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Regulating risk factors for chronic disease: Experiences from the United States

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The United States preceded Latin America in its path to a dominance of noncommunicable disease. But even as the rest of the Americas joins us in this demographic transition, we are still discovering the paths to systematically prevent or postpone these illnesses. Today's epidemiology of cardiovascular disease, diabetes, cancer and pulmonary disease was built on pyramids of social inequality, societal and technological transformation, and deep economic interests. A piece of very good news in the US is that from 1980 through 2009, coronary heart disease mortality decreased by two thirds, an extraordinary change thought due roughly half to primary prevention and half to medical care. The bad news is that obesity and diabetes have increased markedly in the same time period, and deep inequities persist. While tremendous medical and technological progress has been made, tearing down the edifices of preventable illness will require more than new miracle drugs. To change that situation, without rendering most adults dependent on invasive medical treatment or expensive drugs, will require a more fundamental examination of the building blocks that lead to chronic illness and a rebuilding of our house. This paper will briefly examine how some of those building blocks are being addressed in the United States. Specifically, with a short examination of approaches to social inequality, dietary risks, tobacco and physical inactivity.

Economic and social inequity

Perhaps the most striking characteristic of the burden of chronic disease in the US, as in other nations, is the inequity in its distribution. This inequity is present both in the incidence of many chronic diseases,

and in their outcomes such as hospitalization or death. Income inequality, which had fallen after the crash of 1929, has been increasing steadily in the United States since the 1970s, and now has reached levels not seen since 1928. In 2012, for the first time, the bottom 90% had less than half of the income of the nation.Housing has become increasingly expensive and difficult for many families. Nevertheless some progress on social determinants has been made, for example the percentages of children who graduate on time from high school has increased for all, and for black and Latino children. Homicide has fallen significantly. Implementation of the Affordable Care Act reforms has reduced, but not eliminated, disparities in access to health care, with the percentage of uninsured individuals falling from 18% in 2013 to 11.2% in early 2015. Yet income and race continue to be major determinants of chronic disease incidence and outcomes. For example, Latinos and African Americans in California are roughly twice as likely as non-Hispanic whites to have diabetes or to die from it. In short there is a mixed pattern of progress and backwards movement in addressing basic social determinants that will be reflected in the epidemiology of chronic disease for years to come. Some public health systems attempt to address the basic social determinants underlying chronic disease as part of their work, but this occurs only in a small, but growing, number of jurisdictions. Many other social forces also work to reverse these inequalities.Yet others forces work to aggravate them. Governmental political approaches to income equality vary widely across the country, from conservative governments that have dismantled protections for workers and made taxation more regressive, to administrations that have increased the minimum wage or explicitly sought to reduce inequality. Mayor De Blasio of New York City recently made reduction of income inequality the centerpiece of the City's long term Strategic Plan, OneNYC, pledging to lift 800,000 residents out of poverty over the next decade and significantly reduce the racial and ethnic disparities in premature mortality. It will be important to follow this unusually explicit effort of a major urban center to buck the national trend. While this paper will not review the complex range of social determinants, their importance in determining the distribution of chronic disease cannot be ignored.

Environmental and behavioral risk factors

Globally, four major "behavioral" risk factors underlie more than two thirds of all new cases of noncommunicable disease: unhealthy diet, tobacco use, physical inactivity and harmful use of alcohol. Table 1 highlights the top underlying causes of death in the Global Burden of Disease analysis in the United States, recognizing that these causes interact. For example dietary risks and physical inactivity can in turn generate elevated body mass index, and high cholesterol, plasma glucose and blood pressure.

Table 1. Underlying causes of death United States 2010

Cause	Number of Deaths
Dietary Risks	678,000
Tobacco Smoking	466,000
High blood pressure	443,000
High body mass index	364,000
Physical inactivity	234,000
High fasting plasma glucose	214,000
High total cholesterol	158,000
Ambient particulate matter	103,000
Alcohol use	89,000

Source: Institute for Health Metrics, 2015, accessed at: http://vizhub.healthdata.org/gbd-cause-patterns/

