s. Absolute incidence rates vary across countries, and shifts toward increased diabetes incidence in younger age groups have occurred [8, 9]. In the United States, the Centers for Disease Control estimated that the age-adjusted incidence of diabetes increased from 3.5 to 8.7 per 1000 persons between 1980 and 2008 followed by slightly decreased incidence rates through 2011 [9]. Similarly, increases in diabetes incidence were observed in United Kingdom national clinic data between 1991 and 2009 with constants rates in 2009 and 2010 [8]. Data from the Danish National Diabetes Registry also showed increasing incidence rates from 1995–2004 with a suggestion of a small decline between 2004 and 2007 [10], and stable diabetes incidence rates were observed in the Lombardy region of Italy between 2002 and 2007 [11]. An analysis of the Taiwan Nationwide Health Insurance database also demonstrated constant incidence rates between 2000 and 2009 [12]. Different from what has been seen in these other developed countries, diabetes incidence rates have continued to climb through 2009 in Alberta in Canada [13].

Developing Countries

Unfortunately, evidence on secular trends in the incidence of diabetes in developing countries is lacking. Population-based epidemiologic studies such as the Chennai Urban Rural Epidemiology Study (CURES) [14] in India and the Shanghai Diabetes Study in China only provide evidence on trends in diabetes prevalence [15] or on incidence at one point in time as in the New Delhi Birth Cohort [16]. However, the sharp increase in diabetes prevalence observed in developing countries [2], such that 80 % of diabetes cases are in developing countries [4], seems unlikely to be related to improved survival alone.

Increased Diagnosis of Type 2 Diabetes

The awareness of the diabetes epidemic has likely increased surveillance and, thus, the prevalence of known diabetes. Also, hemoglobin A1c (HbA1c), a test that is more expensive but does not require fasting, is now a recommended screening test for diabetes [17]. In the U.S., Cowie CC et al. reported a stable prevalence of undiagnosed diabetes and prediabetes based on fasting glucose or oral glucose tolerance tests but an increase in diagnosed diabetes for 2005–2006 vs 1988–1994 [18]. Similar results were observed for the periods of 1999–2002, 2003–2006, and 2007–2010 [19]. Diagnosed diabetes increased over time while undiagnosed diabetes remained stable. However, prediabetes defined by impaired fasting glucose or HbA1c ≥5.7 % increased substantially over these periods [19]. With increased screening, we would expect milder or earlier cases, which would contribute to an appearance of increased survival as well.

Increased Burden of Risk Factors for Type 2 Diabetes Worldwide: the Epidemiologic Transition

While the secular trends in the incidence of diabetes have not been well-documented globally, the changing epidemiology of risk factors for type 2 diabetes is quite clear. Traditional risk factors such as age, adiposity, sedentary lifestyle, and adverse dietary patterns have increased substantially, especially in developing countries, and other risk factors have emerged, including environmental exposures, adverse intrauterine environment, gene-environment interactions, and epigenomics. A major driver for the increase in traditional risk factors has been urbanization in developing countries; type 2 diabetes follows as food is easier to acquire, less activity needed for daily living, and the likelihood of surviving to older age increases [6]. Moreover, China and India now account for 40 % of current cases of diabetes [1••], and risk factors, such as body mass index (BMI), appear to increase diabetes risk in Asian populations more than previously observed in non-Asian populations.

An important concept to consider in this discussion is the epidemiologic transition from traditional health risks (eg, poor hygiene) to modern health risks (eg, sedentary lifestyle) [20•]. Using the Global Burden of Disease Study 2010, in a comprehensive study of trends in the global burden of disease between 1990 and 2010, Lim et al. estimated the contribution of 67 risk factors to the global burden of disease, estimated by disability-adjusted life-years (DALYs), from 1990 to 2010 [21••] providing important evidence of this epidemiologic transition.

Age

Diabetes risk increases with age, and as the population ages, we expect a higher burden of type 2 diabetes. However, the

Global Burden of Metabolic Risk Factors of Chronic Disease Collaborating Group found that aging and population growth accounted for only 70 % of the increase in global diabetes prevalence from 1980 to 2008 [1••].

Another particular concern is the burden of diabetes anticipated and observed in children and adolescents. While data are lacking on actual trends across populations over time [22], the existence of adiposity and elevated glucose [23] is alarming and will only add to the current prevalence of diabetes as the population ages. Based on existing data on diabetes and demographic projections in the U.S., the SEARCH for Diabetes in Youth Study Group estimated that prevalence of type 2 diabetes among U.S. persons younger than the age of 20 years will increase by 2.3 % per year through 2050 [24].

