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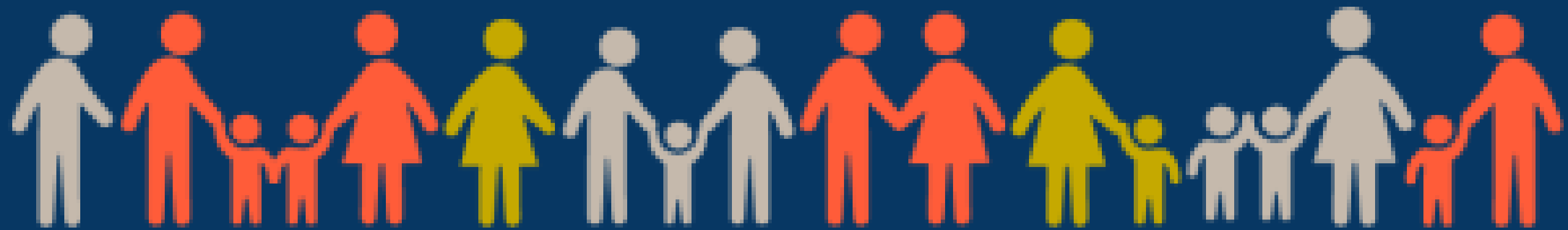
Population Growth and its Dynamics

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Dr. Dharendra Kumar is a population and public health professional. His background combines with sound academic records, proven leadership and managerial skills in institution building of academic and research organization. A trained demographer, he gained experience and deep knowledge on public health and population sciences through his active engagement in academics and research for more than two decades in a National and Global perspective. He obtained his M.Phil. and Ph.D. in Population Studies with specialization in mortality and public health from the International Institute for Population Sciences, Mumbai, India during 1989-1993 and Master of Science in Statistics from Agra University, UP India in 1987. Dr. Kumar has worked in UNICEF County Office New Delhi as National Professional Officer, M& E in SPME Section during August 2016 – February 2019. He has worked as Director in Institute of Health Management Research, Bangalore from the period July 2012 – July 2014. He has also worked as Professor and Dean, Academic and Student Affairs in, IHMR Jaipur. During his tenure in Jaipur, he worked in various capacities to promote health care management education and research in India. Dr. Kumar has worked as Co-investigator and Country Director IIHMR in Afghanistan in collaboration with Johns Hopkins University Bloomberg School of Public Health (JHBSPH), USA and the Ministry of Public Health, Islamic Republic of Afghanistan to implement the Third Party Evaluation of the Basic Package of Health Services (BPHS) in Afghanistan during April 2007 and March 2009. He incepted his contributions as a Demographer and Economist in National Council for Applied Economic Research, New Delhi (1994-1995) and then as a Lecturer in the department of Preventive Social Medicine, Indira Gandhi Medical College, Shimla (1993 -1994). Dr. Kumar has gained rich experience in leading multidisciplinary team of experts in implementing health and nutrition programmes in Afghanistan as Country Health and Nutrition Programme Manager in Save the Children UK Afghanistan and in India as Project Director of “Integrated Programme Strategy (IPS) Rajasthan, Food Fortification Project” with financial support from GAIN. He is a recipient of award of Government of India Fellowship during 1987 - 1989 and a UGC/CSIR Research Fellowship for Ph.D. in Population Studies during 1989-1992. He is a life member of the Indian Association for the Study of Population, member of East-West Centre Association, Honolulu, USA and member of the International Union of Scientific Study of Population (IUSSP) and numbers of several national and international research and academic organizations.



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Dhirendra Kumar, Ph.D. Professor IIHMR U Jaipur

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- Demography Vs Population study
- Measuring Population Change (PBE) and growth
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What is Demography

- The term **demography** is derived from the Greek word 'demos' meaning a human being.(first time coined by a Belgian statistician, Achille Guillard, 1855)
- The scientific study of human populations, primarily with respect to Change in their size, structure or composition and development. (Van de Walle, IUSSP, 1982)
- *Population Studies* : wider definition, it not only deals with levels and changes in the size, composition and distribution of the population but also with the causes and consequences of the levels and changes.
- Multidisciplinary approach to address changes (psychology, law, political science and reproductive physiology, Bogue, 1969; UN, 1958)



Important Aspects of the Population Studies

- What are the changes that are taking place in the size of the population and how are these changes brought about? What is the significance of these changes from the perspective of human welfare?
- Where the people found and what are the changes taking place in their distribution in communities?
- What kind of people are found in a given population group and how do those in one group differs from the other?