While some of these are often referred to as"behavioral risk factors" many should be thought of environmental risk factors. Just as people breathe polluted air and fall ill because the air surrounds them, people eat unhealthy food and travel in cars because it is what surrounds them, and it requires a very conscious set of choices to do otherwise. A major effort of the public health community over the past decade in the US has been to shift from primarily educational approaches to modify individual behavior, with limited effectiveness, to one based on changing these environmental determinants of risk of chronic disease. But that shift is occurring unequally and with limited reach, and requires building broader social con-

sensus for the needed level of transformation. Table 2 presents some of the policy and regulatory approaches that are in use or have been attempted in the US or other countries to address tobacco, dietary risks or alcohol. It is clear that the strategies to address NCD risks that arise from these three groups of consumer products have many common traits, addressing for example the products themselves (composition, packaging, labeling or size), their price, the places they are sold or used, how they are promoted, and their economic impact. Better coordination of measures across NCD risk factors is a potential opportunity, but in general they have been addressed one by one.

Table 2. Policy and regulatory strategies in use or attempted for tobacco products, dietary risks and harmful use of alcohol *

Type of Change	Strategy	Tobacco Use			Unhealthy Diet						Harmful Use of Alcohol
		WHO TARGET: 30% Reduction**			WHO TARGETs: Halt rise of diabetes and obesity, 30% reduction in salt intake, eliminate trans fat**						WHO TARGET: 10% Reduction**
		Cigarettes	E-Cigarettes	Other	Fruits & vegetables	Sugary Drinks	Fast food	Trans Fat	Salt in Food	Energy dense nutrient poor foods	Alcohol
Retail practices	Promote availability of healthy products				✓						
	Require Retailer License	✓	✓	✓							✓
	Restrict Density/ Location of Retailers	✓	✓	✓			✓				✓
	Restrict Near Schools	✓	✓	✓			✓				✓
	Prohibit self-serve	✓	✓	✓							
	Restrict Product Display/Settings	✓	✓	✓						✓	✓

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		Cigarettes	E-Cigarettes	Other	Fruits & vegetables	Sugary Drinks	Fast food	Trans Fat	Salt in Food	Energy dense nutrient poor foods	Alcohol
Restrictions on products	Product Portion/ Package Size Restrictions	✓				✓					✓
	Product Prohibition		✓	✓			✓	✓			✓
	Content limits						✓	✓	✓		✓
	Plain Packaging	✓									
Information	Warning labels	✓	✓	✓		✓			✓		✓
	Mandated Information for Consumers	✓	✓	✓		✓	✓	✓	✓	✓	✓
Price	Excise Taxes	✓	✓	✓		✓				✓	✓
	Sales Taxes	✓	✓	✓		✓	✓			✓	✓
	Minimum price	✓									✓
	Restrictions on Discounting	✓	✓	✓							✓
Marketing	Prohibition on marketing to children	✓	✓	✓		✓	✓	✓	✓	✓	✓
	Restrictions on time place and manner	✓	✓	✓		✓	✓	✓	✓	✓	✓
	Broad prohibitions for all age groups	✓	✓	✓							✓

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		Cigarettes	E-Cigarettes	Other	Fruits & vegetables	Sugary Drinks	Fast food	Trans Fat	Salt in Food	Energy dense nutrient poor foods	Alcohol
Social environment	Regulations for second hand smoke	✓	✓								
	Regulations on day care practices	✓	✓		✓	✓	✓	✓	✓	✓	✓
	Regulations on school practices	✓	✓		✓	✓	✓	✓	✓	✓	✓
	Regulations on workplace practices	✓	✓			✓		✓		✓	✓
	Regulations on public spaces	✓	✓			✓				✓	✓
Other economic approaches	Agricultural subsidies (add or eliminate)	✓	✓	✓	✓						
	Public Procurement policies (promote or restrict)				✓	✓	✓	✓	✓	✓	✓
	Land use/agricultural use or urban zoning policies	✓	✓		✓						
	Incentives/ subsidies for citizens				✓						

✓ = In use or passed somewhere in the US (may be used internationally as well)

✓ = In use internationally but not in the US

* Adapted from PAH0, 2015

Dietary Risks

The U.S. is a leader in the international obesity epidemic. Its food marketplace is dominated by highly processed and unhealthy foods and beverages. Unhealthy diet is the largest leading underlying risk factor for death. At the same time it is a major agricultural producer. The nation has been largely successful in increasing the availability of low cost food and diminishing hunger, but today the poorest and most food insecure suffer most from the poor quality of affordable foods, and are the most likely to be obese.

