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Joachim Singelmann
Dudley L. Poston, Jr *Editors*

Developments in Demography in the 21st Century

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We dedicate this book to two of the best teachers, mentors, collaborators, colleagues and friends we have ever had, ***Harley L. Browning*** *and* ***Jack P. Gibbs****. Thanks to both of you for everything you have ever done for us over the past 50 years.*

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Part I
Introduction

Chapter 1
Developments in Demography

Joachim Singelmann and Dudley L. Poston, Jr

1.1 Introduction

A knowledge of the demographic structure of a society is of crucial importance for decision making. Demography is the social science that studies (1) the size, composition, and distribution of human populations; (2) the changes in population size and composition and distribution over time; (3) the components of these changes, i.e., fertility, mortality, and migration; (4) the factors that affect these components; and (5) the consequences of changes in population size, composition, and distribution, or in the components themselves. Demography is important because it makes many societal outcomes more likely than others. For example, the age structure of the U.S. population at the time of the introduction of Social Security made it more likely that this program was funded intergenerationally instead of building up individual annuities, because at that time, there were far fewer people in retirement ages than in working ages. The ultimate decision, however, was a political one.

The sex ratio of a population is another demographic factor influencing social outcomes. When there is a large imbalance in the number of males and females at the typical ages at marriages, say, many more males than females, the possible responses could be the outmigration of some of the males, an increase in out-of-wedlock births (if the number of females happened to exceed the number of males, as has been in the case in some Caribbean islands), or an inmigration of females, as is now happening in China and South Korea and some other countries where there

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is a large surplus of young males. Again, which outcome actually takes place is not fully "decided" by demography; the specific outcome is the result of social and political decisions. That is, demography is not destiny, but the demographic structure of a society makes certain policy decisions more likely than others.

We often hear the expression, "Demography is destiny." Indeed, the founding father of sociology, August Comte, is believed to be the first person to have made such a statement. Today, commentators and news analysts sometimes use the phrase as an explanation of how things are, and how they got that way, and how they will be. Some demographers, however, tend to shy away from the expression. While there is some validity to the phrase, "demography is destiny," there are many other variables that intervene in determining where an individual or a society stands at any given point in time. Nevertheless, there are instances in the study of demography, particularly with respect to population behavior occurring in relatively short periods of time, when it can indeed be argued that demography is destiny.

For instance, consider the large number of births, i.e., the baby boom, that occurred in the U.S. from the mid-1940s until the early 1960s. We have known for many years that by the year 2020, there will have occurred a very large population increase in the numbers of elderly people in the United States. Why? Because we know how many people were born during the baby boom period, and we can be fairly accurate as to how many have already entered and will be entering the elderly years of life. A similar statement can be made with regard to the many, many millions of baby boys already born in China and South Korea, and elsewhere, i.e., in India and Taiwan, who, when it is time for them to marry, will not be able to find Chinese or Taiwanese or South Korean or Indian brides. These boys have already been born, and we know that they far outnumber the women who will be there for them to marry.

A major strength of demography is that a large body of research has an applied focus. Perhaps more than so than in other social sciences, a key concern of demography is the focus on the quality of data. In large part, this is due to the fact that census data are the source of much demographic analysis. Another major data source is vital statistics; indeed, the improvement of birth and death registries has been a long-term objective of demography. Aging and health are other main topics of demography. And a large part of our knowledge about urbanization, marriage patterns, or poverty, to name just a few social issues, is informed by social demographic analysis. For each of the aforementioned topics, demographic analysis has been a key input for policy planning. For much of demography, there is a short step from analysis to policy application, assuming that political actors value evidence-based policy planning.

The origin of this volume was the Applied Demography Conference held in San Antonio, Texas in 2014. From the many outstanding presentations at the meeting, the two editors, Joachim Singelmann and Dudley Poston, have selected those that combined two characteristics: first, they are theoretically and/or methodologically at the forefront of development in demography; and second, there is some focus on public policy issues. However, not all the chapters in this volume were presented at the conference. The editors decided to include a few other chapters that also represent the above two characteristics.

The four sections of the volume thus are methods and statistics; data issues; health, aging, and mortality; and social demography. All reflect the topics that we listed above as major foci of applied demography. The chapters in these sections add knowledge that is helpful for public policies. In the paragraphs below, we briefly summarize the main findings of the selected chapters.

1.2 Developments in Demography: Chapter Summaries

In Chap. 2, "What's Changing the World? A Demographer's Perspective," Wendy Baldwin entertains the very broad issue of population changes in the decades ahead in the world and in its major regions and countries. She correctly notes that most of the countries of the world have improved their levels of educational attainment and have increased their control over infectious diseases. However, there has been a marked shift in past decades in many countries from infectious to non-communicable diseases, and she notes that this shift will accelerate in the coming years. This is a matter of special interest in low and middle income countries because non-communicable diseases occur at earlier ages there than they do in wealthier countries. The earlier onset means that these diseases will also tend to lower their economic productivity. Baldwin shows clearly how and why the growing burden of non-communicable diseases in the future in the developing world will challenge individuals, families, communities and nations.

