

# Chapter 13

## Population Aging in India: Facts, Issues, and Options



**Arunika Agarwal, Alyssa Lubet, Elizabeth Mitgang, Sanjay Mohanty, and David E. Bloom**

**Abstract** India is undergoing unprecedented demographic changes. Increasing longevity and falling fertility have resulted in a dramatic increase in the population of adults aged 60 and up, in both absolute and relative terms. This change presents wide-ranging and complex health, social, and economic challenges, both current and future. This chapter lays out the context, scope, and magnitude of India's demographic changes. It then details the major challenges these shifts pose in the interconnected areas of health, gender, and income security. We also present an overview of India's recent and ongoing initiatives to adapt to population aging and provide support to older adults and their families. We conclude with policy recommendations that may serve as a productive next step forward.

**Keywords** Population aging · Gender · Health care · Income security · India

---

A. Agarwal · D. E. Bloom (✉)  
Department of Global Health and Population, Harvard T.H. Chan School of Public Health,  
Boston, MA, USA  
e-mail: [arunika@mail.harvard.edu](mailto:arunika@mail.harvard.edu); [dbloom@hsph.harvard.edu](mailto:dbloom@hsph.harvard.edu)

A. Lubet  
Harvard Graduate School of Education, Cambridge, MA, USA  
e-mail: [alyssa\\_lubet@gse.harvard.edu](mailto:alyssa_lubet@gse.harvard.edu)

E. Mitgang  
Department of International Health, Johns Hopkins Bloomberg School of Public Health, John  
Hopkins University, Baltimore, MD, USA  
e-mail: [mitgang@jhu.edu](mailto:mitgang@jhu.edu)

S. Mohanty  
International Institute for Population Sciences, Mumbai, Maharashtra, India  
e-mail: [sanjay@iips.net](mailto:sanjay@iips.net)

## 13.1 Introduction

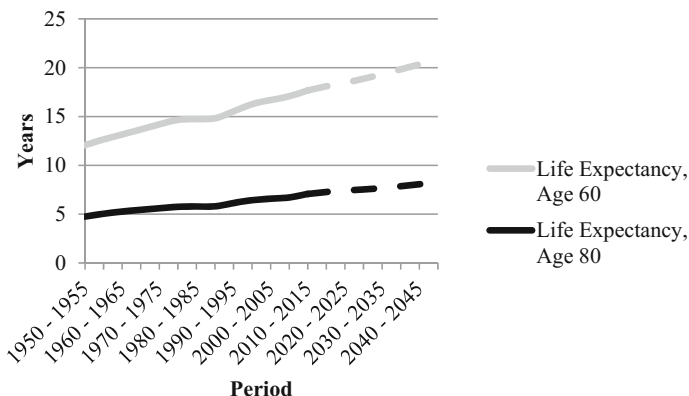
India, one of the world's two population superpowers, is undergoing unprecedented demographic changes. Increasing longevity and falling fertility are leading to a dramatic increase in the population of adults aged 60 and up, in both absolute and relative terms. This change presents wide-ranging and complex health, social, and economic challenges, both current and future, to which this socially, economically, culturally, and linguistically heterogeneous country must rapidly adapt.

This chapter first lays out the context, scope, and magnitude of India's demographic changes. It then details the major challenges these shifts pose in the interconnected areas of health, especially the massive challenges of a growing burden of noncommunicable diseases; gender, particularly the needs and vulnerabilities of an increasingly female older-adult population; and income security. This chapter also presents an overview of India's recent and ongoing initiatives to adapt to population aging and provide support to older adults and their families. It concludes with policy recommendations that may serve as a productive next step forward, keeping in mind the need for urgent and timely action on the part of government, private companies, researchers, and the general population.

## 13.2 Demography: India's Changing Population Landscape

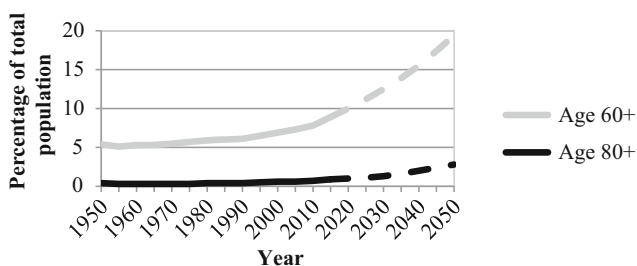
India's population of 1.31 billion, the second largest globally, comprises 17% of the world's total (United Nations 2015), and the United Nations Population Division estimates that India's population will in fact overtake China's by 2028. As India's population grows, its expanding share of older adults is particularly notable. Currently, the growth rate in the number of older individuals (age 60 and older) is three times higher than that of the population as a whole (Giridhar et al. 2014).

Three dominant demographic processes drive the growing share of older Indians: firstly, declining fertility rates due to improved access to contraceptives, increasing age at marriage, particularly among women, and declining infant mortality; secondly, increasing longevity because of advances in medicine, public health, nutrition, and sanitation; and, thirdly, large cohorts advancing to older ages (Bloom et al. 2014b). India's total fertility rate has decreased from 5.9 in 1950 to 2.3 in 2013 and is projected to drop further to 1.88 by 2050, which is below the replacement level. Life expectancy at birth has improved vastly over the last few decades, increasing from 36.2 years in 1950 to 67.5 years in 2015 and projected to rise to 75.9 years by 2050 (see Fig. 13.1) (United Nations 2015). Even more significant in its implications for population aging, life expectancy at age 60 has also increased dramatically, rising from about 12 years in 1950 to 18 years in 2015 and projected to rise further to more than 21 years by 2050 (see Fig. 13.1). Average Indian life expectancy at age 80 has likewise increased significantly, from about 5 years in 1950 to more than 7 years at the present time. By the middle of this century, it is predicted to rise to 8.5 years



Source: (United Nations, 2015); dashed lines represent projected life expectancy

**Fig. 13.1** Steadily increasing life expectancies at older ages



Source: (United Nations, 2015); dashed lines represent projections under a medium-fertility scenario

**Fig. 13.2** The number of older Indians is growing rapidly as a proportion of the country’s population

(United Nations 2015). In addition to these three main demographic processes, the population share of older Indians in certain communities may be increased by high rates of international out-migration, particularly on the part of working-aged adults. In 2013, India was the top origin country for international migrants, with over 14 million individuals of Indian birth living outside of their country of origin (Pew Research Center 2013).