Efforts to reduce risk from diet have encompassed nutrient specific approaches, place based efforts, informational approaches, fiscal policy and broader efforts to shift the nature of food production and the food supply. Some examples stand out. The US has been successful at greatly reducing consumption of trans fat since national labeling went into effect in 2006, and a round of local legislation further restricted the substance. A federal ban may be finalized this year. While a national voluntary effort to reduce salt consumption, coordinated by New York City, has been underway since 2010, the federal government has not moved forward with either voluntary or regulatory measures to date. Saturated fat consumption has not declined. Some companies have reduced salt across the board or for certain products, for example Walmart reduced it by 16% across its portfolio, but corporate buy in is still far from comprehensive. This stands in contrast to progress in the UK with a government led rigorous voluntary campaign. Or to the combination of voluntary and regulatory measures in Argentina, for example. The combination of education, policy and regulatory efforts has been associated with a decline of 20% in consumption of soft drinks between 2000-2013. However the industry has innovated in response, and sugary energy drinks, sports drinks and teas are on the rise, as is bottled water.

Efforts to create more rigorous requirements for food in place based settings such as daycare centers, schools, hospitals and workplaces have advanced. National legal requirements for healthier school food have been strengthened through the Healthy Hunger Free Kids Act of 2010, but are still threatened with legislative reversal. Daycare food and physical activity

was regulated in New York City in 2007 with associated reductions in early obesity. National daycare standards for publicly subsidized food are under revision, and efforts to extend similar measures voluntarily are underway. Many hospitals are getting rid of sugary drinks and seeking to improve their food offerings. Local governments are increasingly adopting broader public food procurement standards that apply to a wide range of publicly funded or served food or to food sold in publicly owned places.

Other efforts have worked to assure that fruits and vegetables and a broader variety of foods are available even in low income or rural areas that are often characterized as "food deserts." The effectiveness of these measures is not yet clear. In general, efforts to expand access to healthy foods has been less controversial and better accepted than the equally or more important efforts to reduce the ubiquity of unhealthy foods and beverages. These latter efforts have been far more controversial and strongly resisted by the food industry, although gradual progress has been made on some issues, like children's fast food meals.

Rapid expansion of portion sizes for sugary drinks, junk food and a wide range of foods has also been an important contributor in the US. In the 1950s the only size soda at McDonalds was 7 ounces (207 ml). Today that is smaller than their drink for children and beverages in some stores have reached almost 2L. New York City broke ground in passing a law that would modestly restrict sugary drinks in restaurants to 16 ounces (473 ml), however that measure was blocked on a legal technicality by the courts. There has been no attempt yet to regulate allowable package sizes more broadly in the retail market. Interestingly, McKinsey Global Institute estimated that reductions in portion sizes sold may be the most effective intervention for obesity.

Efforts to reduce marketing of unhealthy products to children – or adults – have been very difficult in the U.S. due to current interpretation of constitutional protections for freedom of speech, which have unfortunately been extended by the courts to apply to commercial speech. This has made regulation of marketing of harmful products, even to children, extremely challenging. Efforts by the Obama administration to develop even voluntary guidelines were blocked by Congressional opposition and the

Federal Trade Commission even stopped their monitoring of this marketing.

Information for consumers is showing modest improvements. New York City's innovative 2006 requirement for labeling of calories in chain restaurants survived lawsuits and spread widely. In 2009 menu labeling was included in the national health care reform bill and Federal regulations were finally issued five years later in 2014, and will go into effect nationally in December of 2015. This will require prominent information on calories of prepared foods in chain fast food and other restaurants, and many vending machines, movie theaters and grocery chains. Proposed revisions to mandatory nutrition facts labels on packaged food products are also under consideration and would offer some progress, however they fall far short of the clarity and impact of front of pack labeling systems such as those used in Chile and Ecuador with clear graphic warnings to consumers about unhealthy products.