In Chap. 3, "A Demographic Evaluation of the Stability of American Community Survey (ACS) Estimates for ACS Test Sites: 2000 to 2011," Gregory Robinson and Eric Jensen report the results of a demographic evaluation of the stability of American Community Survey (ACS) estimates from 2000 to 2014. They consider the estimates to be stable when differences between demographic groups are maintained over time. They focus in particular on differentials in the poverty and ownership rates for race and Hispanic origin groups. They examine the consistency of the ACS estimates since 2000 and compare them to benchmarks from the 1990 and 2000 decennial censuses. They show that the differential poverty and ownership rates are consistently estimated by the ACS in each period and agree with the differentials reported in the decennial census data.

Eugenia Conde and Dudley Poston are concerned in Chap. 4, "Approaches for Addressing Missing Data in Statistical Analyses of Female and Male Adolescent Fertility" with how to address the issue of missing data in statistical analyses of adolescent fertility. Several of the variables they use in their analyses have extensive amounts of missing data. They undertake separate analyses for females and for males of the likelihood of the respondent reporting having had a teen birth. They handle the problem of missing data by using several different missing data statistical approaches. They show that depending on the missing data method used, many of the independent variables in the sex-specific models vary in whether they are, or are not, statistically significant in predicting the log odds of having had a teen birth, and in the ranking of the magnitude of their relative effects on the outcome.

In Chap. 5, "Considering Local Measures of Poverty Using Shift-Share Techniques: A Comparative Analysis," Gregory Hamilton and Melody Muldrow note that poverty studies typically use family income or individual income as their measures of poverty. In contrast, they propose an alternative method to measure poverty in a local economy that is based on shift-share analysis which permits them to identify some of the possible local causes of poverty. They apply a shift-share method to all the counties in Arkansas to find out whether this method yields the desired identification of local effects on poverty. Their careful analysis shows that shift-share does not improve the conventional way of examining poverty at the local level. This non-finding is important because shift-share analysis has often been viewed as a useful tool for localizing effects on the outcome variable. Hamilton and Muldrow demonstrate that such is not the case for examining poverty at the local level.

In Chap. 6 on "Potential Explanations for the High Net Undercount of Young Children in the U.S. Census," William O'Hare focuses specifically on the undercount of young children in the U.S. 2010 decennial census and the extent to which several factors may be at work influencing the undercount. Two issues to which he gives considerable attention are, one, the belief expressed by some that the federal government does not wish to include young children in the census counts, and, two, the fact that some respondents completing the census form do not want the government to know about the existence of their young children. Although he does not find any systematic statistical evidence about the extent to which these two beliefs would affect the net undercount of young children, he believes that these issues certainly deserve additional research, both qualitative and quantitative.

In Chap. 7, "Babies no Longer: Projecting the 100+ Population," Sandra Colby and Howard Hogan observe that although most demographers know that the aging of the baby boomer cohort in the U.S. will certainly contribute to the future growth of the centenarian population, they do not really know exactly how much growth to anticipate. In their chapter, they first conduct a literature review on the issue of maximum life expectancy to get an idea of the range of the future size in the U.S. of this 100+ population. They next evaluate Census Bureau projections of life expectancy with those of other agencies producing similar products for the United States and for other developed nations. They also explore historic changes in the centenarian population to provide context for the projected changes. They then develop and report data for various sets of projections of the centenarian population. Their projected numbers all make clear that there will be a substantial increase in the centenarian population.

Chapter 8, "Cohort Approaches Using Educational Data of the Czech Republic: Massification of Tertiary Education and Its Impact on Education Attainment," Vladimír Hulík and Klára Hulíková Tesárková analyze the expansion of higher education in the Czech Republic. They base their analysis on Martin Trow's theory of massification of higher education according to which it is impossible to maintain the elite system of higher education in the face of the expansion of that educational segment, with the same holding true once mass education becomes universal. Their analyses show that the Czech tertiary education system changed from elite to mass in the early 1990s, and from mass to universal in the middle of the 2000s. On the

basis of these findings, they construct a robust multi-state model of educational attainment to project educational attainment in the Czech Republic through 2050. Their projections are important because of the central role of education in explaining changes in other demographic factors such as fertility, mortality, migration, and health status.

Ernesto Amaral and Joe Potter analyze in Chap. 9, "Factors Associated with Female Sterilization in Brazil." They are especially interested in adding to their sterilization survival models a variable that captures the amount of time of exposure to the risk of sterilization. They show that sterilization is greater among older women, among those with two children at delivery, and among those residing in areas of elevated fertility rates, namely the Brazilian regions in the North and Northeast. Their analyses also indicate that women who had a Cesarean section, gave birth at private hospitals, or with the support of health insurance experienced the greatest chances of becoming sterilized following a birth. Given this finding, Amaral and Potter argue that the Brazilian government needs to implement family planning programs with equal access to sexual and reproductive health services for all women.

Chapter 10, "Aging and Family Support in the State of Mexico" by Viridiana Sosa Marquez, examines the current situation of people 60 years and older who are living in the State of Mexico. Sosa Marquez first provides information about the living arrangements of the elderly in terms of marital status and household size, to show the potential family help that people could expect to receive as they grow older. She points out that most elderly Mexicans have either a spouse or children living with them, and they often have other children in separate households, reflecting the relatively high fertility of that generation. She concludes, however that to fully answer the question of the extent to which the elderly in the State of Mexico can count on support from family members, one needs to complement the demographic analysis with additional qualitative work.