Adiposity

Excess adiposity has long been recognized as a strong risk factor for type 2 diabetes, and the global prevalence of overweight and obesity in adults has increased substantially since 1980 [25••, 26]. The age-standardized prevalence of overweight increased from 24.6 % to 34.4 % between 1980 and 2008, and the age-standardized prevalence of obesity increased from 6.4 % to 12 % between 1980 and 2008 [25••]. While central and eastern Europe had the highest prevalence of obesity in 1980, by 2008, north Africa, the middle East, central and southern Latin America, southern sub-Saharan Africa, and high-income north America had the highest prevalence [25••]. Female obesity increased from 1980 in all regions, and male obesity increased in all regions with the exception of central sub-Saharan Africa and south Asia [25••]. The largest absolute increases in numbers of overweight people occurred in the United States, China, Brazil, and Mexico between 1980 and 2008 [25••], and proportionally, the most dramatic increases occurred in Oceania, a region in which the prevalence of obesity was already >20 % in 1980 [25••].

Specific quantitative evidence on how much of the increasing global burden of diabetes can be ascribed to adiposity is sparse. A recent analysis of the National Health and Nutrition Examination Survey (NHANES; 1988–1994, 1999–2004, and 2005–2010) did show that most of the increased prevalence of diabetes between 1988 and 2010 in U.S. adults younger than the age of 65 could be explained by corresponding increases in BMI [27]. Increases in overweight among infants and children have been observed worldwide as well [28, 29], and earlier obesity appears to increase later risk of diabetes [30, 31].

Much of the data discussed above rely on BMI as a measure of adiposity, and BMI is known to predict diabetes risk differentially across racial and ethnic populations. As noted in multiple comprehensive reviews on the topic [32•, 34], compared with Caucasians, South and East Asian populations develop type 2 diabetes at a lower BMI and have more "metabolically-disadvantageous" body composition (more abdominal and visceral fat and less lean mass) [4, 32•]. In the U.S., higher diabetes burden at a lower BMI has also been observed in Asian Americans (Chinese, Japanese, Filipino, Korean, Vietnamese, Southeast Asians, and South Asians) and Native Hawaiians compared with Caucasians [33, 34]. Thus, increasing adiposity in populations that appear more susceptible to accumulating more metabolically-harmful adipose has certainly contributed to the increased global burden of diabetes.

Nutrition & Physical Activity

The epidemiologic transition can explain this global increase in adiposity [20•]. As infectious disease becomes less of a burden, life expectancy increases and economic growth occurs. These facilitate adoption of a Western lifestyle characterized by increased access to food, shift to a lower-quality diet, and a more sedentary lifestyle [20•, 21••, 35•]; diet [36] and a sedentary lifestyle contribute to excess adiposity but can also cause diabetes independently.

With this nutrition transition, carbohydrates such as whole grains are replaced with lower-quality carbohydrates such as refined sugars (including sugar-sweetened beverages) [35•]; fresh fruit and vegetable consumption decrease [20•]; and the consumption of animal products increases [35•]. Even though more income may be available for food, cheaper foods of lower nutritional quality are more appealing in developing countries where despite economic growth, incomes are still low [35•].

In 2010, physical inactivity, high-sodium diets, and diets low in whole grains contributed substantially to the global burden of diabetes [21••]. Other "modern" dietary factors have also emerged as possible risk factors for diabetes. In a recent cross-country analysis of data from 43 countries, despite similar total sugar intake, diabetes prevalence was 20 % higher in countries with higher availability of high fructose corn syrup [37]. Red meat consumption, and in particular processed red meat consumption, also appeared to raise diabetes risk in observational studies in the United States, France, Japan, and Rotterdam [38–41].

Smoking

Active smoking is associated with a 44 % increased risk of diabetes based on a meta-analysis of 25 observational studies [42], and the overall numbers of tobacco smokers increased from 1990 to 2010 [35•], consistent with what is unfortunately expected with the epidemiologic transition [20•].

Socioeconomic Factors

Given the risk factors described above, the impact of changing macroeconomics on the global burden of diabetes risk factors must be discussed. In a study combining data from the Global

Burden of Metabolic Risk Factors of Chronic Disease with data on country-level gross domestic product (GDP) and urbanization, higher GDP was associated with a higher BMI with a plateau (for both men and women in 1980 and for men in 2008) or decrease (women in 2008) in BMI at the highest GDPs [36]. Increasing BMI was also observed with increasing urbanization, especially in the 2008 analyses [36].