Modifications of fiscal policy have advanced extremely slowly. Proposed substantial taxes on sugary drinks had failed to pass in over 30 jurisdictions, until November 2014 when the first measure was approved in the small City of Berkeley, California. Berkeley's is a 10% tax, similar to Mexico's. A smaller tax, and one that incides on both soda and junk food was also passed in the lands of the indigenous Navajo Nation. Evaluation of the Berkeley measure is underway. A national tax – the Sweet Act - has been proposed, but is unlikely to progress at this time.Yet at the same time federal food subsidies to families can be used to purchase sugary drinks, generating a $4 billion dollar annual public subsidy to the soda industry, and demonstrating the contradictory impact of public policies in different spheres.

Others are working to encourage a broader reformulation of food production and food supply, often uniting goals of better nutrition and environmental sustainability. This has been reflected in the rapid spread of local Food Policy Councils. These councils have addressed a variety of issues including adoption of more sustainable food production methods, increased access to fruits and vegetables, community gardens, greater use of locally produced foods through farm to school and farm to fork programs, economic incentives for fruit and vegetable consumption, incre-

ased neighborhood availability of healthy foods and conditions for those working in agriculture and food sectors. Councils are also collaborating regionally and nationally to increase their impact on state and national food policy. One policy initiative that has grown out of this work is an incipient effort by the large Federal supplemental nutrition assistance program (SNAP), which provides low income families with grants for purchasing food, to pilot incentives for purchase of fruits and vegetables.

The recent Report of the US Dietary Guidelines Advisory Committee significantly advanced the national discourse both in terms of proposed policy measures for improving the food supply and its emphasis on a more holistic approach to foods and sustainability.

In short, levels of awareness and of action on the risks posed by an unhealthy diet have risen substantially in the US over the last decade, and efforts to transform the food supply are multiplying. However these efforts are very unequally distributed across the nation and have limited reach. They have only just begun to change the face of the food supply. Far more deep-seated changes to the nature of food sold in our supermarkets, restaurants and other commerce are still urgently needed.

Tobacco

The United States has been home to groundbreaking work in the field of tobacco control. Fifty years after the landmark 1964 Surgeon General's report: *Smoking and Health*, enormous progress has occurred. Adult smoking rates have fallen from about 43% in 1965 to about 18% in 2014. Rates of death from lung cancer, the leading cause of cancer death, are declining. Nevertheless, over 40 million Americans still smoke, including over 3 million middle and high school students. Tobacco has killed more than 20 million people prematurely since the first Surgeon General's report in 1964. Unfortunately the rate of decline in smoking has slowed and deaths attributable to smoking are expected to remain high unless action is taken. Part of this persistence reflects the creative adaptive strategies of industry to induce and maintain nicotine addiction. More people are using multiple tobacco products, particularly young peo-

ple. This reflects the introduction into the US market of e-cigarettes, and diversification of small cigars and smokeless tobacco in a wide range of flavors and product designs designed to attract the young, from mango to chocolate. The percentage of U.S. middle and high school students who use electronic, or e-cigarettes, more than doubled between 2011 and 2012. The economic costs attributable to smoking in the US were estimated at US $289–332.5 billion between 2009–2012 and reflect both direct medical care of adults and lost productivity due to premature death and secondhand smoke.

Current efforts are focused on expanding now strongly evidence--based policies that include taxation, smoke free air, increased tobacco addiction support free of barriers to use, warning labels, public health campaigns, and restrictions on advertising, promotions, and sponsorship. Public investments in tobacco control have been directly correlated with rates of smoking in the young. However funding and political commitment have been insufficient to fully implement these strategies and reach the entire population at recommended levels. Only two states reached the levels of tobacco control funding recommended by the Centers for Disease Control and Prevention in 2014, and over 40 were at less than half that level.

The US was a pioneer of local smoke free air policies. California was the first state to require all workplaces, bars and restaurants to be smoke free in 1998. Prior to 1998 few such comprehensive policies were in place anywhere. This was preceded by decades of progressive development of stronger smoke free policies. By 2011, nearly 8 of every ten Americans was covered by 100% smoke-free air legislation (in non-hospitality workplaces and/or restaurants and/or bars). Tobacco taxation levels vary widely across the nation, from $0.46 per pack in Missouri to $4.75 per pack in New York, leading average pack prices to vary from $4.41 top $10.29. A few jurisdictions have established minimum price policies or prohibited discounting of tobacco products as complimentary roads to keep prices high.

