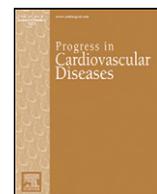




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Commentary

Preventing preventable chronic disease: An essential goal



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Introduction

Chronic disease is the dominant cause of morbidity and mortality across the globe. The cost of treating the clinical expression of the traditional chronic diseases has become exorbitant to the point of significant economic disruption in spite of the fact that many of these diseases are to a very large extent preventable, to wit cardiovascular disease (CVD), stroke, type 2 diabetes (T2D), obesity, chronic lung disease and many cancers. Recognition that the costs of treatment could stunt economic growth has not yet meaningfully penetrated the public health debate.

In the 1960s the Framingham Heart Study fostered identifying what are now considered traditional risk factors, hypertension, elevated lipids, smoking, diabetes and sedentarism. In the absence of effective therapy, the mid-20th century approach to chronic disease was to identify and then manage the asymptomatic risk factors. Suppression pushed disease expression forward in the lifecycle creating the societal benefits of child-rearing and career productivity.

As treatments evolved, wealthy economies initially could keep pace with the expanding costs. However, cost escalation soon began to grow far more rapidly than national wealth, and the curves are ever widening. Middle-income countries reached a median age of 59 years in the mid-1980s. As Daniels et al. show,¹ these countries had half the wealth of advanced economies when they had reached this same longevity but by the mid 1980s expensive interventions were available. When low-income countries began reaching this same longevity in the second decade of this century, they had half the wealth of middle-income countries in the mid-1980s. But now global connectivity informs all of the availability of bypass surgery (coronary and gastric), coronary stents, kidney dialysis, care for the blind, stroke interventions, cancer chemotherapy, and joint replacement to name just the top of the list.

The world is richer, older, more urban, more informed and better educated than it has ever been. Democratization and open societies increased in the latter part of the 20th century and hopefully will return to that trajectory in the near future. On the other hand, this wonderful progress possesses characteristics that are to varying degrees the drivers of chronic disease. Resolving this conflict, and it must be resolved, will be difficult and will require persistence, resilience and tact.

For example, when families move to cities, the wife joins the workforce and relies on safe, tasty, long-shelf-life food for her family supplied primarily by multinational food companies. This food, however, enhances the risk of obesity, T2D, hypertension and hyperlipidemia.

Diminished physical activity levels aggravate these conditions, particularly in children captured by television, electronics, and school. Smoking rates almost invariably increase in both men and women and both boys and girls, only naturally abating in a generation or so as some become well educated and better-informed.

The cost of treating these disorders into the infinite future is an existential threat to national security and stability. If the anticipated health care demands are met, there will be little, if any, capacity to meet equally pressing government obligations. If the health demands are ignored or left to market forces that favor the well-to-do, the political and social dislocations and angst could threaten societal cohesiveness and political stability. This Homeric tug of war will come to any country, rich or poor, that aspires to remain an open society.

One example, replicated qualitatively in all advanced economies for a variety of diseases, is that CVD cost \$555 billion in the U.S. in 2014 and this is estimated to rise to \$1.1 trillion by 2035.² All developed economies face similar cost escalation burdens now, and they sit menacingly on the horizon of all emerging economies that must confront them with a vastly lower Gross Domestic Product/person.

The new global health goal needs to become economic development, even economic survival. Current preventive measures too often are amelioration, not prevention. The traditional risk factors themselves need to be prevented, so-called primordial prevention. Being free of traditional risk factors may reduce the emergence of CVD and T2D by up to 90%.^{3,4} These are powerful targets and reaching them, even partially, over decades could rescue a health care system, or an economy.

Universal health care (UHC) in emerging economies is postulated to be robust primary care that includes basic surgical capacity as well as obstetric care. No doubt countries whose systems offer poor, fragmented care with high out-of-pocket costs, lack a capacity for follow-up, and are not tied to hospital services when needed will be delighted to embrace these basic capacities. But how long will such satisfaction last? What then? This tsunami of expectation will drown the national budget or anger and frustration will threaten the political establishment. In addition, Schmidt et al⁵ argue that UHC, now the primary goal of WHO and many other agencies, will redirect money, personnel and focus away from prevention. A new, complex level of prevention will be essential in the 2030s. On a positive note, civil society efforts in developed economies suggest a responsiveness to policy changes such as taxing sugary drinks or improving children's nutrition.