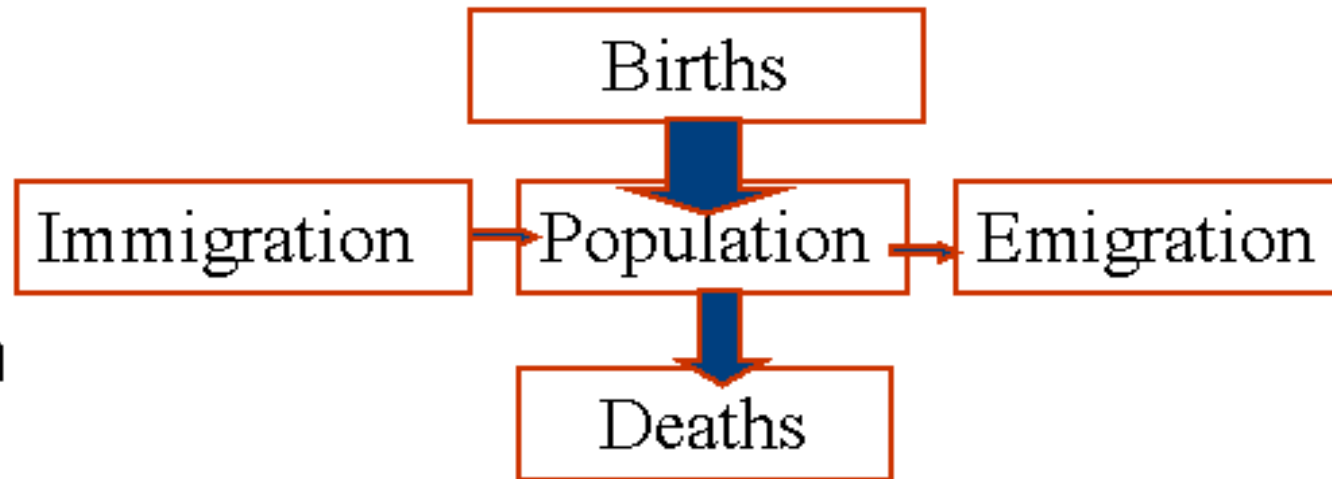
Warren. S. Thompson 1936

(The ANNALS of the American Academy of Political and Social Sciences)



Measuring Population Change : Three Basic Demographic Processes

- ◆ Births
- ◆ Deaths
- ◆ Migration



Measuring Population Change

Demographic Balancing Equation

- ♦ Population change = (Births - Deaths) + (Immigrants - Emigrants)
- ♦ Or using the common notation, it can be expressed:

$$P_t - P_0 = (B - D) + (I - E)$$

where:

P_0 is the initial population and P_t is the population after time t

$$P_t = P_0 + B - D \pm Mij$$

$$\frac{P_t - P_0}{P_0} = \frac{B}{P_0} - \frac{D}{P_0} \pm \frac{M}{P_0}$$



Fert Markt Mij



$$\frac{P_4^{2011} - P_0}{P_0^{2001}} = \frac{B - D}{P_0} + \frac{Mig}{P_0}$$

migrati
ratio

Natural Increase

Population Growth and Migration in Kerala, 1901–2001

Year	Census Population (000)	Growth Rate	Natural Increase Rate	Migration Rate
1901	6,396	–	–	–
1911	7,148	1.11	1.08	0.03
1921	7,802	0.88	0.84	0.04
1931	9,507	1.98	1.86	0.12
1941	11,032	1.49	1.49	–0.01
1951	13,549	2.06	2.16	–0.11
1961	16,904	2.21	2.41	–0.20
1971	21,347	2.31	2.47	–0.16
1981	25,454	1.75	1.96	–0.22
1991	29,011	1.32	1.63	–0.31
2001	31,839	0.91	1.20	–0.27

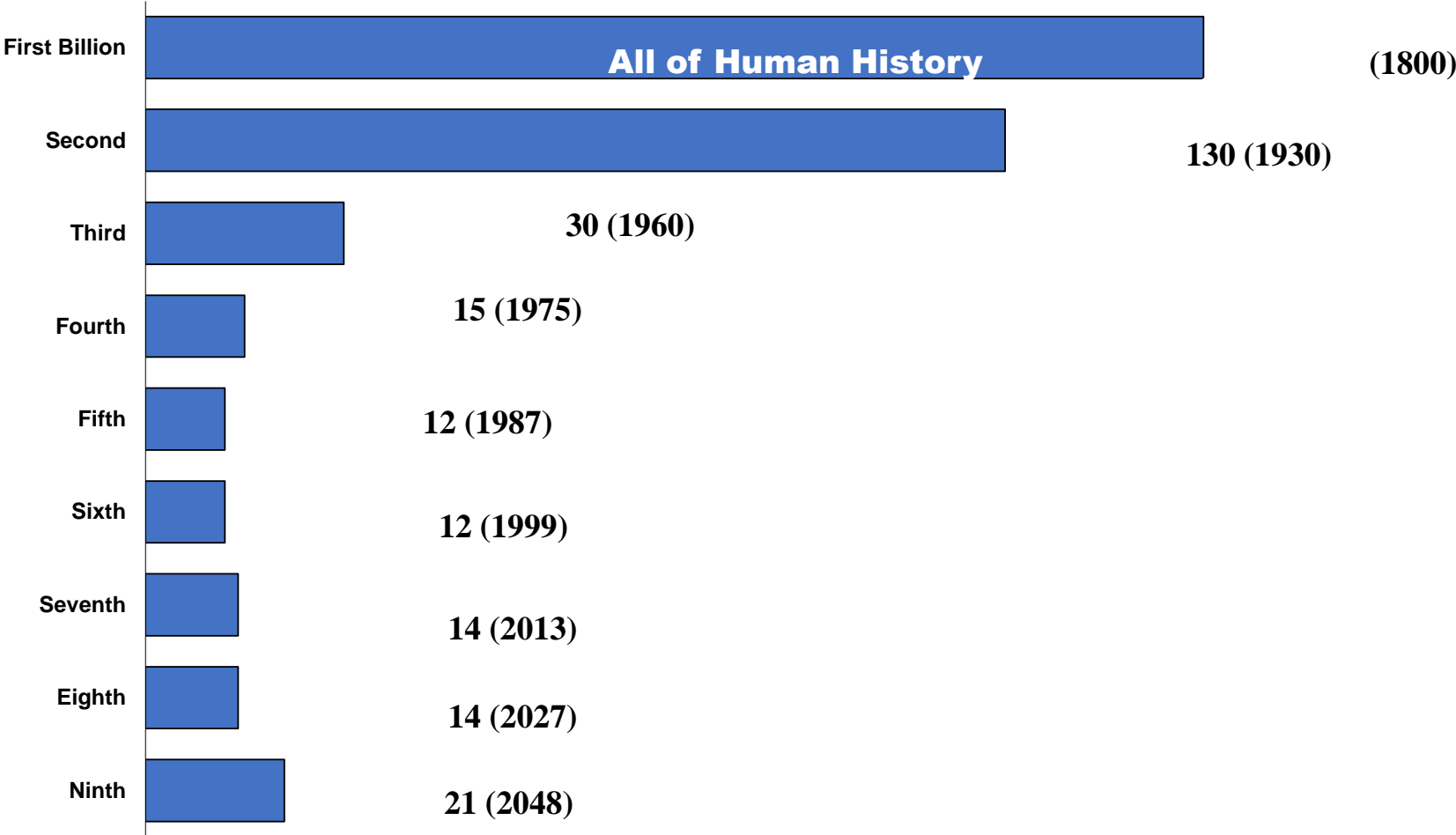
Sources: Mari Bhat and Irudaya Rajan (1990); Irudaya Rajan and Zachariah (1998)