Additional local policies that are advancing include extending smoke-free air laws to cover e-cigarettes or multi-unit housing, prohibiting flavored tobacco products, creating more rigorous local tobacco retail

license requirements, which may include reducing density, proximity to schools, sales in pharmacies or other considerations.

Tobacco control efforts were for many years primarily state or local in nature, but since the Food and Drug Administration received the authority to regulate tobacco products in 2009, the Federal government has begun to play a more active regulatory role. The Federal government has also recently stepped up its national media campaigns, and support to local government, with immediate impact on quit attempts.

However, many advocates feel that this work is advancing too slowly. The American Lung Association in its annual State of Tobacco Control gave the Federal government a "failing grade" on regulation, taxation, for failing to ratify the Framework Convention on Tobacco Control after its initial signature, and a slightly higher assessment for addiction support. They would like to see the new Federal authority used more proactively and promptly to protect health.

Tobacco addiction support is now a mandated preventive service for almost all health insurance in the US since the 2010 Affordable Care Act was approved,

Some strategies adopted in other countries have or would face legal challenges in the US, such as outright bans on advertising, plain packaging, stronger point of sale counter-advertising, hiding the product in stores in closed cabinets, or stronger graphic packaging requirements. These mostly revolve around the Supreme Court interpretation of US freedom of speech requirements that also restrict our ability to regulate marketing of unhealthy foods. For example, warning labels of insufficient prominence, have been on tobacco products for many years, but a 2011 rule to require prominent graphic warnings on all packs was blocked by the courts in 2012.

In general, in the US, as in other countries, it appears that a combination of measures in different areas and constant refreshing of strong tobacco control strategies is needed to keep the curve of tobacco use declining. Since some avenues are closed due to US law, it will be urgent to both fully implement proven strategies and continue to test innovative policies.

Perhaps the most important discussions underway today look at so--called"end-game"strategies. These include reducing or eliminating nicotine, the main addictive substance in tobacco products to reduce addiction, or strategies to reduce sales, including banning entire classes of tobacco products, as Brazil has done with e-cigarettes, for example. However these "end-game" strategies have not yet been adopted in the United States, with the exception of restrictions on certain flavored cigarette products nationally and other products locally. Marked reduction or elimination of nicotine from tobacco products to reduce addiction may be the highest impact end-game option. This approach was proposed by US researchers and continues under investigation, but needs to be implemented and evaluated.

In short, in spite of early leadership, innovation and strong progress, ending tobacco addiction is a battle only half won in the United States.

Physical Inactivity

The US, often envisioned as the home of tough pioneers and cowboys, is now also home to one of the more sedentary and obese populations in the word. The US helped create the well-known suburban sprawl model of housing development, malls and freeways, completely dependent on cars for transportation and often with limited public transportation. Our technological development has simultaneously designed much physical activity out of daily life, from escalators and elevators, to washing machines, forklifts and food processors. Television, computers, smart phones and tablets occupy our time for both work and entertainment. In many communities recreational spaces are lacking or unsafe, although in others wonderful opportunities for recreation abound.

Strategies to increase physical activity include traditional educational messages, efforts to increase safety and availability of active transportation, transformation of urban and rural planning to create more sustainable mixed use communities, greater access to recreational spaces, and expansion of physical activity opportunities in placed based settings including childcare, schools and workplaces. As is the case for diet and

tobacco, the emphasis has gradually shifted from individual education to one of policy and environmental change.

National surveillance of physical activity patterns is not as robust as for other risk factors. However leisure time physical activity does appear to have increased somewhat since 1998. National Health Interview Survey data show that the number of adults meeting 2008 Physical Activity Guidelines for Americans increased from 14.3% in 1998 to 20.7% in 2010 However these increases in leisure-time physical activity may offset by reductions in energy expenditure at work and sedentary behavior. Daily occupation-related energy expenditure has been estimated to have fallen by more than 100 calories over the last 50 years. Screen time (time that people spend watching television and videos, playing video games, or using a computer) has also increased nationally.