Argument

Going forward population health needs to focus on policy, not behavior or pills or the patient-practitioner relationship. Our call for policy interventions is not new.^{6,7} Unfortunately, the lens through which the policy or commercial determinants of health are currently viewed is the narrow aperture of health—reducing individual risk, increasing

taxes if permitted, and meekly suggesting nutritional policy changes. The Health in All Policy⁸ effort, for example, was timid, collaborative rather than confrontational, and weighted toward social equity.

We argue that a wider lens is essential. Future goals will be altering global trade agreements, agricultural subsidies, formulation of food-stuffs, TV advertising aimed at children, and eliminating combustible tobacco. If these are not introduced successfully, most non-health issues such as infrastructure, transportation, education and even the military will be woefully underfunded in order to provide for chronic disease treatment for the rapidly expanding middle class, middle-aged and elderly populations, otherwise known as voters. They will make their voices heard in a world now more open and more responsive to civic demands.

The dominant budget-busting disorders will be the progression from obesity to diabetes to end-organ diseases and combustible tobacco. Obesity, the first phase of the dietary cascade of illness, shows little likelihood of diminishing. Global overweight/obesity in adults (body mass index/BMI >25 kg/m²) increased by >25% from 1980 to 2013.⁹ The second stage of this trajectory, T2D, has not decreased in any country since 1980. Coupling this with population increase, the number of adults with diabetes worldwide quadrupled.¹⁰ In fact, diabetes (mostly T2D) in the U.S. cost \$245 billion in 2012, including lost productivity and this had increased 30% since 2007. Days-in-hospital increased 6% between 2007 and 2012 whereas national hospital utilization fell by 10%.¹¹

The third phase, end organ cardiac, cerebral, renal and joint disease, all manageable at great expense, is coming to emerging economies. The population health question of the age is whether or not that third stage can be curbed in the future by interventions inaugurated now. Although the cost burden will persist for the next several decades, the benefits ultimately will be profound and dramatic.

Diabetes, especially T2DM, leading role in determining future health care costs warrants a more detailed discussion. In the U.S. healthcare costs for the obese are 37% higher than patients of normal weight. Obesity-related illnesses consumed 27% of the increase in healthcare costs from 1987 to 2001.¹² Each categorization of obesity, overweight, obesity and morbid obesity, defined as a BMI \geq 30Kg/m², is associated with a step up in the incidence of T2D.¹³ For overweight women, the 10-year adjusted odds ratio of type 2 diabetes is 4.6, reaching 17 for the morbidly obese. For men the step up is greater, going from 3.5 in the overweight to 23.4 in the morbidly obese.¹³ Snapshots of sub-Saharan Africa, India, and Mexico are consistent with these observations although the cost data are far less robust.

Urbanization is a ubiquitous and forceful driver of overweight and obesity and sub-Saharan Africa is the most rapidly urbanizing region in the world today. Whereas the global increase in T2D from 2010 to 2030 is estimated to rise by 54%, the estimate for sub-Saharan Africa is nearly double that, 98%. Impaired glucose tolerance will more than double, 37% to 76%. While most sub-Saharan Africa data come from cross-sectional, not longitudinal studies, in those African countries with more rigid data applied the prevalence of T2D increases from 2 to 4 times.¹⁴

In India the epidemic is and will be severe. The Indian population has a heightened incidence of T2D and CVD beyond what would be considered usual; it is unclear if this is genetic, epigenetic, or gestational, but it is real, not artifact. In 2030 it is estimated that there will be over 100 million diabetics; adding to this, the number of hypertensive adults is estimated to rise from 140 million to 214 million.¹⁵ Again, the impact of urbanization is quite pronounced, with the urban T2D prevalence being five times higher for women and four times higher for men in one study¹⁵ and three times higher for both genders in another.¹⁶ Today over half (53%) of all deaths are attributed to chronic diseases; this will surely increase going forward.

Mexico currently faces a healthcare fiscal crisis due to a large extent to obesity and T2D. Obesity-related diseases cost \$800 million in 2013 with "alarming projections".¹⁷ From 2000 to 2010 obesity and overweight increased from 60.7% to 69.4% in men and from 65.3% to 73.0%

in women. By 2050 the estimate for diabetes ranges from 13.7% to 22.5%. In 2012 a third of children less than five years of age were obese or overweight.¹⁷ For children born in 2010 the lifetime risk for T2D ranges from 34% to 53%.¹⁸ Should these estimates become a reality, the national budget would hardly have room for anything but healthcare.