Environmental Exposures

In parallel with changes in macroeconomics, additional environmental exposures that may increase diabetes risk have emerged, most of which remain poorly understood. An elegant discussion of many of these postulated exposures and how they may trigger hyperinsulinemia as the primary "lesion" underlying type 2 diabetes is provided by Corkey 2012 et al. [43••]. These putative exposures include climate change, contamination of the food and water supply (from chemicals in agriculture, drugs in food animals, and plasticizers used in the packaging of foods) and advanced glycation end-products in prepared food. Some of the strongest evidence for this insulin hypersecretion hypothesis is on the effect of food additives in increasing insulin secretion [43••]. In addition, The Danish Diet, Cancer, and Health Study demonstrated the possibility that air pollution as estimated by residential NO_2 levels may increase diabetes risk [44]. The International Diabetes Federation published a report on diabetes and climate change given the increasing global burden of disease related to both of these seemingly unrelated entities. Diabetes and climate change share etiologies including increased mechanization of transportation, depletion of natural resources with population growth, increased use of animals for food, industrialization of food production, and globalization of food and agriculture, and the IDF postulates that climate change, through natural disasters and droughts, contributes to the diabetes epidemic through excessive pressure on health care systems, especially those in developing countries, with concomitant food insecurity causing continued diabetogenic dietary patterns [45•].

Genetic Risk

Knowledge of how genetic variation contributes to type 2 diabetes risk has grown exponentially during the time that type 2 diabetes has emerged as one of our most important global public health issues. Well over 50 single nucleotide polymorphisms (SNPs) are now known to associate with type 2 diabetes risk [46]. However, it is unlikely that these genetic risk factors have increased in prevalence during the past approximately 50 years that diabetes prevalence has increased. The "thrifty gene" hypothesis is a well-known, although not ubiquitously-accepted, explanation [47, 48] for the emergence of type 2 diabetes in the face of a likely fairly constant genetic background over these 50 years. This hypothesis suggests that selection for genetic variation that allows for storage of energy in the case of famine occurred over time [47]. Basically, there was previously an evolutionary benefit of insulin resistance [49]; now, in an era of excess food and decreased physical activity, these genetic variants that were previously beneficial are now emerging as risk factors for type 2 diabetes. The overall effect of this is an overarching interaction between previously-selected genetic variation and secular trends in environment.

Genetic discovery for type 2 diabetes has mainly occurred in populations of European ancestry [46]. Additional genetic variation important for diabetes risk is emerging in other populations (eg, South Asians, East Asians, and East Africans) although data are still quite limited [46, 50–52]. The existence of unique genetic variation contributing to diabetes burden in other populations may help to explain absolute differences in diabetes risk and differences in the relationships between adiposity and diabetes across populations as described above.

Another consideration relevant to this discussion is the impact of epigenomics on diabetes [53•]. Epigenetic changes occur throughout development and the life span in response to factors ranging from parent-of-origin effects for alleles to the intrauterine environment and beyond. Early evidence indicates that the intrauterine environment can affect epigenetic changes ultimately relevant to diabetes risk [53•]. It seems likely that other environmental factors, such as those described above, will emerge as triggers of epigenetic changes, which alter diabetes risk.

Chronic Diseases and Medications

While a complete discussion of this topic is beyond the scope of this review, we must acknowledge that secular trends in other chronic diseases and medication use also likely increase the overall burden of diabetes. Conditions increasing in prevalence that appear to increase diabetes risk include periodontal disease [54], nonalcoholic fatty liver disease [55], psoriasis [56], depression [57], and vitamin D deficiency [58, 59]. Similarly, common medications for chronic disease, such as atypical antipsychotics, increase weight [60, 61] and may increase diabetes risk.

Secular Trends in Survival of Persons with Type 2 Diabetes

An obvious explanation for the increasing global prevalence of diabetes is improved survival because of improvements in care. Evidence for this improvement is supported for populations in some developed countries. However, it seems unlikely that developing countries would have improved survival in the face of a growing epidemic and constrained resources. Globally, diabetes rose from being the 15th most common cause of death in 1990 to being the 9th most common cause of death in 2010 [62••]. Compared with 2010, the International Diabetes

Federation estimated that global deaths attributable to diabetes increased by 15.9 % in 2011, likely related in part to overall increasing prevalence [7].