The most comprehensive approaches to increasing physical activity are looking at how to transform our communities. One early effort was New York City's Active Design Guidelines. This brought together public health leaders, together with architects, planners and design and construction leaders. They reviewed the evidence and designed a set of recommendations for making city buildings and streets more conducive to physical activity. These went from opening up stairwells, to placing trees on streets and using greater mixed use neighborhood planning. This effort, which grew out of a FIT-City Initiative, and later to a Fit –Nation initiative trained architects, planners and designers to sensitize them to the impact of design and planning on physical activity and health. Aspects were also integrated into city contracting policy. City transportation authorities have been leaders in promoting active transportation and building bike lanes and additional public transportation routes. Bike share programs have spread across major cities rapidly. Similar guidelines are being developed in other communities with a range of characteristics from urban to rural.

In general requirements for traditional physical education in schools exist across the country. However many schools fail to comply and many states issue waivers on a large scale. A number of approaches are being used to increase physical activity before, during and after school, whether in the classroom, outside the school or the gym. Regulations of the daycare environment to require physical activity and reduce screen-

time (as well as assure healthier food), have been used in New York City to increase physical activity in young children and were associated with decreased obesity rates. Workplaces are being encouraged to offer physical activity opportunities onsite, support active transportation for staff, and to support workers engaging in physical activity in other settings

Safe routes to schools programs have been one of the most active areas of promoting physical activity. In 1960 roughly half of US children walked or bicycled to school, but today fewer than 15 percent of schoolchildren do so. This is a major contributor to kids being less active and healthy. Driving children to school is also a significant contributor to use of fossil fuels and increased traffic. Concerned by both the transportation and health effects of this issue, Federal funding has been allocated since 2005 to promote safe routes to school nationally. Communities can use transportation funds to construct new bicycle lanes, pathways and sidewalks, as well as to launch Safe Routes to School campaigns in elementary and middle schools. In California an innovative statewide Active Transportation Program combines Federal funds and funds from measures to control climate change to promote walking, biking and public transportation use. Its first round in 2014 included 265 projects utilizing US $367 million in program funds. Of this amount, $311 million was dedicated to 220 projects in disadvantaged communities. Safe Routes to School projects were an important component of this funding.

Public health departments across the nation are now also beginning to build active collaborations with their planning, transportation and design counterparts in government. While this is still a minority of jurisdictions, examples of collaboration and recognition of the synergies between health, sustainability and quality of life are growing rapidly. In California for example, public health has been actively involved in revising the statewide recommendations for local general plans, the legal documents that guide community design, and local departments at the county and city level have been actively engaging to ensure that the built environment of their communities promotes physical activity, healthy eating and greater equity.

One of the most innovative programs in the nation come from California's Strategic Growth Council which is seeking to reduce gree-

nhouse gas emissions and working in the interface between health and prevention of climate change. Twenty percent of funds from the large California cap and trade program to reduce greenhouse gas emissions are being used to fund the Affordable Housing and Sustainable Communities Program, which began in 2014. This program seeks to: a) Reduce air pollution; b) Improve conditions in disadvantaged communities; c) Support or improve public health; d) Improve connectivity and accessibility to jobs, housing and services; e) Increase options for mobility, including active transportation; and f) Protect agricultural lands to support infill development. In short it will help prevent chronic disease by building communities whose very design will promote active transportation and reduce pollution, as well as increase access to housing. It is likely this type of "health in all policies approach" that will be needed to reverse the underlying environmental characteristics that reduce physical activity, particularly in relation to transportation. The Strategic Growth Council is also home to California's Health in all Policies Task Force, a high level council that brings together the leadership of state agencies to identify intersectoral priorities for promoting health.

Barriers

Three key barriers are common roadblocks for advancing this work. The first is funding. While the US health care delivery system is extremely well funded, its prevention activities are not. The health care reform law created the Federal Prevention and Public Health Fund, but that fund has had its proposed appropriations reduced and currently receives only about $3 per capita. There are also significant restrictions on how funds can be used, particularly for policy measures, which reduces its impact. Only some communities receive funding, based on competitive bidding, so it is not a steady funding stream, although it is an important start. One or more additional, larger sources of funding to sustain noncommunicable disease prevention activities and expand their reach to cover the entire country is badly needed. A few states have experimented with creating their own "Wellness Trusts". The state of Minnesota's State Health Improvement

Program is funded by fees on health care providers, for example and funds are distributed to every county for evidence based interventions to prevent chronic disease. Taxes on unhealthy products such as sugary drinks or tobacco could represent an alternative funding stream, as is occurring in Berkeley, and are being proposed for that purpose in a number of jurisdictions. Establishing adequate funding flows for prevention is one of the critical challenges facing the US health system. Nevertheless, Health in All Policies approaches such as those beginning in California can help assure that resources from other sectors such as transportation are used in ways that will have more positive health impact.