HISTORICAL SCENARIO OF POPULATION GROWTH

World Population Growth, in Billions

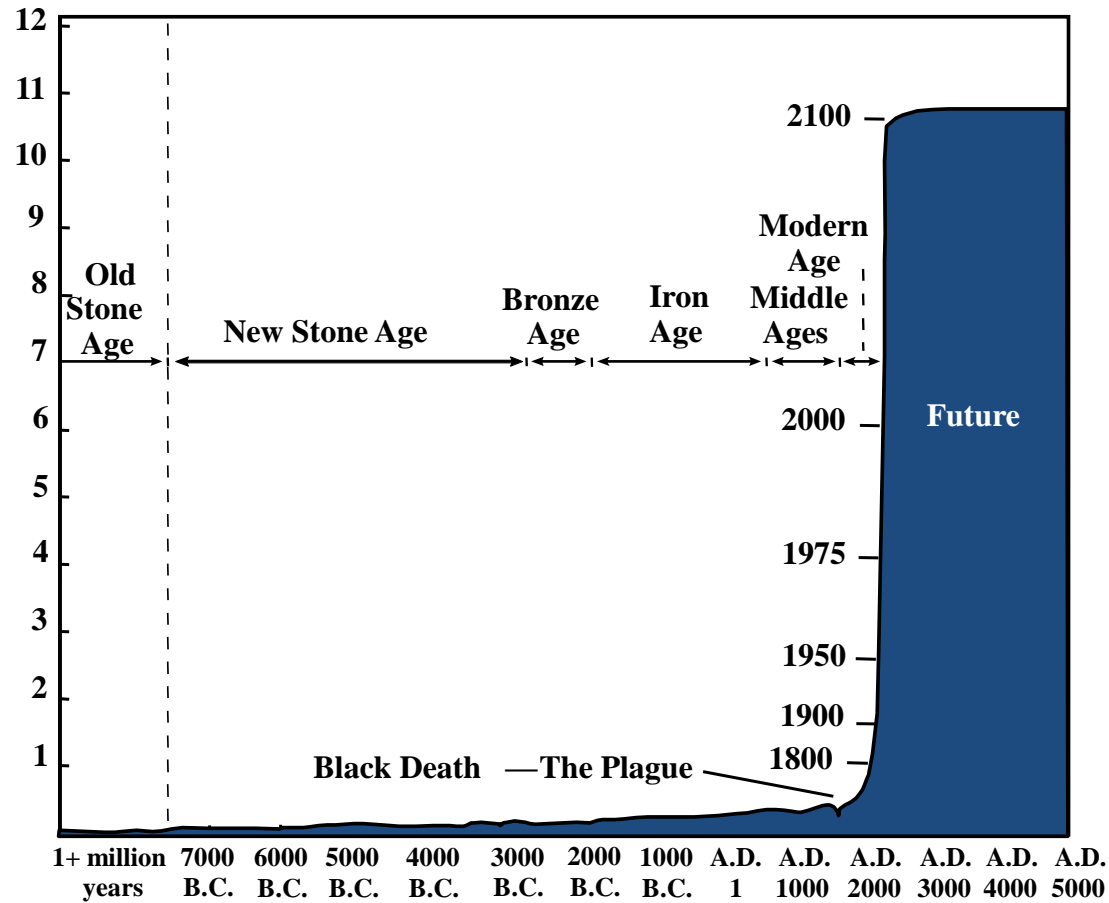
Number of years to add each billion (year)



Sources: First and second billion: Population Reference Bureau. Third through ninth billion: United Nations, *World Population Prospects: The 2004 Revision* (medium scenario), 2005.