In Chap. 11, "Intimate Homicide Mortality in Alaska from a Demographic Perspective," Donna Shai analyzes intimate homicide, that is, a homicide committed by a current or former legal or common-law spouse, boyfriend or girlfriend. She undertakes a qualitative analysis of twelve intimate homicides, selected from the 23 such homicides reported in the state of Alaska between 2007 and 2012. She shows that although most of the homicides were perpetrated by men, almost a quarter were perpetrated by women. The motives behind the men's attacks in some cases are a sense of maintaining a hold on the women, and using great force, despite the women's objections. Alternately, the women's motives range from self-defense to anger over infidelity. In both cases, Shai concludes that couples could have profited from counseling, especially in order to end relationships without violence and tragedy. Agencies, including the military, she argues, should take special steps to prevent multiple family homicide by carefully monitoring the reentry of service men and women to civilian family life.

Chapter 12 by Silvia Mejía Arango, Joachim Singelmann, and Rogelio Sáenz, "Cognitive Decline among the Elderly: A Comparative Analysis of Mexicans in Mexico and in the United States," is a longitudinal analysis of the factors affecting cognition among the elderly in Mexico and elder Mexican Americans in the United

States. The authors ask the following two questions: (1) what are the similarities and differences between Mexicans in Mexico and Mexicans in the United States in the factors that influence cognitive impairment; and (2) are the sex differentials in the factors predicting cognitive impairment in Mexico similar or different for Mexican Americans? Their findings show that after a 10-year period, cognitive decline is higher among Mexican Americans than among Mexicans in Mexico. They also show that while Mexican women in Mexico have a higher incidence of cognitive decline than their male counterparts, the reverse is true for Mexican Americans. Their research supports the hypothesis of a negative association between acculturation and health status among Mexican migrants. In general, such "strong" factors as age, education, health, and sensory and functional limitations have similar effects on cognitive impairment of Mexicans in the U.S. and Mexicans in Mexico, but there are differences in the effects of social factors on cognition in the two populations.

Qian Xiong and Dudley Poston in Chap. 13, "The Urban Hierarchies in China and the United States," first introduce and discuss the concept of the "urban system" and review its initial development in the mainly Western literature on metropolitan dominance and integration. Then using data from the *2012 China City Statistical Yearbook* and from the U.S. *2012 Economic Census*, they configure quantitatively the urban systems of China and the United States as of 2012. They compute metropolitan dominance scores for each of China's 177 large cities, and for each of the 69 large cities of the U.S. Their results show that Beijing is the most dominant city in China, although not the largest in population, and is followed closely by Shanghai. And New York City is the most dominant city in the U.S. Beijing and Shanghai in terms of their dominance in China are comparable to New York City in terms of its dominance in the United States. Key findings of their research are the demonstration that the dominance of a city is not purely determined by its population size or administrative role, and that there is a hierarchical relationship in the urban system.

Matthew Martinez, in Chap. 14, "School District Formation as an Explanation for Spatial and Temporal Dimensions of Concentrated Poverty in Bexar County, Texas," investigates the social impact of school district fragmentation in Bexar County, Texas (which is largely the City of San Antonio). Using a socio-historical analysis, Martinez first shows how school district formation in the county reified persistent and concentrated neighborhood poverty. He next asks whether school district consolidation should be considered within the framework of ending cycles of persistently concentrated neighborhood poverty. He shows that Bexar County has a history of place-based educational and economic disparities between school districts. Most high-poverty neighborhoods in the county have had high poverty for the entire period 1970–2000. And it is in those neighborhoods where school dropouts are the highest. He argues that the stubborn nature of concentrated high neighborhood dropout rates should be on of great concern for policy creation in Bexar County due to the strong relationship that dropout rates have with neighborhood poverty.

In Chap. 15, "Union Formation Selectivity after Childbearing: Do Local Marriage Markets Matter?", Gabriela Sánchez Soto focuses on the context of union formation after childbearing, with a special focus on the role of local marriage markets.

Understanding the processes in which single parents enter new unions is essential for understanding outcomes for their children and their families. Two explanations for the role of marriage markets on the union formation of single parents are marriage selectivity and marital search theory. Her findings show that marriage markets play different roles in the types of families that men and women form. Although step-families are only a small proportion of all unions formed, men are more likely than women to enter step-families either through marriage or cohabitation. Her findings show further that while socioeconomic characteristics of the respondents do not always have a significant effect, the characteristics of the partner/spouse do matter, especially for women.

Early in Chap. 16, "Minority Student Participation in International Programs: A Survey of Undergraduate Students Attending HBCUs," Komanduri Murty notes that there has been and continues to be an underrepresentation of minority students in study abroad programs. Hoping to better understand this underrepresentation, he analyzes in his chapter the findings of the national-based United Negro College Fund Special Programs (UNCFSP) web-based minority undergraduate student survey that was conducted in 2007. He finds that the participation levels of minority students in study abroad programs are low because of high costs and conflicting schedules. Some minority students appear to prefer completing necessary coursework for degree requirements before they take part in some of the international and study abroad activities. The research he reports in his chapter will hopefully encourage further analysis of minority students at HBCUs and their participation in international education and study abroad activities.