However, the progress that increasing life expectancy represents comes with the challenge of a burgeoning older population. In India, the population share of adults 60 and up grew from 5.4% in 1950 to 9% today (Fig. 13.2). In absolute number of individuals, this represents an almost sixfold increase, from 20.3 million in 1950 to more than 116 million today. For comparison, this population increase of 95.7 million people is greater than the entire individual populations of all but 13 countries

**Table 13.1** Countries with the greatest absolute number of adults 60+, 2015 and 2050

2015		2050	
Country	Adults 60+ (thousands)	Country	Adults 60+ (thousands)
1. China	209,240	1. China	491,533
<b>2. India</b>	<b>116,553</b>	<b>2. India</b>	<b>330,043</b>
3. United States	66,545	3. United States	108,326
4. Japan	41,873	4. Brazil	69,882
5. Russian Federation	28,730	5. Indonesia	61,896

Source: United Nations (2015); medium-fertility scenario

worldwide.<sup>1</sup> Under a medium-fertility scenario, the United Nations Population Division projects that adults 60 and over will comprise 19% of India's total population by 2050, equal to more than 324 million individuals, which is more than the current populations of all but five of the world's nations. In terms of absolute numbers of adults 60 and older, India is currently second only to China, a standing that will likely remain constant over the next several decades (see Table 13.1). Meanwhile, the proportion of the "oldest old" adults aged 80 and older has more than doubled over the past 65 years, from 0.4% of the total population in 1950 to 0.9% in 2015, and is projected to reach nearly 3% of the population—almost 48 million individuals—by 2050 (United Nations 2015).<sup>2</sup>

While these statistics are telling, national figures to some extent also obscure the heterogeneity in population aging that exists across Indian states. As Table 13.2 shows, among Indian states with a population of over ten million (2011 Census), the population share of adults aged 60 and above ranges from just under 7% in Assam, to nearly double this proportion in Kerala, indicating that the force of aging varies considerably across states. The dramatic, massive, and complex nature of these current and ongoing demographic shifts indicates the nature and scale of the population-aging challenges India is facing.

<sup>1</sup>These countries are, as of July 2016, China (1.38 billion), India (1.31 billion), United States of America (322 million), Indonesia (258 million), Brazil (208 million), Pakistan (189 million), Nigeria (182 million), Bangladesh (161 million), Russian Federation (143 million), Mexico (127 million), Japan (127 million), Philippines (101 million), and Ethiopia (99.4 million) (United Nations 2015).

<sup>2</sup>When discussing the scope and nature of the challenges of population aging, differentiating the "old" (60+) from the "oldest old" (80+) is important and helpful, as the needs and capacities of those in their 80s and older tend to differ significantly from those in their 60s and 70s.

**Table 13.2** Adults age 60+ and 80+ as a share of state populations, selected Indian states

State	Population	Adults 60+ as a share of population	Adults 80+ as a share of population
Uttar Pradesh	199,812,341	7.73%	0.91%
Maharashtra	112,374,333	9.88%	1.05%
Bihar	104,099,452	7.40%	0.65%
West Bengal	91,276,115	8.48%	0.97%
Andhra Pradesh <sup>a</sup>	84,580,777	9.79%	0.89%
Madhya Pradesh	72,626,809	7.87%	0.92%
Tamil Nadu	72,147,030	10.41%	1.03%
Rajasthan	68,548,437	7.46%	0.86%
Karnataka	61,095,297	9.48%	1.02%
Gujarat	60,439,692	7.92%	0.91%
Odisha	41,974,218	9.49%	0.95%
Kerala	33,406,061	12.55%	1.62%
Jharkhand	32,988,134	7.14%	0.57%
Assam	31,205,576	6.66%	0.74%
Punjab	27,743,338	10.33%	1.37%
Chhattisgarh	25,545,198	7.84%	0.73%
Haryana	25,351,462	8.65%	1.08%
Delhi National Capital Region	16,787,941	6.83%	0.67%
Jammu and Kashmir	12,541,302	7.36%	1.01%
Uttarakhand	10,086,292	8.93%	1.04%

Source: Government of India (2011)

<sup>a</sup>The 2011 Indian Census, from which these data are drawn, was conducted before the state of Andhra Pradesh split into two separate states, Andhra Pradesh and Telangana. Therefore, data from Andhra Pradesh here represent both the present-day states of Telangana and Andhra Pradesh (with populations of about 35 million and 49 million, respectively)

### 13.3 Health: The Challenges of the Noncommunicable Disease Burden and Multimorbidity

As India's population structure changes, so does its health profile. This is especially true for noncommunicable diseases (NCDs). NCDs include cardiovascular diseases, cancers, chronic respiratory diseases, diabetes, and eyesight conditions, the prevalence of all of which increases with age. While infectious, nutritional, maternal, and perinatal conditions have traditionally represented the greatest health threats in India, the country now faces a "triple burden of disease" comprising both infectious and chronic conditions and violence and injury—particularly violence against women and girls (Bloom et al. 2014a). The chronic disease corner of this triangle has been growing increasingly; in the past three decades, NCDs have surpassed infectious, nutritional, maternal, and perinatal conditions as a cause of death, both in absolute numbers and percentages. Noncommunicable diseases, mainly cardiovascular illnesses, cancers, and chronic respiratory diseases, have likewise surpassed these

**Table 13.3** India's growing NCD burden

Disease group	1990			2013		
	Deaths	% of all deaths	DALYs (thousands)	Deaths	% of all deaths	DALYs (thousands)
<b>All NCDs</b>	3,702,920	40	173,999	5,312,560	53	253,629
Cardiovascular diseases	1,215,810	13	31,813	2,095,930	21	48,794
Cancers	433,134	5	13,193	663,032	7	19,094
Chronic respiratory diseases	1,115,340	12	33,322	1,176,740	12	35,880
Infectious, nutritional, maternal, and perinatal conditions	4,807,890	52	350,464	3,483,130	35	221,818

Source: Institute for Health Metrics and Evaluation (2014)

other conditions in the number of annual disability-adjusted life years (DALYs) (Table 13.3) (Institute for Health Metrics and Evaluation 2014).<sup>3</sup>

The prevalence of mental illness, another prominent NCD, is also rising as the population ages. In 2013, mental health and substance abuse disorders accounted for an estimated 5.5% of total morbidity in the country, some 27 million DALYs. This represents a change of more than 2 percentage points from 1990, when mental health and substance abuse disorders accounted for an estimated 3% of all morbidity (Institute for Health Metrics and Evaluation 2014). Mental illnesses and substance abuse disorders have also been increasing among older age groups: between 1990 and 2013, mental illness and substance abuse disorders rose from 2.8 to 4% of the total morbidity burden among adults 50–69 years of age. Among adults 70 and older, the increase in the same period was from 1.4 to 1.7% (Institute for Health Metrics and Evaluation 2014).

Although reliable data on the prevalence of mental illnesses can be difficult to collect due to social stigma and lack of trained mental health professionals in many communities, particularly in lower-income countries, evidence indicates that the burden of mental illness in India is far-reaching and pervasive in nature. A study in India's southern states reports that the prevalence of mental illness among older adults may be as high as 27%, with depression, anxiety, bipolar disorder, dementia, and alcohol dependence predominating (Reddy et al. 2013). Meanwhile, data from India's National Sample Survey (NSS) suggest a significant positive correlation between mental illness prevalence and age, especially in rural areas (Lakhan and Ekundayo 2015).

This growing burden of both physical and mental chronic illnesses has the potential to translate into staggering economic losses: a 2014 World Economic Forum report predicts that NCDs may cost India as much as \$4.3 trillion in

<sup>3</sup>Disability-adjusted life years (DALYs) are a measure of healthy life used by the World Health Organization and other health-monitoring bodies.

productivity losses and health care expenditure between 2012 and 2030, a figure that is twice the country's annual GDP (Bloom et al. 2014a). Deaths from cardiovascular disease alone may cost India more in terms of years of healthy working life than any other country in the world (Srinath Reddy et al. 2005). While one theory about the future path of aging suggests “compression of morbidity”—the reduction in the portion of the human life span spent living with disease and disability (Fries 1980)—evidence exists that years of disease and disability are in fact increasing for older Indians as life spans grow longer (Arokiasamy and Yadav 2014).