World Population Growth Through History

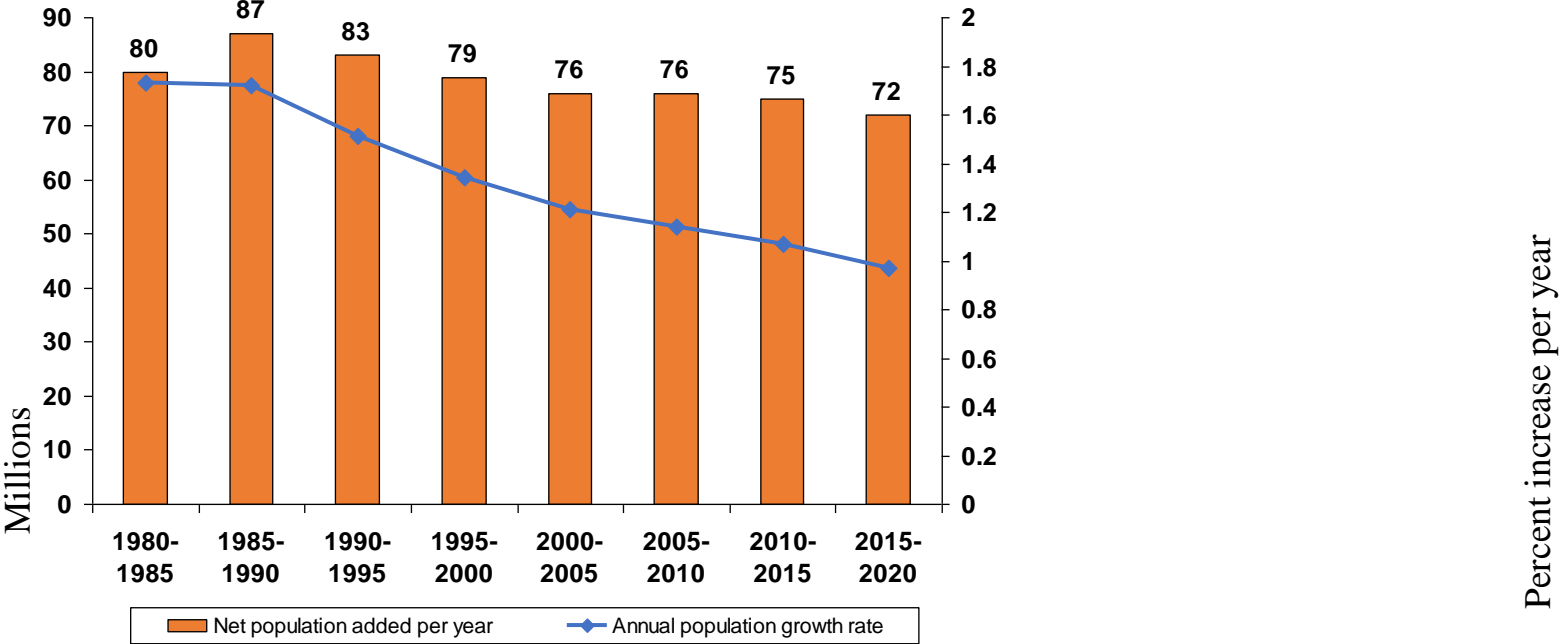
Billions



Source: Population Reference Bureau; and United Nations, *World Population Projections to 2100* (1998).