Angelica Menchaca and Dudley Poston analyze in Chap. 17, "Community Well-being and Mexican Interstate Migration in the United States," the interstate migration flows of Mexicans in the United States during the period of 2011–2015. They find that migration theories conceptualized with a classic gravity model and a human ecological model are appropriate and suitable for analyzing and understanding the effects of community well-being on the interstate migration flows of Mexicans. The main factors of state-level well-being that encourage Mexican migration at both origin and destination are shown to be the proportions of Hispanics at origin and destination, and whether or not the states are classified as punitive. Their research indicates that more work is needed especially with respect to the development of the ecological model of migration and the employment of a wider body of factors of community well-being.

In Chap. 18, "Family Values at Work in the Mississippi Delta: Effects of Marriage and Employment on Well-Being of TANF Participants," Marlene Lee, Joachim Singelmann, and Lena Etuk address the consequences of the 1996 welfare reform legislation. The aim of that legislation was a reduction of welfare care loads by moving women on public assistance to employment through a mix of incentives and sanctions. Marriage was seen as another path to move people from welfare, assuming that two incomes would lift a family out of poverty. However, using simulation models, the authors find that employment has a stronger effect on the reduction of TANF caseloads and poverty than does marriage, although the relative effects of employment and marriage are reversed in rural areas.

Chapter 2
What's Changing the World? A Demographer's Perspective

Wendy Baldwin

2.1 Introduction

Population growth around the world between now and 2100 will be led by developing countries. Over 75% of the growth will occur in developing countries. And the fastest growing regions will mainly be those in sub-Saharan Africa. This growth differential will be important to keep in mind in my discussions below of trends and projected trends in non-communicable diseases.

Many countries have lowered their fertility rates, improved their levels of educational attainment and increased their control over infectious diseases. These are good signs for the health and productivity of their populations. However, many of these countries now face a growing impact from non-communicable diseases (NCDs). In this chapter, I focus specifically on trends and patterns in non-communicable diseases in the regions and countries of the world, now and in the future.

There has been a shift in past decades from infectious to non-communicable diseases in many countries, and this shift will accelerate in the coming years. NCDs in low and middle income countries occur at earlier ages than in wealthier countries. The earlier onset means that these diseases will also lower economic productivity.

The four major NCDs, namely, cardiovascular disease, diabetes, most cancers, and chronic respiratory disease, share four underlying, modifiable behavioral risk factors, namely, tobacco, excessive alcohol, poor diet, and low levels of physical activity. This means that the potential burden of NCDs can be lowered by addressing behavioral risk factors now.

Adolescence provides an opportunity to do this. The often high and generally rising levels of adolescent health risk behaviors is a call to act now to support a healthier, more robust future. I discuss this issue later in the chapter.

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2.2 The Rising Burden of Noncommunicable Diseases

There is a fairly clear picture about population global growth for the foreseeable future. I have shown above in Fig. 2.1 that the more developed countries will contribute little to that growth in the decades ahead, while the less developed countries will continue to grow, albeit likely at a slower pace than has been true in the past. This is a reflection of the demographic transition which has taken countries from high fertility and mortality rates, and slow population growth, to falling death and birth rates, and typically population growth, to finally a stage of low fertility and mortality rates, and slow population growth, that are observed in most of the more developed regions of the world where population levels are generally stable.

There are many dimensions to this population picture, but one that has clear implications for possible interventions is the changing pattern of health, disease and mortality in the less developed countries. But, it is not only the just mentioned demographic transition that writes the script for a country's future. Most developing countries are at the cusp of the epidemiologic transition. This is a transition from high levels of infectious disease and maternal/infant mortality to one where mortality is dominated by non-communicable diseases, where mortality is low and life

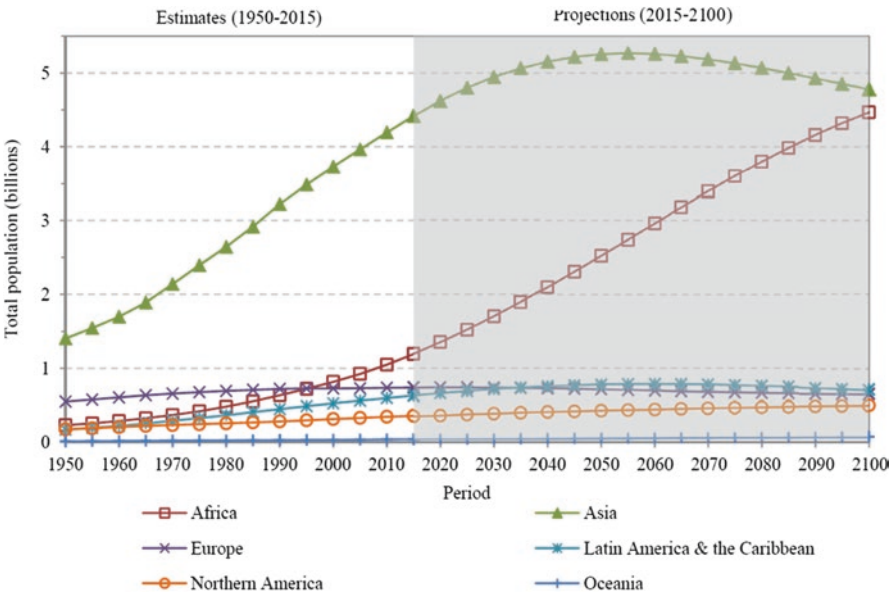

Fig. 2.1 Population of the regions of the World: 1950 to 2015; and 2015 to 2100
(Source: United Nations, Department of Economic and Social Affairs, Population Division (2017). *World Population Prospects: The 2017 Revision*. New York: United Nations)

expectancy is high. This latter stage now characterizes much of the world, especially the developed countries.