Mortality

In the Global Burden of Disease Study, the age-standardized death rate increased by 20 % between 1990 and 2010, and the increased mortality burden due to diabetes was particularly pronounced in central Latin America, the Caribbean, North Africa, the Middle East, and Oceania [62••]. In the U.S., data from the National Health Information Survey demonstrated a decrease in all-cause and cardiovascular disease mortality for participants with diabetes between 1997 and 2006 [5]. Decreasing mortality has also been observed for type 2 diabetes in Sweden between 1980 and 2004 [63], the United Kingdom (Wirral Peninsula, 2000 to 2007) [64] and Taiwan between 2000 and 2009 [65].

Cardiovascular Disease-Related Mortality

Decreases in cardiovascular disease (CVD)-related deaths in diabetes have been reported in developed countries. In The Netherlands, mortality for patients with diabetes after a myocardial infarction remained high throughout but decreased between 1985 and 2008 [66]. A recent analysis of all patients hospitalized for percutaneous interventions at the Mayo Clinic between 1979 and 2008 demonstrated decreases in in-hospital death in patients with diabetes by approximately 2.5 percentage points from the period of 1979–1996 to 1997–2008 [67]. Findings from the National Health Service in the U.K. showed similar results with decreases in in-hospital mortality with acute myocardial infarction and stroke in patients with diabetes between the periods of 2004–2005 and 2009–2010 [68].

Cardiovascular Disease Risk Factors

These improvements in survival for patients with diabetes in developed countries are likely related to improvements in risk factors for cardiovascular disease such as blood pressure, cholesterol, and smoking. In the U.S., NHANES data demonstrated an improvement in meeting HbA1c, blood pressure, and low density lipoprotein (LDL) cholesterol goals between 1988 and 2010 [69]. In the Health Survey for England, even though diabetes prevalence increased, patients with diabetes experienced reductions in blood pressure, total cholesterol, and smoking between 1994 and 2009 [70]. Improvements in blood pressure, cholesterol, smoking, and glycemic control were also observed in a Parisian cohort with diabetes from 2001–2002 to 2006–2007 [71]. Similar findings were obtained in Taiwan for HbA1c, blood pressure, and cholesterol in Taiwan between 2006 and 2010 [72]. The Guideline Adherence to Enhance Care (GUIDANCE) study, a cross-sectional analysis conducted in 8 European countries, found that HbA1c and blood pressure were lower in 2009–2010 compared with a similar analysis in 1998–1999 although statistical significance of the differences between studies was not reported [73]. Decreased total cholesterol and blood pressure were observed among patients with diabetes between 1994 and 2008 in Norway [74].

General Diabetes Care

General improvements in other aspects of diabetes care have occurred in some regions as well. A study of the Italian National Hospital Discharge Database showed a nationwide decrease in admissions for acute diabetes complications between 2001 and 2010 [75]. In the U.S. the age-adjusted percentage of adults with diabetes receiving an annual foot exam increased from 48.1 % in 1994 to 67.5 % in 2010 [9].

Medication Use

Aspirin and HMG CoA reductase inhibitors are now widely used for secondary prevention of coronary heart disease, including in patients with diabetes. In Taiwan, among patients with diabetes and hypercholesterolemia, statin and aspirin use increased from 1988 to 2006 by 78 % and 47 %, respectively [76].

We must also consider metformin utilization as a possible contributor to improved survival in diabetes seen in some regions. Metformin is the recommended first agent for treatment of type 2 diabetes [77], and its use has increased in developed countries [78, 79]. Metformin may confer survival benefits because of its beneficial metabolic effects (eg, lipids) beyond HbA1c and possible beneficial effects on cancers [80]. A recent observational study from the UK General Practice Research Database showed that those treated with metformin monotherapy were less likely to experience the composite outcome of incident cardiac event, incident cancer, or mortality during follow-up compared with sulfonylurea monotherapy, insulin monotherapy, and insulin combined with metformin [79].

Cancer

The emerging role of cancer in the diabetes epidemic has been recognized over the past decade. Diabetes appears to increases the risk of and mortality from many cancers [81], and treatments for diabetes may increase or decrease cancer risk [79, 82]. Thus, from the standpoint of the global burden of diabetes, we anticipate that the global cancer risk and mortality burden related to diabetes will increase, but evidence on the medications used to treat diabetes is less clear and requires continued investigation.