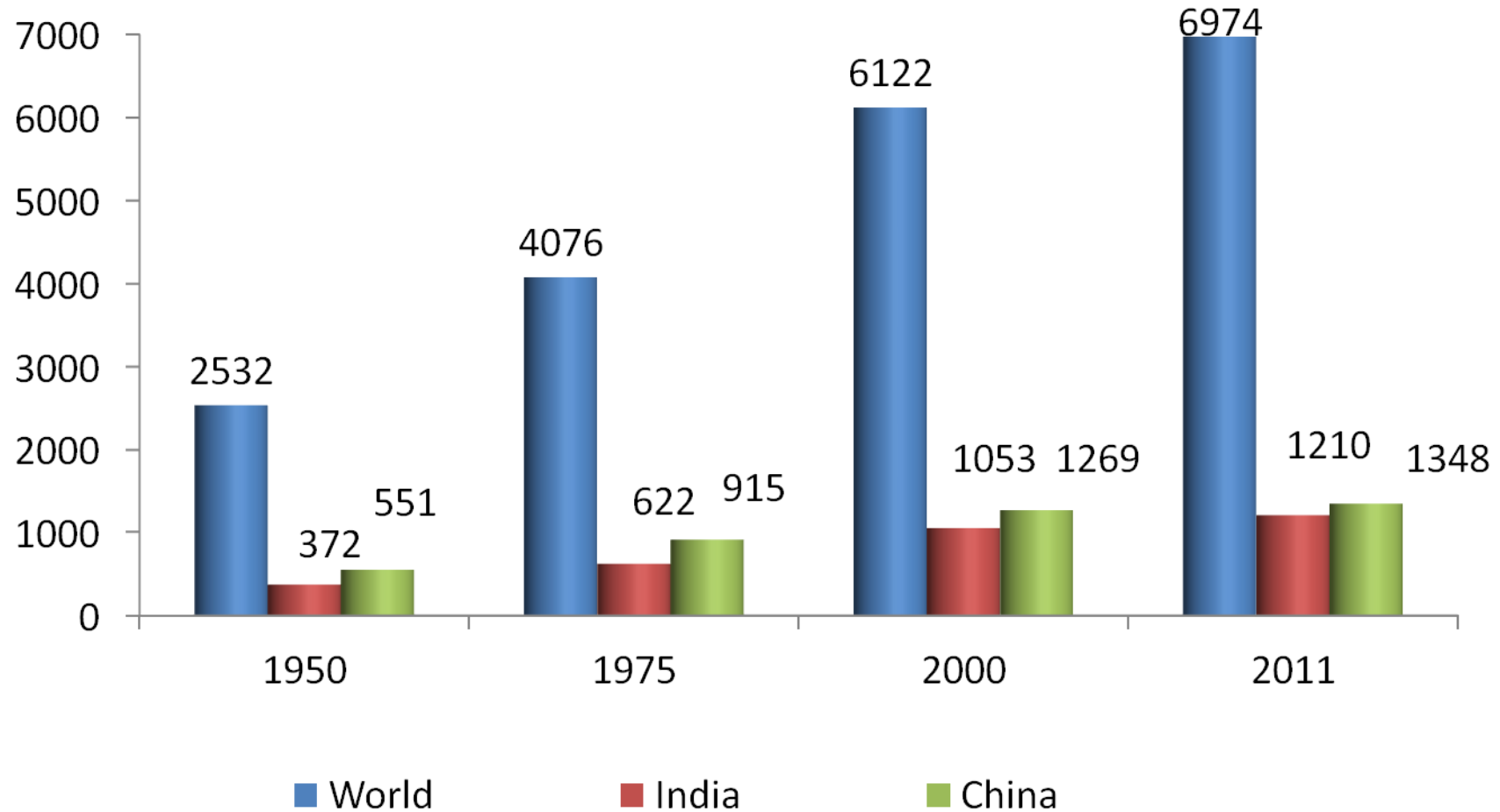
Trends in Population Growth Worldwide

Population Increase and Growth Rate, Five-Year Periods



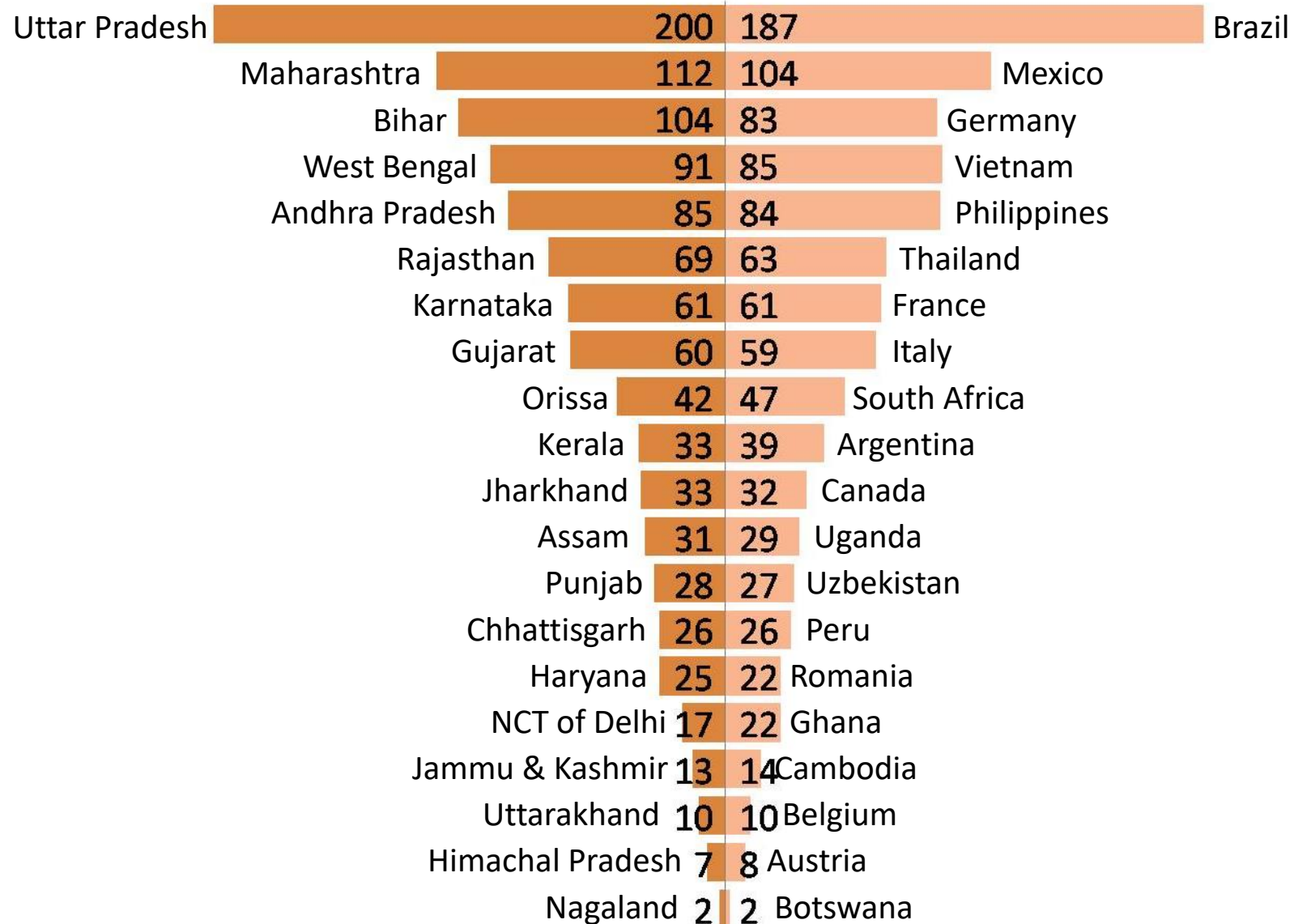
Source: United Nations, *World Population Prospects: The 2004 Revision* (medium scenario), 2005.