But it is the transition state per se that should concern us today (Omram 1971). The process of going from a high burden of infectious disease to a situation of non-communicable diseases might seem like an inevitable process and one where the debate is about which diseases will affect the elderly. While the picture is more complex, it is one laden with hopeful opportunities.

There are many encouraging signs in the developing world, from lowered fertility and mortality levels, and increased school enrollment, especially for girls. This has led many countries to have a growth in their youth populations. A large number of young people can be an economic engine if other conditions are also met (Gribble and Bremner 2012). Another reason to look at these large populations of young adults is their implication for the future health of the population. Behaviors adopted during adolescence and young adulthood will also shape the future health picture for individuals and their countries.

Young people are often given little attention in the discussion of the burden of health, except for sexual and reproductive health. Their health tends to be good, they are minimal users of health services, and their mortality rates are low. However, health behaviors during youth often set the stage for what they and their communities will face in the future (Baldwin et al. 2013a). We could simply look at their disease profiles during adolescence, but it would be better to ask what the future is likely to bring as countries move through the epidemiologic transition.

The globe has been riveted, and rightly so, on the burden that communicable diseases create. And, while there are many such diseases, the emphasis has been on a few, such as AIDS, malaria, tuberculosis, and the "newcomer," Zika, that takes a large toll. There are many non-communicable diseases, but the global health interests have identified the four I have already mentioned, that represent 80% of the burden. These are cardiovascular disease, most cancers, diabetes, and chronic respiratory disease. The World Health Organization has focused on these four which also share four underlying behavioral risk factors (WHO 2011). This focus makes looking at potential interventions much more manageable.

While the focus here is on the rising burden of NCDs and the risk factors that lead to them, this does not mean that infectious diseases have been conquered or that they can be ignored. Far from it. Infectious diseases still present huge burdens where no clear prevention is available and/or where treatment is hugely demanding and often expensive. But, just because there is still a burden from infectious disease does not mean that the burden of non-communicable disease is not rising as well. Countries can, and do, face a "double burden" of disease (Kolcic 2012).

Non-communicable diseases already dominate the mortality patterns of the wealthy countries, accounting for almost 90% of all deaths (Nikolic et al. 2011) (see Fig. 2.2). And they are the predominant cause of death in other regions with the exception of sub-Saharan Africa. Even there, the proportion of deaths to non-communicable diseases will reach almost half of all deaths by 2030. In other areas, such as south Asia, the percentage will likely rise from over 50% to over 70%. In their 2011 report, the Institute for Health Metrics and Evaluation identified five

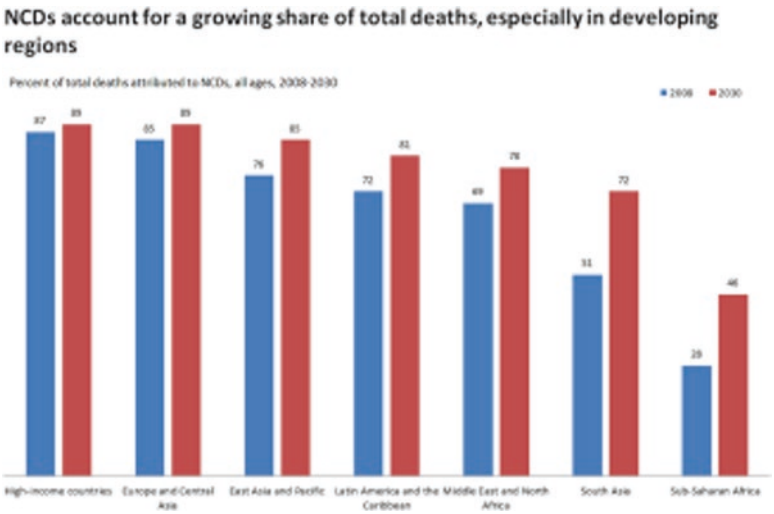

Fig. 2.2 Percent of deaths due to non-communicable diseases: regions of the World, 2008 and 2030. (Source: Nikolic et al. 2011)

major challenges for the future: the demographic transition/longer lifespan, the cause of death transition to NCDs, the global shift to disability as opposed to mortality, the changing risk factor to behavioral risks, and health systems facing enormous challenges (IHME 2013). The different NCDs will grow in importance, country by country.