The fact that neither obesity nor diabetes have decreased in any country in decades is prima facie evidence that there are no effective policies to curb their growth. Because the magnitude of the threat is not fully appreciated by policy makers, the current range of interventions presented for consideration is far more timid, than what is required.

Compared with the complexities and multiple facets of diabetes, the most straightforward intervention is tobacco control. This is the one area in which U.S. public health displayed a visible, overt, comprehensive policy assault, albeit decades ago. Summarizing a great deal of careful observation, three things emerge: high taxes, although very regressive, reduce consumption; the policy stipulations of the Framework Convention on Tobacco Control contribute to a ratcheting down of global consumption; and many countries have probably reached a floor below which these policies will no longer be effective. Getting smokers to switch to e-cigarettes when combustible tobacco is available does not work.¹⁹ The policy that needs to be considered seriously is the curtailment of production, manufacture and distribution of combustible tobacco. The e-cigarette likely reduces risk of chronic disease by 95%²⁰ and does not leave nicotine addicts stranded. The emergence of the mob after alcohol prohibition in the U. S. will not be repeated because the addict is not abandoned. The concerns about impurities in e-cigarettes can be approached by creating tax incentives and benefits for low or zero contaminants.²¹

The trajectory of chronic disease in emerging economies in the 21st century is orders of magnitude different from that of the 20th century in advanced economies. The time frames and social transformations of the past cannot be applied to emerging economies. Wealth creation, technological advancement, food resources, education and urbanization are changing much more rapidly than they did in the West. The cost of interventions for both risk factor control and disease management and treatment has exploded. Emerging economies cannot even contemplate offering treatment of all for these diseases. But these governments can contemplate the dismay, frustration, and anger that such inability can bring.

Table 1
Categories of policy Interventions.

Policy	Goal	Examples
Cap and trade	Improve industrial processes	Reduce impurities in e-cigarettes
Create alliances with civil society	Alter corporate or government policy.	Reduce sugar, fat, salt in soda, snacks and school lunches
"Mothers against drunk driving"		
Conditional cash transfer	Promote leanness and exercise programs in school	Change school diets and exercise programs
Public-private partnerships "Agita Sao Paulo"	Reduce sedentarism	Encourage exercise for all
Messaging in children's TV programs	Establish health principals and patterns in preschool children	Emulate Bogata-Sesame St. program
Influence/change government/institutional policy	Establish health outcomes as goals for trade and subsidy policies	Place public health advisors in the office of trade representatives and departments of agriculture
Outright ban	Harm reduction	Eliminate combustible tobacco

Belling the cat

Designing a policy agenda is beyond the scope of this paper, but we offer several categories of effective policies (Table 1). To reduce the SO₂ emissions, the U.S. Environmental Protection Agency issued guidelines and offered tradable tax credits to corporations that were able to come in below a required standard. In due course the industry reduced the emissions close to zero.²¹ This approach can be taken for contaminants in e-cigarettes. Public health initiatives designed to create allies within civil society, using the model of Mothers against Drunk Driving, can be effective and could be directed at the sugar content of breakfast cereals or soda and the salt and fat content in snack food, school lunches, TV advertising, alcohol consumption and multiple other targets. Regulatory intervention would follow upon popular support. Conditional cash transfers have been effective in supporting education and vaccine adherence²²; they could be offered for maintaining leanness and physical activity in school. Public-private partnerships such as Agita Sao Paulo²³ to increase physical activity and exercise across all age groups represents an effective model that could have wide application. The pre-school/early school TV education program in Bogota, Colombia has shown that young students absorb and act upon dietary messages embedded in entertaining TV, and that the entire family can be the beneficiaries.²⁴ The U.S. Trade Representative's office has seven hundred people sitting on multiple advisory committees, none representing public health. This needs to change.

Conclusions

Public health needs a strong wake-up call and needs to call forth the resources to begin a global policy assault on the prevention of chronic disease risk factors, including obesity and T2D. Public health needs to design policy priorities and create societal allies to begin to confront the dominant but controllable health threat of the next 50 years.

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Declaration of competing interest

None.

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