China and India: The Population Billionaires (millions)



Source: Calculated from World Population Prospects: The 2010 Revision

India: 1.2B of the 7B



Components of population change

Fertility

- Fertility refers to a woman's reproductive performance in terms of live births. It is determined by a variety of biological, social, economic, psychological and cultural factors.

Mortality

- Mortality refers to the 'occurrence of deaths in a population'. Changes are determined primarily by changes in a population's standard of living and advances in medicine, public health and science. Low-income countries typically have higher mortality rates than high income countries. Education also has a substantial impact on mortality rates.

Migration

- Migration refers to the 'change in one's place of residence from one political or administrative area to another'. It refers solely to changes in place of usual residence, thereby excluding all short-term or temporary movements such as commuting to work, visiting friends or relatives and going away on vacation.

A Model of Fertility Change

Underlying Determinants
(Socio-economic, cultural and other factors)



Proximate Determinants
(Biosocial mechanisms)



Fertility
(Biological processes)

Underlying Determinants of Fertility: Some Examples

- ? *Social*: education, income, work, status of women
- ? *Cultural*: marriage practices, post-partum abstinence, religious beliefs about contraception
- ? *Health*: prevalence of STDs, malaria
- ? *Political*: government policies regarding family planning, female education
- ? *Programmatic*: availability of contraceptive information and services

Proximate Determinants of Fertility



Davis and Blake 1956 introduced the concept of Proximate determinants that directly affect the biological processes to control or govern fertility.



Bongaarts 1982 provided an analytical model for measuring most important proximate determinants that affect fertility

Bongaart's Proximate Determinants

1. *Proportion of women in a sexual union (married)
2. *Use of contraception
3. *Post-partum amenorrhea (due to breastfeeding)
4. *Induced abortion
5. Frequency of intercourse
6. Spontaneous fetal losses
7. Sterility (due to disease)

** Major determinants of variability in fertility in most populations.*

Malthusian Theory of Population Growth (Early 19th Century)

The "cause" of poverty

- ◆ Population tends to increase at a geometric rate
- ◆ Food can only increase arithmetically
- ◆ Population expands to eat up any surplus
- ◆ Subsistence wages forever unless "moral checks" (abstinence from marriage)
- ◆ Otherwise "positive checks" on population growth - misery (wars, famines) and vice (use of contraception)