But deaths from NCDs tell only part of the story, since the timing of death is also important. Only 13% of NCD deaths in wealthy countries occur to individuals under the age of 60. But it is almost 30% in low and middle income countries. These earlier deaths are occurring at times when individuals are still the mainstays of their families and are economically productive. Also, many of the NCDs are preceded by periods of disability which can have disastrous effects on families when a breadwinner is incapacitated (WHO 2011). In India, for example, one-half of all heart attacks in the population occur to persons before age 50, and 25% of them to persons before age 40 (Vyas 2012) (Fig. 2.3).

Many NCDs have medical precursors that can be addressed through medication, such as hypertension or high cholesterol. Some of these diseases can be managed medically and may be able to forestall other adverse health events. But medical management, or secondary prevention, requires a health system that can screen, diagnose and treat (for life) large segments of the population. This is an enormous undertaking, especially for health systems that are still dealing with infectious diseases and maternal/child health demands. Primary prevention, while aimed at even larger segments of the population, can lower the risk factors and bring more than the health sector into the process of supporting a healthy and productive population for years to come.

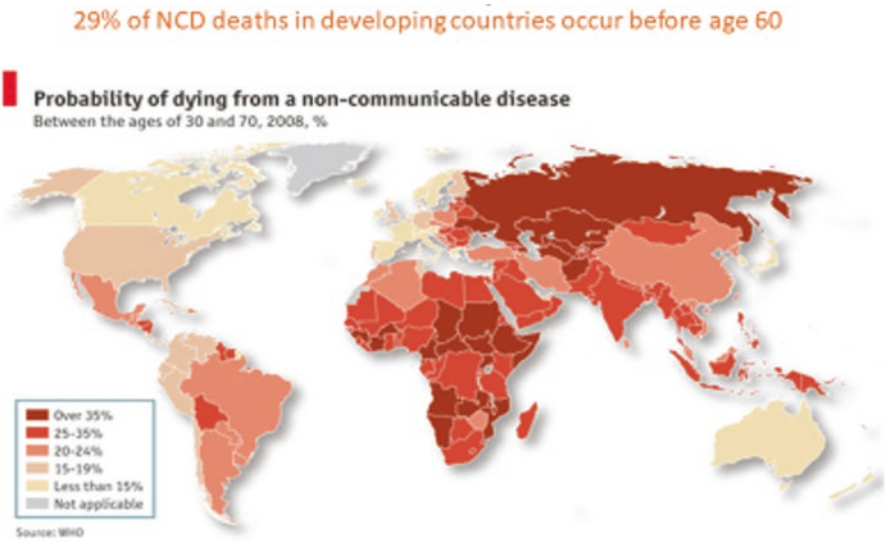

Fig. 2.3 Probability of dying from an NCD between the ages of 30 and 70, 2008

2.3 The Four Risk Factors that Account for Most NCDS

I now move to the optimistic portion of the chapter. There are four risk factors that account for about half of the risk for the four major NCDs. These are tobacco use, alcohol use, poor diet, and low physical activity (WHO 2011). The latter two typically combine to lead to the rising rates of overweight and obesity. To address the rising burden of NCDs we must look at the initiation of these risk factors, and this means looking to youth. Two of the risk behaviors begin during adolescence, namely, tobacco and alcohol. Also, for diet and exercise, adolescence is an ideal time to reinforce positive behaviors than can become lifelong habits.

There is modest evidence about adolescent risk behaviors for NCDs. Two data sources that provide comparable data for a number of low and middle income countries are the Global School-based Student Health Survey and the Global Youth Tobacco Survey. Each survey includes youths between the ages of 13–15 who are in school. This means that for the countries with low school enrollments, or biased enrollments on the basis of gender and/or ethnicity, the results will be less informative for the country as a whole. However, since school enrollment rates have been increasing, this may not be a major shortcoming. There are also some data available from the Demographic and Health Surveys; their primary focus is on reproductive health, but they include measures of obesity.

For tobacco and alcohol use, the best measure is "use in the past 30 days." Some surveys include measures of "ever used," but they may capture very limited or occasional use – or even one-time experimentation. Alcohol can be purchased or home brewed. Consumption is the key issue for risks to youth. Diet and physical activity

are frequently presented together because they combine to represent energy balance. Dietary risk factors include the low consumption of fruits, vegetables, nuts, seeds and Omega-3 fatty acids, and the increased intake of salt and refined sugar, processed carbohydrates and unhealthy fats (Escobar et al. 2013).

What do data from these surveys tell us? What is the evidence? Tobacco use is substantial in many parts of the world, typically more so for boys than for girls (PAHO 2011). However, in some countries, the use rate among girls is quite high, and often increasing. In Chile, for example, 43% of girls aged 15–24 smoked one or more cigarettes in the last 30 days. By comparison, in the U.S., 20% of high school boys and 16% of high school girls reported smoking one or more cigarettes in the last 30 days. Some countries are beginning to show declines in smoking rates, but in others the rates are climbing. Also, the risks tend to be higher in urban areas (Baldwin et al. 2013b).

Surveys in Latin America document levels of alcohol consumption at around 47% for girls aged 13–15 in Jamaica and 48% for boys aged 14–17 in Argentina (Baldwin et al. 2013c). Other regions also show considerable variability. Rates are low in Muslim majority countries (Kaneda et al. 2014). By comparison, in surveys of U.S. high school students, the rates were 38% for girls and 40% for boys (Baldwin et al. 2013c).