Fueling the growing burden of NCDs is an increase in the prevalence of four major chronic disease risk factors: tobacco use, obesity, physical inactivity, and alcohol consumption, the first three of which are particularly pertinent to older Indian adults. According to the second Indian Human Development Survey (IHDS-II) conducted in 2011–2012, more than 10% of respondents age 60 and up reported that they smoked cigarettes “sometimes” or “daily.” A far greater number, however, reported smoking bidis (inexpensive hand-rolled tobacco cigarettes) or hookah (water pipe): about 6% of 60+ IHDS-II respondents reported that they smoked bidis or hookah sometimes, while 36% reported smoking them daily. Far more common was the use of chewing or smokeless tobacco—highly popular in South Asian countries—among older respondents, with nearly 60% reporting occasional or daily use (Desai et al. 2015). In the first wave of the World Health Organization's (WHO's) Study on Global Ageing and Adult Health (SAGE) survey, conducted in several low- and middle-income countries including India, China, Ghana, and the Russian Federation, the rate of daily smoking among 50+ Indian adults was nearly 47%—the highest of all countries surveyed (Wu et al. 2015).

In addition to high rates of smoking, overweight and obesity are also rising among older adults in India. According to anthropometric data collected by the IHDS-II, some 63% of adults 65 and up were classed as overweight or obese, with overweight defined as having a body mass index (BMI) of 25–29.9 and obesity defined as a BMI of 30 or higher (Desai et al. 2015). Obesity is on the rise in India in part due to a combination of readily available high-fat-content food products and increasingly sedentary lifestyles. In the 2010 Longitudinal Aging Study in India (LASI) pilot study of about 1500 older adults (adults 45 and up in rural and urban areas and their spouses irrespective of age) in four states, a full 69% of respondents reported getting no physical exercise; lack of exercise increased with age and was significantly more prevalent among females than males (Arokiasamy et al. 2012). This finding is consistent with the anthropometric data gathered in the pilot study, in which 29% of female and 20% of male respondents had BMIs of 25 or above. In addition, the median systolic blood pressure reading among study participants was 130 and the median diastolic reading was 83, both in the prehypertensive range; one in three participants was found to have hypertension proper with a systolic reading of 150 and above and a diastolic reading of 90 or above, with a large proportion of these respondents previously unaware of their hypertensive status (Bloom et al. 2014b).

India's recent NCD morbidity and mortality increases are even more pronounced among older adults than in the general population. In 2013, an estimated 2.4 million deaths of Indian adults aged 50–69 were due to NCDs. Nearly three-quarters of all

deaths in this age group and nearly half of these were due to cardiovascular disease. Among adults 70 and up, NCDs caused some 2.7 million deaths, 93% of the total (Institute for Health Metrics and Evaluation 2014). Exacerbating the problem is the issue of multimorbidity, which complicates the management of NCDs considerably, especially because in India, as in many other countries, most health programs have a vertical, disease-specific approach that targets a single set of outcomes rather than dealing with the health of the individual holistically (Pati et al. 2014). Survey data show that the prevalence of multimorbidity increases sharply with age. The World Health Organization's Study on Global Ageing and Adult Health (SAGE) in India found 30.6% of respondents 70 and older reported having more than one chronic condition, compared with just 1.3% of individuals 18–29 years of age (Pati et al. 2014). Meanwhile, results from the IHDS-II indicate that about 7.3% of respondents 65 and up reported having two or more chronic conditions, compared with about 1.3% of adults between the ages of 18 and 65 (however, the IHDS-II, which is not targeted specifically at older adults, did not collect data, measured or self-reported, on certain NCDs that frequently afflict older adults, such as stroke, musculoskeletal disorders, eyesight conditions other than cataracts, or chronic respiratory diseases other than asthma, and thus did not capture all instances of multimorbidity) (Desai et al. 2015). Although further studies are needed, India's aging-fueled multimorbidity increase will most likely mean an even more costly and complicated illness burden.

Although the reported burden of chronic illness is high, many NCDs affecting older adults remain undiagnosed due to lack of access to health education, services, and financial resources. In a cross-sectional study conducted in 10 Indian states in 2009–2010, some 15% of about 5400 diabetic individuals and 33% of over 7200 hypertensive individuals were previously unaware of their health condition(s) (Joshi et al. 2012). The International Diabetes Federation gives an even higher estimate, positing that some 33% of adult diabetics in India remain undiagnosed (International Diabetes Federation 2012).

Overall, the country will clearly need to address the changes in its health care needs and priorities accompanying the demographic shift that is already underway.

### 13.4 Population Aging and Gender Issues

Accompanying the aging of the Indian population is increasing feminization in older age groups, which brings its own unique issues and challenges. Although the average life expectancy has increased dramatically in India, it has not risen equally for males and females. Although women's life expectancy at birth has long exceeded men's, as in most countries globally, the life expectancy gender gap has been widening in India. In the period 1950–1955, Indian women's life expectancy at age 60 exceeded men's by 0.7 years; by 2010–2015, this gap had doubled, and by 2050–2055, it is projected to reach 2 years (see Table 13.4). Meanwhile, although



**Table 13.4** Trends in male–female differences in life expectancy at ages 60 and 80 in India, 1950–2055

Year	Male life expectancy, age 60	Female life expectancy, age 60	Sex gap, age 60	Male life expectancy, age 80	Female life expectancy, age 80	Sex gap, age 80
1950–1955	11.7	12.4	–0.7	4.2	5.2	–1.0
1980–1985	14.1	15.5	–1.4	5.3	6.2	–0.9
2010–2015	17.0	18.4	–1.4	6.8	7.2	–0.4
2030–2035	18.5	20.1	–1.6	7.5	7.9	–0.4
2050–2055	20.4	22.4	–2.0	8.0	8.9	–0.9

*Source:* United Nations (2015); 2030–2055 figures are projections based on a medium-fertility scenario

the male–female gap in life expectancy at age 80 fell between 1950 and the present, it is expected to rise again over the next 40 years (United Nations 2015).<sup>4</sup>

India’s older-adult population is slowly growing increasingly female. In 1950, India’s population share of female adults 60 and up was 50.8%. By 2015, despite a high overall male/female sex ratio throughout the latter half of the twentieth century (about 106–107 males per 100 females), this proportion had grown to approximately 51.4% and is projected to reach about 53% by 2050 under a medium-fertility scenario. In the oldest old segment of adults 80 and up, the proportion of females is projected to increase from the current 55 to 56% by 2050. Although the change in percentage points is small, in absolute terms it represents hundreds of thousands of individuals. In comparison, about 51% of 60+ adults in China, the only country more populous than India, are currently female; by 2050, this proportion will actually decline by about 0.02%. The proportion of female 60+ adults in Brazil and the United States is also projected to slightly decline, rather than increase, in the next 35 years (Brazil: from 56% to 55%; United States: from 54% to 53%) (United Nations 2015).

As with overall population aging, this national trend obscures a great deal of heterogeneity across Indian states. Different male and female life expectancies and life expectancy gaps in different states and regions of the country imply that states will have dramatically dissimilar sex divisions among their older-adult populations.