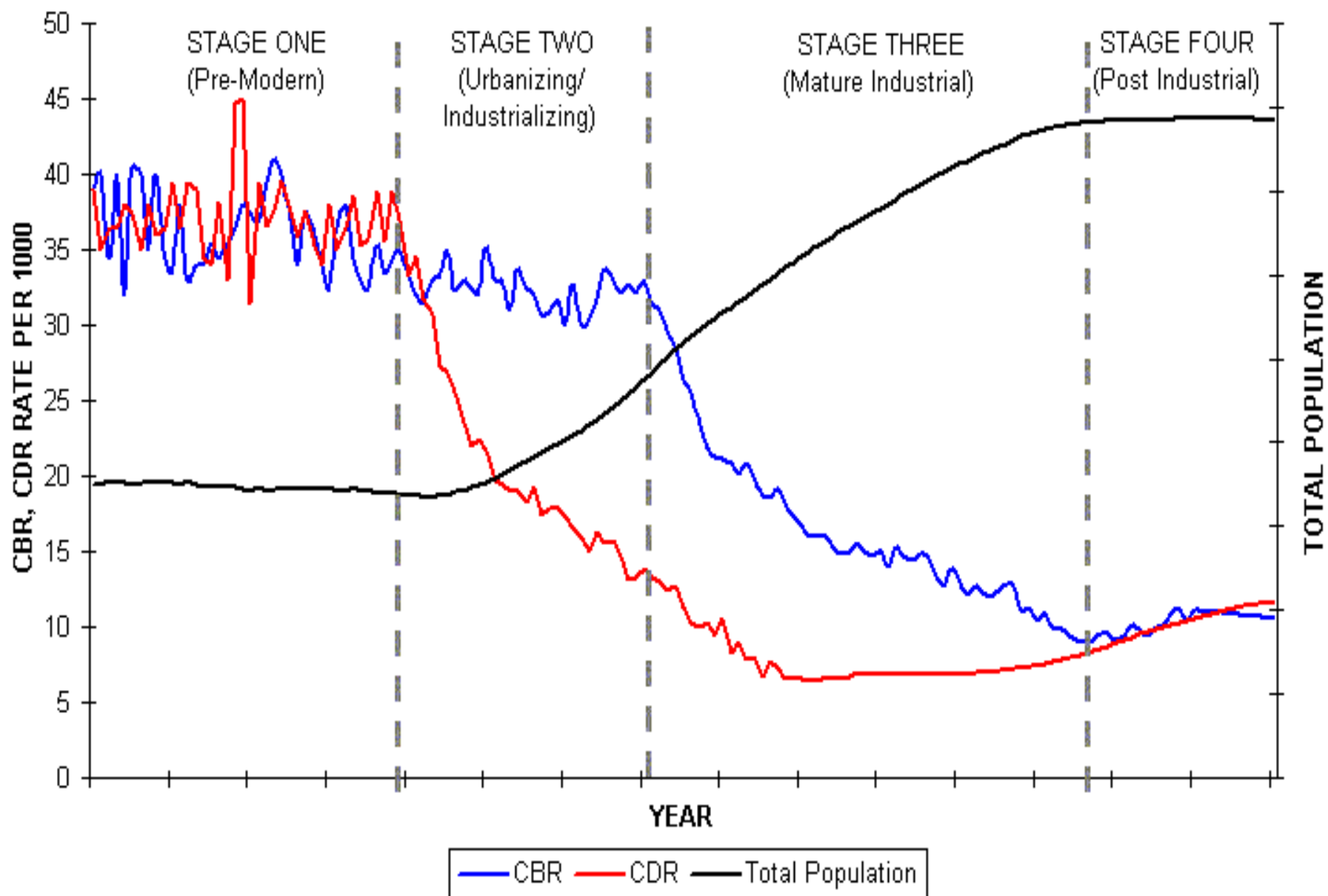
Why Fertility Declines: The Classic Demographic Transition Theory (Notestein and Davis, 1950s)

- ◆ Socio-economic development leads to:
 - Increased supply of children due to reduced mortality
 - Reduced utility of children
 - Reduced desired family size
- ◆ Declining mortality and, after some lag period, declining fertility follow from socioeconomic development

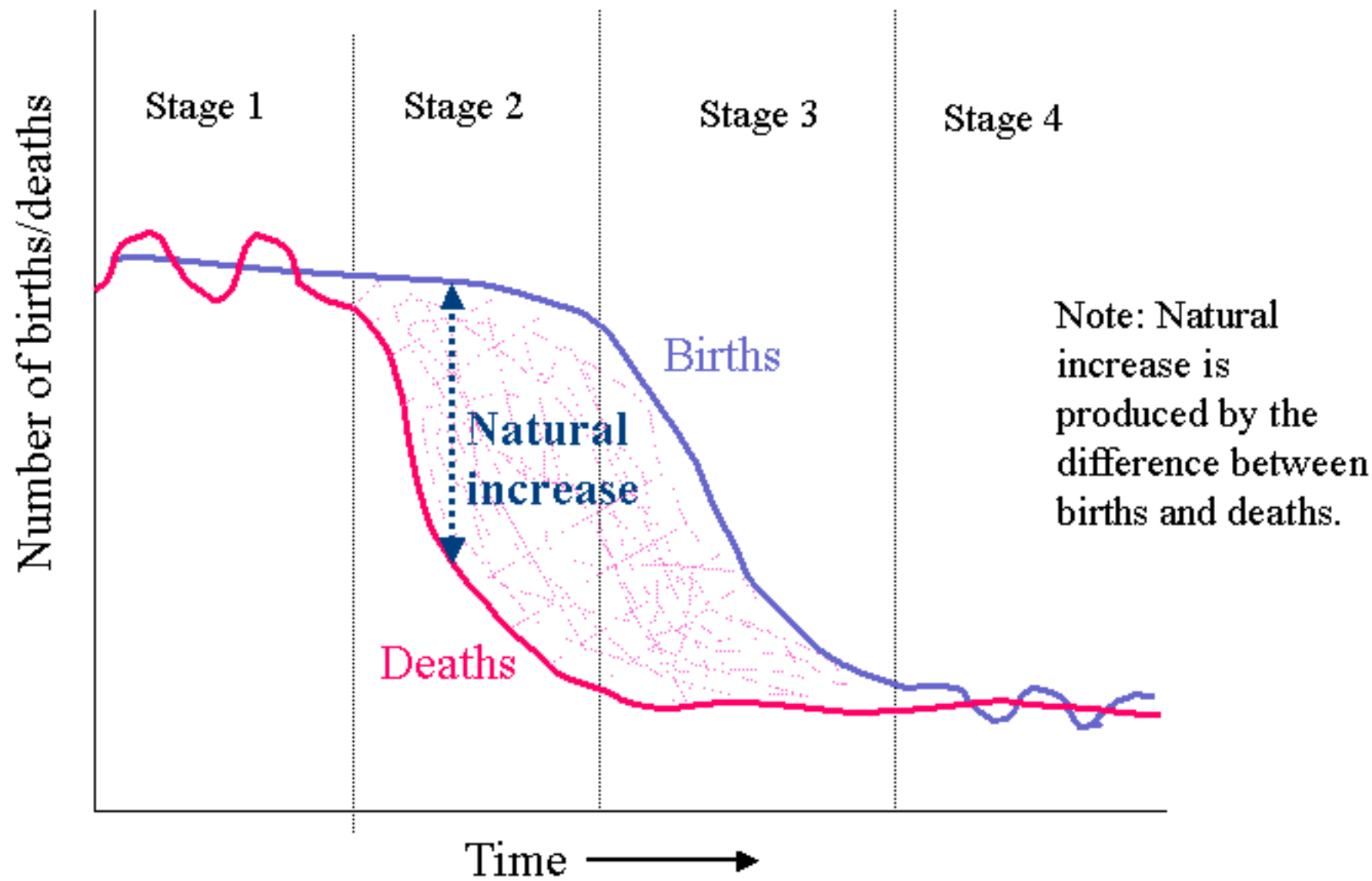
What Does Empirical Evidence Say about the Demographic Transition?