Research in the U.S. shows an interesting pattern between the age of onset of drinking and later addiction. The early onset of drinking is related to high rates of addiction regardless of whether there is a family history of addiction. Concerns and interventions about alcohol use focus on the early adolescent years, even though the actual proportions of young people drinking tend to be lower at those ages (see Fig. 2.4).

Unhealthy diet and insufficient physical activity are a pathway to high blood pressure, overweight and obesity. Not surprisingly, type 2 diabetes, hypertension and heart disease are also likely outcomes. Data from Latin America and the Caribbean (LAC) show that most 13–15 year old girls do not meet physical activity guidelines; indeed the LAC region has the most serious problem with obesity

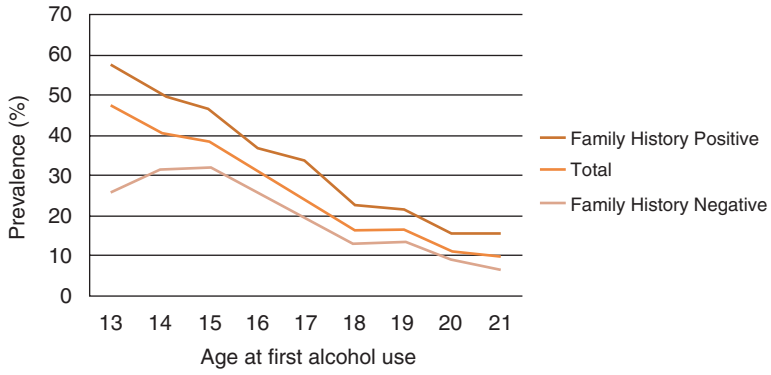

Fig. 2.4 Onset of alcohol use and alcohol dependence in the United States

worldwide. The region is highly urbanized, and urban living frequently leads to an unhealthy diet and reduced physical activity. Urban areas usually provide few opportunities for physical activities that are safe and appealing.

Many developing countries are still battling undernutrition and stunting, that is, children being short for their age. Thus it might seem odd that obesity is being raised as a problem for developing countries. However, it is possible to see both undernutrition and overweight/obesity occurring in the same country (Bolivia Ministry of Health 2009), and even in the same household. South Africa has both underweight and wasting among children and substantial obesity among adults (Kruger et al. 2012). In Egypt, one study showed that 15–25% of Arab children under five were stunted, and 5–15% were underweight. Among adults, 30% were obese, a level higher than in other Arab countries. In Egypt, 12% of stunted children have obese mothers (The Economist 2012). This points to deficiencies in nutrition in families where early malnutrition for the mother affects her metabolism which leads to excess storage of fat. Her food intake may change, but if micronutrients are lacking, obesity will follow. Among pregnant women, half are anemic as a result of an iron deficient diet.

It is hard to find children who are not physically active, but in many settings activity levels tend to decline during adolescence. Low levels of physical activity typically lead to a 20–30 increase in all cause mortality (Office of Disease Prevention and Health Promotion 2013). Young people need at least 60 min of physical activity every day. Data from Latin America indicate that most young people do not meet these guidelines for physical activity (Baldwin et al. 2013d).

While there are global standards for appropriate levels of activity, there are different ways to conceptualize the phenomenon. For example, one might count only the time spent explicitly exercising, but walking to school or work is also activity. Also, while it is true that some forms of work involve significant physical activity, others do not. In Colombia it was clear that youth could report on these different forms of activity, and that there were gender differences. Adolescent males who were employed were more likely to be in jobs that involve physical labor. In South Africa, a household survey of 15–24 year olds reported that 31% of the males noted they were physically inactive, compared to 47% of the females. In that population 10% of the males were overweight compared to 31% of the females (Steyn 2013).

The broad picture here is clear. NCDs are of growing concern in developing countries, but context is important. Some regions, such as Latin America, began their transition decades ago and others, such as Africa, are in the early stages (Popkin and Gordon-Larsen 2004). Some countries have strong gendered patterns of consumption of alcohol and tobacco such that interventions may need to consider ways to reach young males more so than females. On the other hand, many countries show greater risks for obesity among females. Some young males retain higher levels of physical activity because of the kinds of work they do, but as the nature of work changes with development, the young men will likely be exposed to the same lowered levels of physical activity that are seen in wealthier countries.

As countries develop, the patterns of risk may shift. In high income countries youth from lower socioeconomic groups have the highest levels of overweight and

the lowest levels of physical activity. At the present time, youth in low and middle income countries are more likely to suffer from obesity if they are in the higher socioeconomic groups (Hanson and Chen, 2007). As countries advance economically, youth – and others – may move away from a lifestyle that includes a lot of physical activity and a generally healthy diet. Increased income may lead to lowered physical activity when work places fewer demands on the adolescents. The availability and appeal of shelf stable carbohydrates, sugar sweetened drinks, the use of unhealthy cooking oils, and less availability of fresh fruits and vegetables may erode healthy nutrition. In Ghana, more than half of the boys and girls usually drink carbonated drinks one or more times a day (Naik and Toshiko 2015). Perhaps NCDs should be called the diseases of development. No one would propose reducing or slowing down the progress toward development, but it may be time to address the likely changes that development can bring that are to the detriment of individuals, families, and nations.