<sup>4</sup>This prediction is primarily based on the trend of Indian women’s life expectancy increasing at a faster rate than men’s over the past several decades. Since the 1970s, Indian female life expectancy has been consistently increasing at a higher rate than male life expectancy, ranging from about one-half to two percentage points more over each 5-year interval between 1970 and the present day. To a lesser extent, this projection is also due to the expected convergence of Indian life expectancy trends to the world average: globally, females currently enjoy a greater advantage over males in life expectancy at age 60 than they do in India.

**Table 13.5** Differences in years between male and female life expectancy at age 60 in 2011, and female share of adults aged 60+ and 80+, selected Indian states

State	Life expectancy at age 60			Female population share	
	Male	Female	Difference	Age 60+	Age 80+
Bihar	17.0	17.5	-0.5	47%	47%
Jammu and Kashmir	19.1	22.3	-3.2	48%	48%
Uttar Pradesh	15.8	18.0	-2.2	48%	48%
Assam	15.4	17.9	-2.5	49%	51%
Haryana	17.6	20.5	-2.9	50%	51%
West Bengal	16.9	18.7	-1.8	50%	54%
Punjab	19.3	21.0	-1.7	50%	51%
Odisha	16.8	17.6	-0.8	50%	49%
<i>National Average</i>	<i>17.0</i>	<i>18.4</i>	<i>-1.4</i>	<i>51%</i>	<i>55%</i>
Tamil Nadu	17.2	18.9	-1.7	51%	54%
Rajasthan	16.9	21.0	-4.1	52%	57%
Madhya Pradesh	15.4	17.6	-2.2	52%	53%
Himachal Pradesh	18.3	21.0	-2.7	52%	55%
Gujarat	17.1	19.8	-2.7	53%	58%
Andhra Pradesh	16.8	19.2	-2.4	53%	57%
Karnataka	16.8	19.0	-2.2	53%	57%
Maharashtra	17.9	19.5	-1.6	53%	54%
Kerala	18.0	21.6	-3.6	55%	62%

Sources: United Nations (2015) (National Average); Government of India (2013, 2015a) (State estimates); Government of India (2011); authors' computation from data

<sup>a</sup>See Note 3 regarding Andhra Pradesh and Telangana

Table 13.5 shows this interstate spread, comparing state-level sex differences in life expectancy at age 60, as well as females as a proportion of the 60+ and 80+ population in selected states. The somewhat large range between the half-year difference in Bihar and the more than 4-year gap in Rajasthan, as well as the wide range of the feminization of older populations (from less than half of over-60- and over-80-year-olds in Bihar to 55% and 62%, respectively, in Kerala), indicates that different states have distinctive gender profiles in their populations of older adults. This may necessitate state and local governments to tailor their policies and programs appropriately, perhaps aided by further devolution of decision-making power to the state level on the part of the national government.

One of the most important implications of an increasingly female older-adult population in India—including variations in the extent of this trend across states—will be the prevalence of widowhood among women. Higher female life expectancies and the fact that males' average age at first marriage is higher than females' are leading to a sharp increase in the population of widowed females in India. Women whose husbands have died may also spend more years of their lives as widows. In 2012, for example, only 8% of Indian males aged 60–64 were widowed, compared with 35% of females in this age group. Among adults 80 and older, a majority of females, more than 60%, had been widowed, compared with just 27% of males

(Desai et al. 2015). This is highly significant because in many Indian communities, and particularly under traditional Hindu law, widowed women have historically suffered from social stigmatization and discrimination, although evidence exists for improvement in the treatment of widows in the country as a whole (Kadoya and Yin 2012). Most notably, widowed females may suffer from income insecurity due to inheritance traditions that favor sons over daughters and insecurity in their living arrangements (Dey et al. 2012; Sathyanarayana et al. 2014). Evidence also indicates that Indian widows aged 60 and up may be as much as 13% more likely to suffer from morbidity due to communicable and noncommunicable diseases than male widowers in the same age group. Despite this, however, older female widows are also significantly less likely to engage in health care-seeking behavior (Agrawal and Keshri 2014).

In addition to the perils of widowhood, older women in India are significantly disadvantaged in terms of education and literacy relative to both their male contemporaries and to women and men in younger age groups. According to the IHDS-II, as of 2012, only about 22% of Indian women aged 65 or over were literate, compared with 55% of men in this age group. This disparity is especially striking compared with literacy rates for adolescents and adults aged 15–64: a nearly equal 63% for females and 64% for males, which reflects more recent improvements in educational access and opportunity. The education gap in older age groups also bears out in years of schooling. While men and women aged 15–64 have nearly identical average years of schooling—with females’ years of education actually slightly higher than males’ (females averaged 2.8 and males 2.7)—a pronounced disparity exists among those aged 65 and up. Among older Indian adults, women average only one year of education compared with four for their male counterparts (Desai et al. 2015). Because of these disparities in education, older Indian women may be less able to learn about issues such as health risk factors and government benefits and less able to advocate for themselves effectively.

Economic security for older Indian women—particularly widowed and unmarried women, but also for women in general—is also a major concern. Labor force participation among women is very low, and a majority of women depend on their families for economic support (Government of India 2011). Moreover, women in India have historically not owned assets due to the nation’s patriarchal inheritance system in which property is kept within a family’s male lineage. Not until a 2005 amendment to the national property law have women been entitled to equal property inheritance rights (Government of India 2005). Policy that strives to ensure financial security for both older men and women must be committed to promoting and defending these newly legalized inheritance rights.

Because of ongoing age and gender demographic shifts, considerable heterogeneity in sex-based life expectancy gaps, and prevalence of widowhood across Indian states, aging- and gender-related issues will likely converge as India’s population continues to age over the next several decades. Policy changes and programs must pay attention to the special needs and situations of older women, particularly widows, to ensure the well-being of the country’s older population.

### 13.5 Income Security: Changing Patterns and Lack of a Safety Net

Another major challenge of population aging in India is income and housing security for older adults. This is due in part to a changing social and economic landscape in which the traditional family support system is breaking down in the households of many older adults. In India, as in many East and South Asian countries, family has traditionally served as the prime source of support for aging adults, with sons responsible for caring for their parents. However, evidence indicates that this support system has been declining due to factors such as increased urbanization and mobility; a 2011 United Nations Population Fund (UNFPA) survey carried out in selected states revealed that about a fifth of 60+ respondents lived alone or solely with a spouse. The main reasons cited for living without children were having no children, or children living in a different locality due to education, work, or marriage, rather than due to personal preference. Furthermore, only 14% of these single-generation, older adult households received financial support from friends or relatives (Alam et al. 2012).

Employment and workforce attachment data give information about income and income security for India's aging population. Estimates from India's most recent census indicate that 42% of adults 60 and up and 22% of adults 80 and up still participate in the workforce (Government of India 2011). The UNFPA survey of older Indians found that about 24% of India's nearly 10,000 respondents aged 60+ remained in the workforce and that a large proportion of these respondents were working at a relatively high intensity level of at least 6 months out of the year or more than 4 h a day. Rates of workforce participation among older adults were markedly higher in rural (47%) than in urban areas (29%). They were also much higher for males than for females (as is the case at all ages, see Table 13.6). Moreover, they varied significantly across states, from 26.8% in Goa to 53.5% in Nagaland. As many Indians experience longer life spans and better health, an increasing number may choose to continue to work, full time or part time, beyond traditional retirement ages for reasons of enjoyment and intellectual stimulation, or to share their knowledge and experience with younger workers. At the present time, however, more than 70% of older Indian workers surveyed cited economic necessity, rather than personal preference, as their main reason for remaining in the workforce, indicating a high level of income insecurity (Alam et al. 2012).