Disparities in Survival with Diabetes

Available evidence indicates disparities in trends in diabetes outcomes across populations. In the U.S., while HbA1c, blood pressure, and total cholesterol, improved in patients with diabetes from 1988–1994 to 1999–2008, for the 1999–2008 cohort, compared with whites, African Americans and Mexican Americans were more likely to have HbA1c ≥7 % [83]. In addition, persons with less than a high school education were also less likely to experience improvements in glycemic control over the time studied [83]. Additional evidence on health disparities in diabetes complications are reviewed fully in a recent Endocrine Society Scientific Statement [84••].

Conclusions

The global burden of type 2 diabetes is clearly increasing, and the contributions of increasing incidence, due to increases in diabetes risk factors and increased screening, and improved survival vary substantially worldwide. In the context of heterogeneous and ever-changing macroeconomic conditions across the globe, we can surmise that increases in screening and improvements in care benefit areas with resources (eg, developed countries) and that areas with lower GDP have not increased screening and quality of care such that the increased prevalence of diabetes can be attributed to those factors.

Evidence from developing countries demonstrates increasing incidence rates from the 1980s to the 2000s with a plateau or downturn in more recent years. Fasting glucose criteria used for the diagnosis of diabetes were also lowered twice during that period and, thus, contribute to some of the increased incidence observed [17]. Data on secular trends in diabetes incidence are simply lacking from most regions, and surveillance is needed to understand incidence in these areas that represent most of the globe. We also have evidence of improvements in survival with diabetes from certain regions of the world, and we know that risk factors for diabetes morbidity and mortality have improved in these regions but do not have sufficient evidence on others. Globally, the mortality burden of diabetes has only increased over time. Finally, diabetes screening rates have increased in some areas, but the extent of this globally remains unknown.

Even though data on incidence rates over time are insufficient, the global burden for important risk factors for type diabetes is clearly rising. The epidemiologic transition from communicable to noncommunicable disease means that diabetogenic dietary and physical activity patterns, adiposity, and environmental exposures will only increase in the current landscape. The interaction of these factors with a genetic background selected for diabetes mandates that diabetes incidence will continue to rise in most areas of the globe. In addition to economic conditions that will affect the future prevalence of diabetes globally, racial and ethnic differences in the susceptibility to diabetes risk factors and diabetes are of major concern as diabetogenic economic conditions occur with the epidemiologic transition. These areas, such as China, India, and Oceania, are now emerging as hotbeds of type 2 diabetes, and further understanding of the biology and health behaviors underlying this susceptibility is necessary to ultimately prevent the excess of diabetes that will occur in these populations.

This review of the factors contributing to the global prevalence of diabetes is limited by the current data available on trends in incidence, including risk factors and surveillance, and survival. We have selected large epidemiologic studies spanning the globe when possible to present global data and trends. In many cases, such studies were not available, and we have then selected country-specific studies, which cannot address epidemiology at the global level. Additional studies certainly exist, but a full review on each of these topics is outside of the scope of the current perspective. It must be noted that these global studies are ecologic studies highly susceptible to confounding; while exact estimates are likely flawed, the overall inferences regarding overall changes in burden are likely accurate. Finally, consistent with what is known about the epidemiology of diabetes mellitus, we have assumed that the included studies on trends in diabetes prevalence, diabetes risk factors, and survival from diabetes represent data on type 2 diabetes unless otherwise specified.

In summary, the epidemiologic transition likely explains the bulk of the growing global prevalence of diabetes. With this transition come increasing life spans and the occurrence of diabetes in populations previously unaffected by this disease, with many of these populations particularly susceptible to diabetes. A stabilization of incidence and improvement in survival in selected areas also contributes to the growing prevalence of diabetes and provides a starting point to address this rampant epidemic in other areas. While many higher-income countries have already realized improvements in diabetes risk factors and stabilized incidence rates, some risk factors, such as adiposity and sedentary lifestyle, have remained at best, stable. In these countries, additional interventions are needed to address these well-established risk factors. Uniform surveillance for trends in diabetes incidence and its risk factors in most other regions of the globe is imperative to understand the projected burden and to target areas ripe for improvement. Ultimately, to address the burden of diabetes in developing countries, we must fully recognize and respond to the context of the epidemiologic transition and build upon the successes experienced in high-income countries.

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Compliance with Ethics Guidelines

Conflict of Interest Nisa M. Maruthur declares that she has no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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