The second major barrier is that of building human capacity within the public health system, and partner agencies, particularly regulatory capacity. In general the background and training of most public health professionals does not prepare them well to regulate the food supply, or take on large corporate interests such as tobacco companies or Coca-Cola. The regulatory capacity of health departments locally and nationally is limited even for traditional activities like preventing foodborne outbreaks, and is far weaker for preventing chronic diseases from dietary risks. Building this capacity at all levels of government is a second challenge. That capacity may range from the ability of health sector professionals to carry out surveillance of these risk factors to their ability to act as a force for change. It may require creating new legal frameworks, institutional structures and funding streams as well as human resources, as we are seeing in the US. This needed capacity will encompass the skills to assess risks, formulate or implement regulatory and other policy measures and programs to reduce risks from tobacco, alcohol and unhealthy foods to an ability to work effectively across sectors to create a healthier food supply and built environment and to reduce in inequities in social determinants.

The third barrier is that of the political will to confront vested economic interests that benefit from the status quo. For physical activity this may be land or housing developers with an established way of doing business. For smoking it is the tobacco industry, which has long been a daunting and creative opponent. Today the food industry is increasingly a force that is opposing essential measures to prevent diet related noncom-

municable disease. Unlike the tobacco industry, people will always need food, and there are many healthier alternatives they can sell. But the food industry has opposed most changes, and is adopting the same nefarious tactics used in the past by the tobacco industry. As has been the case for tobacco control, building understanding of the issues and the strong organized support of civil society is proving to be an essential ingredient for success on food policy, in the US and elsewhere. Investments in tobacco research, surveillance, advocacy and coalition building have been fundamental to enabling progress in tobacco policy. It will be no different for reducing the risks from the food supply, alcohol industry or other chronic disease risks that require challenging strong economic interests.

Conclusion

Successfully preventing noncommunicable requires a coordinated and comprehensive effort to reduce the major underlying risk factors. This is the case in the United States and globally. While major progress has been made on reducing coronary heart disease, obesity and diabetes are still expanding epidemics. Similarly, our control of key risk factors is unequal across the nation and insufficient. Without reducing social inequity the burden of noncommunicable disease in the US will continue to be unfairly shouldered.

We have made major progress on tobacco control, but vanquishing death from tobacco will require full implementation of existing approaches, including the full scope of the FCTC, and potentially a new generation of "end-game" solutions.

The greatest progress in increasing physical activity is likely to come from the synergies with creating more sustainable transportation systems and community design over the coming years that bring activity back into daily life. That will require legal and regulatory strategies as well as changes in planning culture. But promotion of leisure time and placed based activity will also be important to creating new social norms in an era when many occupations no longer require great physical exertion.

Dietary risks are the leading behavioral risk factor and their impact on NCDs is spreading globally with extraordinary rapidity. The evolution of the US food supply and its health impact offers a cautionary tale for the many countries to which these patterns of food commerce are now being exported. It is prudent to act early to preserve traditional food supplies, promote healthy local foods, and prevent junk food and beverages and other ultraprocessed products from becoming ubiquitous. The legal authority over food that has traditionally been used to address infectious disease must now also be used to prevent today's diet-related noncommunicable disease problems, creating food safety systems appropriate to the demands of the 21st century. That effort is advancing slowly in the US. Marketing, retail practices, portion size and information to consumers must be addressed, as well as the determinations of what is allowed inside the product, to create a food supply that is not only healthy, but also sustainable and minimizes its contribution to climate change. It is likely that to meet the goal of ensuring healthy food supply, we will need tools of similar strength to the groundbreaking Framework Convention for Tobacco Control (FCTC). The creation of a Global Framework Convention for a Healthy Diet is one important idea under discussion globally to advance these efforts in an increasingly globalized world.

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