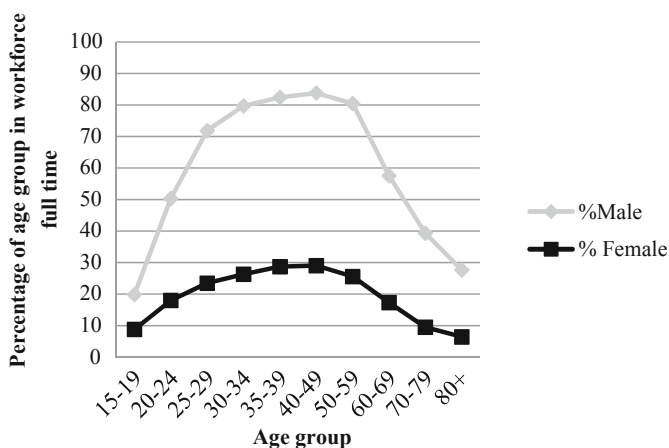
**Table 13.6** Workforce participation by age, sex, and place of residence (%)

Age group	Total			Rural			Urban		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
<b>Total</b>	<b>39.8</b>	<b>53.3</b>	<b>25.5</b>	<b>41.8</b>	<b>53.0</b>	<b>30.0</b>	<b>35.3</b>	<b>53.8</b>	<b>15.4</b>
15–59	58.5	78.4	37.4	63.0	79.8	45.4	49.5	75.7	21.4
60+	41.6	60.4	23.4	47.1	66.4	28.4	28.5	46.1	11.3
70+	29.5	45.1	14.5	33.5	50.0	17.5	19.8	33.1	7.6
80+	22.1	34.9	10.9	24.4	37.1	12.8	16.9	29.5	6.7

Source: Government of India (2011)

Another source of potential income insecurity for older Indians is the fact that only individuals who have worked in the “organized” labor market—that is, those who have had official employment with employers such as government organizations or private corporations—are eligible to receive pensions after their retirement. An estimated 83% of India’s working population, however, is in the unorganized sector and therefore not entitled to receive any pension or retirement benefits in their old age. In total, less than 10% of the population currently receives a pension of any kind (Uppal and Sarma 2007). India faces an urgent need for social safety net measures that are available to all individuals, regardless of work history (Fig. 13.3).

Income security takes on extra significance among older adults due to rising health care consumption and expenditure. As discussed previously, the prevalence of noncommunicable diseases increases with age, and so, accordingly, does health care spending. Average annual per capita out-of-pocket health spending in India is almost four times as high for older adults (INR 2890, about US\$43) as among younger adults (INR 770, about US\$11) (Bloom et al. 2010); in a country in which the per capita GDP is about \$1600 (World Bank 2015), this is hardly an insignificant sum. Moreover, only 17% of the population is covered by health insurance (Bloom et al. 2010). Indeed, the 2011 LASI pilot survey found that of about 1600 adults aged 45 and older, 87% reported “family” as their primary payment mechanism for health care costs, while only 1% reported having insurance (Arokiasamy et al. 2012). In the absence of health insurance and quality health care infrastructure, catastrophic health care expenditures can easily push older adults into poverty. Health insurance and comprehensive health care policies will also be a crucial component of any national action designed to ensure the income security of India’s older adults.



Source: (Government of India, 2011)

Fig. 13.3 Full-time workforce participation rate by sex and age, 2011

### 13.6 Policy Options: Past Attempts, Future Prospects

Although the Indian government has proposed several schemes and resolutions to support an aging population, most of these have thus far met with limited success. At the 1991 United Nations General Assembly, member countries adopted the United Nations' Principles for Older Persons, which encourages governments to incorporate the principles of independence, dignity, care, participation, and self-fulfillment of the elderly in their national policies and programs (United Nations 1991). Soon after the declaration, India's Ministry of Social Justice and Empowerment implemented an Integrated Programme for Older Persons (IPOP) in 1992 (Government of India 2015d). Under this program, citizens aged 60 years and older are eligible to receive basic amenities such as food, shelter, health care, and other welfare services. The scheme also provides financial assistance to nongovernmental organizations (NGOs), voluntary organizations, and Panchayati Raj (local government) institutions to maintain old-age homes, continuous-care homes, and clinics for older persons.

Since 1992, multiple government ministries across various sectors have implemented initiatives that attempt to provide benefits and security to older adults in India (see Table 13.7). However, most of these schemes have not yet been implemented nationwide; many state-level initiatives have failed due to lack of resources and competing priorities. Moreover, in the states where these programs have been implemented, such as Himachal Pradesh, Punjab, West Bengal, Odisha, and Tamil Nadu, the utilization rate remains very low due to lack of public awareness (Alam et al. 2012). According to the United Population Fund survey, for example, 78% of the older-adult population was aware of the Indira Gandhi National Old Age Pension Scheme (IGNOPS), while some 71% knew about the Indira Gandhi National Widow Pension Scheme (IGNWPS). A mere 39% of respondents were aware of the Annapurna food scheme. However, utilization rates of these schemes are typically below 20% of eligible individuals (Alam et al. 2012), with a wide gap between levels of awareness and levels of use due to factors such as corruption and difficult-to-navigate bureaucracy. Meanwhile, data from the IHDS-II suggest that only about 18% of adults 60 and up receive any sort of old-age pension and that 15% of all widows 60 and older receive a widow's pension (Alam et al. 2012).

In late 2015, the World Health Organization announced the development of a Global Strategy and Action Plan on Ageing and designated 2020–2030 as the Decade of Healthy Ageing. The Global Strategy and Action Plan, which was formally adopted by the World Health Assembly in May 2016, calls on all countries to “commit to Healthy Ageing.” Its main strategic objectives include fostering healthy aging, aligning health systems with the needs of older populations, developing long-term care, creating “age-friendly environments,” and improving measurement and evaluation. It may provide a promising framework for India to improve and maintain the lives and well-being of its aging population in the years to come (World Health Organization 2016).

Based on the limited success of past and current policies aimed at aging adults, a business-as-usual approach will clearly not be sufficient to manage India's transition. The challenges discussed in this chapter will necessitate multisectoral responses, including public and private policy pathways, technological advances, and infrastructural modifications and additions.