What is being done to address these challenges? There are a number of initiatives that address the risk factors for NCDs although they are not specifically focused on youth. For example, one successful approach has been an increased tax on tobacco to raise the cost of smoking (Sylvain 2008; Jiménez-Ruiz et al. 2008). In countries where this has been tracked over time, a rise in taxes is clearly associated with a decline in consumption. The data for South Africa show a similar pattern to that seen in the U.S. and in Mexico. In South Africa there was a significant decline in cigarette smoking and an 800% increase in tax revenues after taxes were raised. Taxation is a general strategy, but it appears to have a greater influence on youth smoking. In some countries the gains from taxation are applied to broader public health programs, and in some cases specifically to anti-smoking programs (see Fig. 2.5).

Australia has launched a broad program to limit tobacco consumption, and many countries have laws against the purchase of tobacco by youth (NCD Child 2014).

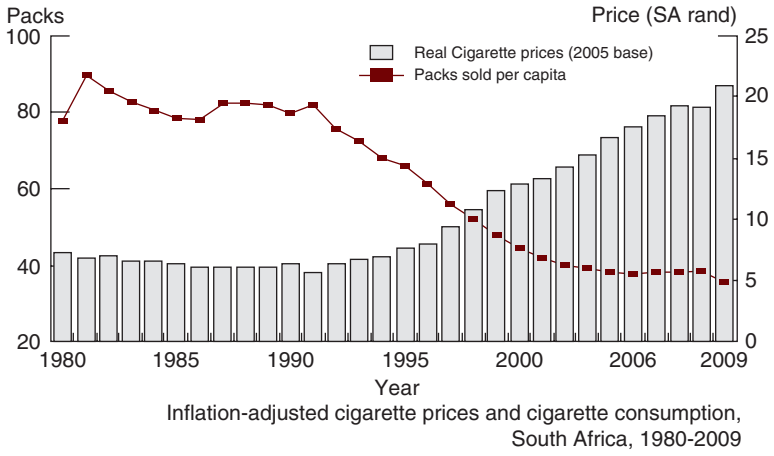

Fig. 2.5 Cigarette prices and consumption: South Africa, 1980–2009

However, taxation is a good starting place for the control of tobacco because it also generates funds that may be applied to other programs. A recent meta-analysis of the research literature on the impact of taxation of sugar-sweetened beverages shows that such taxation may reduce obesity although more research is clearly needed. This is a recognition that interventions outside the health sphere can also have an impact on health. And, in the case of taxation, the interventions may create a revenue stream (Escobar et al. 2013).

There are many opportunities for schools and communities to endorse healthy lifestyles, provide healthy foods in schools, and endorse youth-driven initiatives. Civil society can form partnerships to educate policy makers, the media and the public about the benefits of such initiatives. Social media can engage public figures who are popular with youth. Religious organization and other community based groups can sponsor programs that promote healthier lifestyles.

Many countries and communities have laws against the sale or consumption of alcohol by minors. It is important to consider not only the laws and policies that are in place but also the level and effectiveness of enforcement. As more families and communities become aware of the dangers of early and excessive alcohol consumption, enforcement may become more feasible.

2.4 Conclusion

The growing burden of NCDs in the developing world will challenge individuals, families, communities and nations. The impact of NCDs on health does not just affect the risk of death, but also the likelihood of disability. Disability not only takes away the individual's quality of life, but it also has an impact on their familes and society since it may affect their ability to work. The earlier onset of disease in the developing world compared to the more developed nations contributes to the impact of economic well-being. In high income countries only 13% of people under age 60 die of NCDs, whereas in low income countries the percentage increases to 29% (WHO 2011). The global economic toll of NCDs has been estimated at over $21 million in the low-and-middle-income countries over the period 2011–2030 (Bloom et al. 2011).

One area of synergy is between NCDs and sexual and reproductive health (SRH). Some of the risk factors are shared, and SRH services may be an entry point for interventions to support healthier behavior. For example, alcohol consumption can lower the likelihood of responsible sexual/contraceptive decision-making. Programs to reach youth with SRH services can also point to the benefits to them, and to their children, of their refraining from tobacco products. In Chile, 43% of females aged 15–24 smoked one or more cigarettes in the last 30 days.

The World Economic Forum's annual Executive Opinion Survey shows that about half of all business leaders surveys worry that at least one NCD will hurt their company's bottom line in the next 5 years with similar levels of concern in low, middle and high income countries. This is especially the case where the quality of

healthcare, or the access to healthcare, is considered poor (Bloom et al. 2011). Many of the NCDs have medical regimens that can help slow the progress of disease. For example, medications can help control high blood pressure, cholesterol or blood glucose. However, screening, diagnosing and treating (for life) large segments of the population place extraordinary pressures on health systems. These secondary prevention approaches require not just the medications but ongoing medical monitoring.

As the World Bank has noted, the developing world cannot afford to treat their way out of the growing burden of NCDs (World Bank 2011). Prevention is a must, and prevention should start early. Adolescence provides a time period to focus attention and ensure that appropriate laws, policies, programs, and information are all available to build a healthy, strong population in the future.

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Part II
Methodological and Statistical Issues