**Table 13.7** Overview of current programs aimed at older-adult welfare in India

Sector	Schemes/programs	Objectives	Year implemented
Health	National Program for Health Care of Elderly (NPHCE)	<ul style="list-style-type: none"> <li>– Community-based primary health care</li> <li>– Strengthening of geriatric health services at district hospitals/CHC/PHC/subcenters</li> <li>– Dedicated facilities at 100 district hospitals with 10-bedded ward for the elderly</li> <li>– Establishing eight regional medical institutions for tertiary-level medical care</li> </ul>	2010–2011
	Rashtriya Swasthya Bima Yojana (RSBY)	This scheme provides health insurance coverage for BPL families, including the elderly. Beneficiaries under RSBY are entitled to hospitalization coverage up to Rs. 30,000 for most diseases that require hospitalization	2008
	Private Insurance	Special health insurance schemes for senior citizens over 60 years by various private insurance providers have been initiated	Varies
Finance and Revenue	Incentives under Income Tax Act, 1961	A senior citizen is liable to pay income tax for income above Rs. 3 lakh per annum and Rs. 5 lakh for people 80 years and older; limits are periodically revised.	1961
	Concessions	Senior citizen concessions in railways—40% for men and 50% for women Air India offers 50% discount to senior citizens (to above 63 years old) Discounted tickets for public road transport	Varies
Legal	Senior Citizen Savings Scheme	Senior citizens are eligible for tax deduction under Section 80C of the Income Tax Act as well as higher interest rates for savings accounts at national banks	2004

(continued)

**Table 13.7** (continued)

Sector	Schemes/programs	Objectives	Year implemented
Social Justice and Empowerment	Maintenance and Welfare of Parents and Senior Citizens	Legally obligates children and heirs to provide maintenance to senior citizens and parents, by monthly allowance, in addition to caring for elderly parents	2007
	Integrated Programme for Older Persons (IPOP)	Providing basic amenities like shelter, food, medical care, and entertainment. Financial assistance is provided to NGOs for maintenance of old-age homes, respite-care homes, and continuous-care home; mobile medical units; daycare centers for Alzheimer's patients; etc.	1992
	Old-age pension under Indira Gandhi National Old Age Pension Scheme (IGNOPS)	Central government assistance of Rs. 200 per month to people in the 60–79 year age group and Rs. 500 to people above 80 years of age belonging to BPL households; supplemented by state governments in varying amounts	2007
	Annapurna Scheme	Senior citizens 65 years of age or older who, though eligible for old-age pension under the National Old Age Pension Scheme (NOAPS), are not getting the pension are covered and 10 kg of food grains per person per month is supplied free of cost under the scheme	2000–2001
Rural Development	Indira Gandhi National Widow Pension Scheme (IGNWPS)	Pension of Rs. 200 per month to widows in the 40–64 year age group belonging to BPL category	2009
	National Family Benefit Scheme (NFBS)	Central assistance of Rs. 20,000 provided to a BPL household on the death of the primary bread earner of the family who was in the age group of 18–59 years	1998
	Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)	The Act guarantees 100 days of employment in a financial year to any rural household whose adult members are willing to do unskilled manual work	2006

(continued)



**Table 13.7** (continued)

Sector	Schemes/programs	Objectives	Year implemented
Retirement/ Pension	National Pension System (NPS)	The objective is providing retirement income to all citizens. Initially, NPS was introduced for government employees. Taking effect May 1, 2009, NPS has been provided for all citizens of the country, including unorganized sector workers on a voluntary basis	2004
	Swavalamban Scheme	Implemented especially for unorganized workers, under this program, the government will contribute a sum of Rs. 1000 to each eligible NPS subscriber who contributes a minimum of Rs. 1000 and a maximum of Rs. 12,000 per annum	2010–2011

Source: Government of India (2015e)

Note: Abbreviations: *CHC* Community Health Center, *PHC* Primary Health Center, *BPL* Below Poverty Line

### 13.6.1 Health and Accessibility

India must take significant steps to ensure the health of its aging population. A large component of these steps must include programs and policies for the prevention, detection, and treatment of noncommunicable diseases; this is important both for today's population of older adults and for the current generation of younger adults to ensure healthy future aging. To this end, several recent programs, mostly community- and primary-care based, have met with success in this area. One example is the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS), a government-sponsored screening and prevention program launched as a 2008 pilot program in Karnataka and slated for expansion to at least 10 other states (Government of India Press Information Bureau 2010). The Kidney Help Trust of Chennai, a community-based diabetes screening and prevention program (Mani 2005), and mental health service delivery that utilizes trained lay workers, first tested in Goa (Patel et al. 2010), have also shown promise in terms of efficacy and cost-effectiveness and are good candidates for scale-up (Bloom et al. 2014a). Meanwhile, increased tobacco taxation, smoking bans, and expansion of public awareness campaigns on the health consequences of smoking will also likely be necessary to mitigate one of the leading NCD risk factors in the country (Jha et al. 2011; World Health Organization 2009).

In addition to trying to ameliorate its growing age-associated NCD burden, India must also implement programs designed to meet the special health needs of older adults who are also more susceptible to multimorbidity, which requires holistic and

specialized care. The government has taken steps toward this goal in the form of plans to establish two national geriatric centers in Delhi and Chennai and 12 regional geriatric centers in medical institutions across the country (Express News Services 2015). These centers will act as research and academic institutes for geriatric medicine and provide health services to the local older-adult population. In addition to these national and regional centers, all of which are located in urban areas, connecting these regional centers to district- and village-level health facilities will be crucial to serve the needs of India's rural population, which still comprises a majority of the country's people in spite of increasing urbanization (United Nations 2014).

Beyond expanding and strengthening networks of health care provision for older adults, a need and an opportunity exist to use technology to aid people living in remote areas, or who have limited mobility. One promising technological application is information and resource "telehealth" call and monitoring centers that could offer health advice and support to aging adults (World Health Organization 2007). Such telehealth or "m-health" models aimed at older adults have already met with some success in higher-income countries (Cimperman et al. 2013), while telehealth call centers geared toward women are already in place in India and Pakistan (Symington 2013). Even in rural and low-resource areas, phone-based systems are a highly viable avenue for knowledge and service provision, as the country as a whole has over one billion mobile phone subscriptions, covering over 80% of the population, and rural mobile telephony penetration is approaching 50% and expected to grow (Prasad 2015; Rai 2016). Both low-tech and high-tech innovations are also needed to help maintain older individuals' independence, dignity, and quality of life; low-cost and readily available versions of adaptive devices and aids, such as walkers, hearing aids, reading glasses and magnifiers, and grab bars, present another form of technology solution.

Additionally, infrastructure in India needs to be elderly- and physically challenged-friendly. As India continues to modernize its infrastructure, designing spaces for an aging population will involve building structures, adapting transportation, and implementing services that meet the needs of older adults and that address the principles of inclusivity, accessibility, and connectivity (World Health Organization 2007). This effort has started with Kolkata, Udaipur, and New Delhi becoming members of the WHO Age-Friendly World Global Network (World Health Organization Centre for Health Development 2015; Sinha 2012), a network committed to sharing best practices in urban healthy aging and promoting age-friendly infrastructure components such as accessible buildings and public transit, customer service that is friendly to older adults, and appropriate public places for walking and resting (World Health Organization 2007). With both urban and rural environments that often pose major mobility challenges to older adults and persons with disabilities, more Indian states and cities need to realize the importance of a built environment accessible to the aging population.

### ***13.6.2 Women's and Gender Issues***

Because aging Indian women are particularly vulnerable, the country must pay special attention to their needs, and implement programs and policies that ensure

healthy and secure aging for both women and men. As discussed previously, technology has the potential to be a key asset in improving health care access for older adults and adult women. Call center and m-health services could also be expanded to cater specifically to the needs of older-adult women, whose specialized health concerns may include female cancers, incontinence, and health issues associated with menopause.

While all older-adult health services must take women's needs into account, special attention must also be paid to India's growing population of older widowed women, who may suffer from greater rates of morbidity and engage less frequently in health-seeking behaviors than their male counterparts. While India has made strides toward ensuring the overall rights and dignity of widowed females, the government must continue to combat discrimination against widows, while expanding and ensuring the smooth administration of programs that help to ensure their financial security.

Finally, to ensure the financial security and independence of older women, regardless of their marital status, India must also make sure that laws ensuring women's property and inheritance rights are upheld and enforced. The country must also continue its progress in promoting the education of women and girls and encouraging female workforce participation, so that future generations of older-adult women can become more politically empowered and depend less on husbands or families for their income.

### ***13.6.3 Income Security Issues***

To improve income security for all its aging individuals, India needs to revise its retirement and pension policy to accommodate the country's changing demography (Bloom and McKinnon 2014). A recently announced amendment to the national pension policy that extends the opportunity to receive pension benefits to all age-eligible adults, regardless of employment or sector status, is a first step toward an inclusive retirement and pension policy (Government of India 2015b). By the end of 2015, however, the Atal Pension Yojana Scheme—the portion of the plan that is specifically targeted to unorganized-sector workers—had only one million subscribers in the country, far short of the program's December goal of 200 million enrollments. Although the plan has been well publicized and monthly contribution levels begin at just INR 42 (about US\$0.60), it remains difficult to convince lower-income and low-financial-literacy households of the importance of investing for retirement when day-to-day needs are much more pressing (Seth 2015). New or innovative schemes may be necessary to incentivize higher levels of retirement savings; much ground remains uncovered in restructuring social policies for the elderly in India.

With rising health care costs, India's older adults must also be cushioned from the shocks of catastrophic health care expenditures. The need for readily available health care, including care for older adults, has been on the Indian government's radar for

quite some time. Recommendations for publicly financed health insurance and provision of free drugs and diagnostic services are a part of India's 2012–2017 Five-Year Plan, and in January of 2015 the new government's Finance Ministry released a draft National Health Policy (NHP) that states that "India would need to develop its own cost effective and culturally appropriate approach [ . . . ] to addressing the health and care needs of the elderly," which necessarily includes community and family support and meets the need for palliative and end-of-life care. It also increases the provision of national tax revenue to individual states and devolves responsibility for health care program design and delivery to state governments (Government of India 2015c; Reddy 2015). However, due to resource constraints, the government has drastically cut back on proposed spending for the plan, leaving these "national health assurance" provisions in doubt (Kalra 2015).

Finally, as discussed previously, declining levels of familial support among the elderly over the past decade remain a serious concern. In 2007, the government passed the Maintenance and Welfare of Parents and Senior Citizens Act, which allows adults 60 and older who are "unable to maintain" themselves to bring legal action against adult children or grandchildren who fail to provide them with such basic necessities as housing, food, clothing, and medical care (Sivaramakrishnan 2014; Government of India 2007). This Act codifies the basic rights of older adults—it is particularly germane to vulnerable subpopulations, such as widows and low-income individuals—and provides a legal backbone to a faltering social order. However, it is also difficult to enforce, contains no assurances for childless adults, and does not address what, if any, are the responsibilities of the Indian government toward its aging citizens. Such family-centered social welfare measures must be complemented and supported by appropriate government initiatives such as a robust pension system and health care delivery.

## 13.7 Conclusion

India faces unprecedented population aging due to lengthening life spans, falling fertility, and the progression of relatively large cohorts to the older ages. This demographic shift poses massive and complex challenges to Indian society in the form of a rising burden of noncommunicable diseases, a vulnerable female-heavy older-adult population, a changing family structure, and the lack of a social safety net. Successfully addressing these challenges, while certainly far from impossible, will require equally complex and ambitious changes and innovations in health, fiscal, and social policies.

**Acknowledgment** This chapter was prepared as a part of the Longitudinal Aging Study in India, which is supported by a grant from the National Institute on Aging (R01AG042778).

## References

- Agrawal G, Keshri K (2014) Morbidity patterns and health care seeking behavior among older widows in India. *PLoS One* 9:e94295
- Alam M, James KS, Giridhar G, Sathyanarayana KM, Kumar S, Raju S, Syamala TS, Subaiya L, Bansod DW (2012) Report on the status of elderly in select States of India, 2011. UNFPA India, New Delhi, India
- Arokiasamy P, Bloom DE, Lee J, Feeney K, Ozolins M (2012) Longitudinal aging study in India: vision, design, implementation, and preliminary findings. In: Smith JP, Majmundar M (eds) *Aging in Asia: findings from new and emerging data initiatives*. The National Academies Press, Washington, DC
- Arokiasamy P, Yadav S (2014) Changing age patterns of morbidity vis-a-vis mortality in India. *J Biosoc Sci* 46:462–479
- Bloom DE, Cafiero-Fonseca ET, Candeias V, Adashi E, Bloom L, Gurfein L, Jané-Llopis E, Lubet A, Mitgang E, O'Brien J (2014a) Economics of non-communicable diseases in India: the costs and returns on investment of interventions to promote healthy living and prevent, treat, and manage NCDs. Harvard T.H. Chan School of Public Health and World Economics Forum, Geneva
- Bloom DE, Hu P, Arokiasamy P, Risbud A, Sekher TV, Mohanty SK, Kale V, O'Brien J, Chien S, Lee J (2014b) Longitudinal aging study in India: biomarker data documentation. Harvard University Program on the Global Demography of Aging, Boston
- Bloom DE, Mahal A, Rosenberg L, Sevilla J (2010) Economic security arrangements in the context of population ageing in India. *Int Soc Secur Rev* 63:79–97
- Bloom DE, McKinnon R (2014) The design and implementation of pension systems in developing countries: issues and options. In: Harper S, Hamblin K (eds) *International handbook on ageing and public policy*. Edward Elgar, Cheltenham, UK
- Cimperman M, Makovec Brenčič M, Trkman P, Stanonik MD (2013) Older adults' perceptions of home telehealth services. *Telemed J E Health* 19:786–790
- Desai S, Dubey A, Joshi BL, Sen M, Shariff A, Vanneman R (2015) India Human Development Survey (IHDS). University of Maryland and National Council of Applied Economic Research, Inter-university Consortium for Political and Social Research, Ann Arbor and New Delhi
- Dey S, Nambiar D, Lakshmi J, Sheikh K, Reddy K (2012) Health of the elderly in India: challenges of access and affordability. In: Smith JP, Majmundar M (eds) *Aging in Asia: findings from new and emerging data initiatives*. The National Academies Press, Washington, DC
- Express News Services (2015) Government plans two national centres for the elderly. *Indian Express*, 15 April 2015
- Fries J (1980) Aging, natural death, and the compression of morbidity. *N Engl J Med* 303:130–135
- Giridhar G, Sathyanarayana KM, James KS (2014) Introduction. In: Giridhar G, Sathyanarayana KM, Kumar S, James KS, Alam M (eds) *Population ageing in India*. Cambridge University Press, New Delhi
- Government of India (2005) The Hindu Succession (Amendment) Act, 2005. New Delhi
- Government of India (2007) Maintenance and Welfare of Parents and Senior Citizens Act, 2007. The Gazette of India, New Delhi
- Government of India (2011) Census of India 2011. <http://censusindia.gov.in/>
- Government of India (2013) Sample Registration System Statistical Report, 2011. New Delhi
- Government of India (2015a) Appendix SRS Based Life Table. [http://www.censusindia.gov.in/vital\\_statistics/Appendix\\_SRS\\_Based\\_Life\\_Table.html](http://www.censusindia.gov.in/vital_statistics/Appendix_SRS_Based_Life_Table.html)
- Government of India (2015b) Atal Pension Yojana. Department of Financial Services, New Delhi
- Government of India (2015c) Draft National Health Policy 2015. New Delhi
- Government of India (2015d) An Integrated Programme for Older Persons. <http://socialjustice.nic.in/ipop.php>
- Government of India (2015e) Schemes and facilities for the older people. <http://www.oidagesolutions.org/facilities/schemesmain.aspx>

- Government of India Press Information Bureau (2010). National programme for prevention and control of cancer, diabetes, cardiovascular diseases, and stroke (NPCDCS) approved. <http://pic.nic.in/newsite/erelease.aspx?Relid=63087>
- Institute for Health Metrics and Evaluation (2014) Global burden of disease. IHME, University of Washington, Seattle
- International Diabetes Federation (2012) Diabetes Atlas, 5th edn. International Diabetes Federation, Brussels
- Jha P, Guindon E, Joseph R, Nandi A, John R, Rao J, Chaloupka F, Kaur J, Gupta P, Rao G (2011) A rational taxation system of bidis and cigarettes to reduce smoking deaths in India. *Econ Polit Wkly* 46:44–51
- Joshi SR, Saboo B, Vadivale M, Dani SI, Mithal A, Kaul U, Badgandi M, Iyengar SS, Viswanathan V, Sivakadaksham N (2012) Prevalence of diagnosed and undiagnosed diabetes and hypertension in India—results from the Screening India's Twin Epidemic (SITE) study. *Diabetes Technol Ther* 14:8–15
- Kadoya Y, Yin T (2012) Widow discrimination and family care-giving in India. The Institute of Social and Economic Research (ISER), Osaka University
- Kalra A (2015) Exclusive: Modi government puts brakes on universal health plan. Reuters
- Lakhan R, Ekundayo O (2015) National sample survey organization survey report: an estimation of prevalence of mental illness and its association with age in India. *Neurosci Rural Pract* 6:51–54
- Mani M (2005) Experience with a program for prevention of chronic renal failure in India. *Kidney Int* 67:75–78
- Patel V, Weiss H, Chowdhary N, Naik S, Pednekar S, Chetterjee S, De Silva M, Araya R, King M, Simon G, Verdelli H, Kirkwood B (2010) Effectiveness of an intervention led by lay health counsellors for depressive and anxiety disorders in primary care in Goa, India (MANAS): a cluster randomised controlled trial. *Lancet* 376:2086–2095
- Pati S, Agrawal S, Swain S, Lee JT, Vellakkal S, Hussain MA, Millett C (2014) Non communicable disease multimorbidity and associated health care utilization and expenditures in India: cross-sectional study. *BMC Health Serv Res* 14
- Pew Research Center (2013) International Migrants by Country. <http://www.pewsocialtrends.org/2013/12/17/migration-tables/>
- Prasad R (2015) Rural telephony penetration in India at 48.79 percent. Digit, December 24. <http://www.digit.in/telecom/rural-telephony-penetration-in-india-at-4879-percent-ravi-shankar-prasad-28370.html>
- Rai S (2016) India Just Crossed 1 Billion Mobile Subscribers Milestone and the Excitement's Just Beginning. *Forbes*, January 6. <http://www.forbes.com/sites/saritharai/2016/01/06/india-just-crossed-1-billion-mobile-subscribers-milestone-and-the-excitements-just-beginning/#9df23eb5ac25>
- Reddy KS (2015) India's aspirations for universal health coverage. *N Engl J Med* 373:1–5
- Reddy VB, Gupta A, Lohiya A, Kharya P (2013) Mental health issues and challenges in India: a review. *Int J Sci Res Publ* 3:1–3
- Sathyanarayana KM, Kumar S, James KS (2014) Living arrangements of elderly in India: policy and programmatic implications. In: Giridhar G, Sathyanarayana KM, Kumar S, James KS, Alam M (eds) *Population ageing in India*. Cambridge University Press, New Dehli
- Seth D (2015) Atal Pension Yojana likely to miss December target. *Business Standard*, December 16. [http://www.business-standard.com/article/economy-policy/atal-pension-yojana-likely-to-miss-december-target-115121600020\\_1.html](http://www.business-standard.com/article/economy-policy/atal-pension-yojana-likely-to-miss-december-target-115121600020_1.html)
- Sinha K (2012) Kolkata joins global network for age-friendly cities. *The Times of India*, October 2. <http://timesofindia.indiatimes.com/india/Kolkata-joins-global-network-for-age-friendly-cities/articleshow/16634058.cms>
- Sivaramakrishnan K (2014) Aging and dependency in an independent Indian nation: migrant families, workers and social experts (1940–60). *J Soc Hist* 47:968–993
- Srinath Reddy K, Shah B, Varghese C, Ramadoss A (2005) Responding to the threat of chronic diseases in India. *Lancet* 366:1744–1749

- Symington A (2013) Pakistan's women can now dial-a-doc. *The Christian Science Monitor*, August 8. <http://www.csmonitor.com/World/Asia-South-Central/2013/0808/Pakistan-s-women-can-now-dial-a-doc>
- United Nations (1991) United Nations principles for older persons. United Nations Human Rights, Office of the High Commissioner, Geneva
- United Nations (2014) World urbanization prospects, the 2014 revision. United Nations Dept of Economic and Social Affairs Population Division, Geneva
- United Nations (2015) World population prospects: the 2015 revision. United Nations Department of Economic and Social Affairs Population Division, Geneva
- Uppal S, Sarma S (2007) Aging, health and labour market activity: the case of India. *World Health Popul* 9:79–97
- World Bank (2015) World development indicators. Washington, DC
- World Health Organization (2007) Global age-friendly cities: a guide. World Health Organization, Geneva
- World Health Organization (2009) WHO report on the global tobacco epidemic, 2009: implementing smoke-free environments. World Health Organization, Geneva
- World Health Organization (2016) WHO global strategy and action plan on ageing and health. <http://who.int/ageing/global-strategy/en/>
- World Health Organization Centre for Health Development (2015) Age-friendly cities. [http://www.who.int/kobe\\_centre/ageing/age\\_friendly\\_cities/en/](http://www.who.int/kobe_centre/ageing/age_friendly_cities/en/)
- Wu F, Guo Y, Chatterji S, Zheng Y, Naidoo N, Jiang Y, Biritwurm R, Yawson A, Minicuci N, Salinas-Rodriguez A, Manrique-Espinoza B, Maximova T, Peltzer K, Phaswanamafuya N, Snodgrass J, Thiele E, Ng N, Kowal P (2015) Common risk factors for chronic non-communicable diseases among older adults in China, Ghana, Mexico, India, Russia and South Africa: the study on global AGEing and adult health (SAGE) wave 1. *BMC Public Health* 15:1–13