- ◆ **Princeton European Fertility Project:** launched in 1963, two decade long endeavor- designed to test transition theory with historical data from roughly 700 provincial -level units throughout Europe.
- ◆ **World Fertility Surveys:** launched in the 1970s provided evidence on fertility change from over 40 less- developed countries

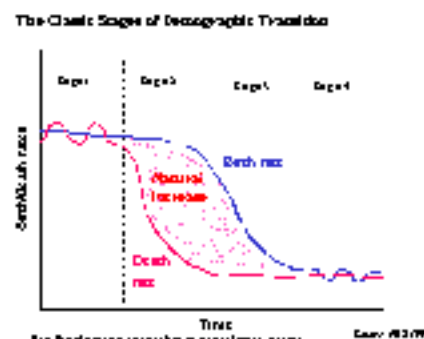
THE DEMOGRAPHIC TRANSITION MODEL



The Classic Stages of Demographic Transition

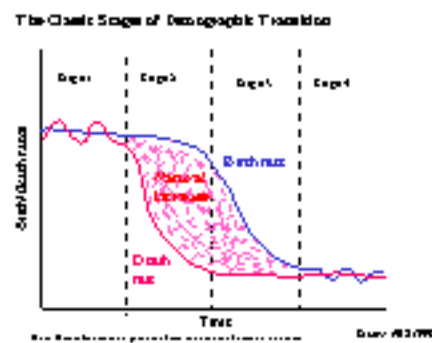


Demographic Transition: What Is It?



- ◆ Shift from high rate of births and deaths to low rates of births and deaths
- ◆ Concept evolved from the history of population growth in Europe and the United States and has been broadly applied to populations everywhere

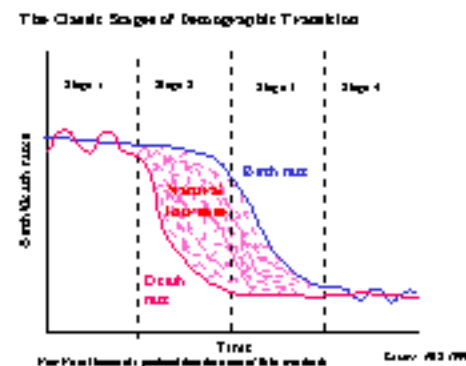
The Classic Stages of the Demographic Transition



- ◆ **Stage I:** high death rates balance high birth rates resulting in no, or slow population growth (or decline)
- ◆ **Stage II:** The death rates begin to drop with birth rates remaining high leading to increasing rates of population growth

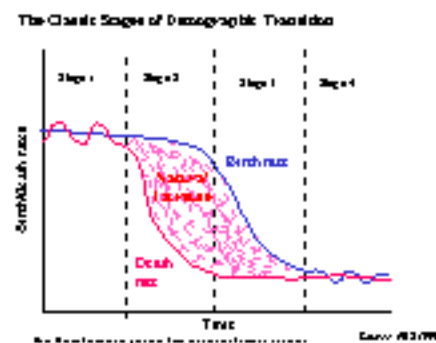
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The Classic Stages of the Demographic Transition



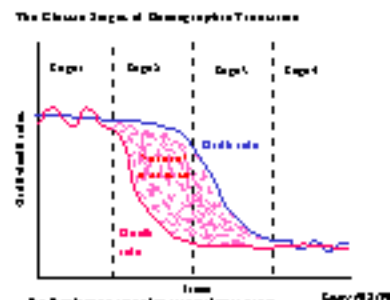
- ◆ **Stage III:** The birth rate declines resulting in a slowing of population growth
- ◆ **Stage IV:** both birth rates and death rates are low and population growth slows, stops or even declines

Demographic Transition: Where are we now?



- ◆ Guided by the experience of developed world, most experts expect this demographic transition to occur through out the world. But there is no guarantee, this will happen.
- ◆ Individual countries are following different time tables and paths for achieving it

Demographic Transition European vs. LDCs



◆ European countries

- BR and DR low over entire time period
- Gradual decline in mortality and fertility over 200 years
- Population growth rates peaked in 19th century, at 1-2% per year

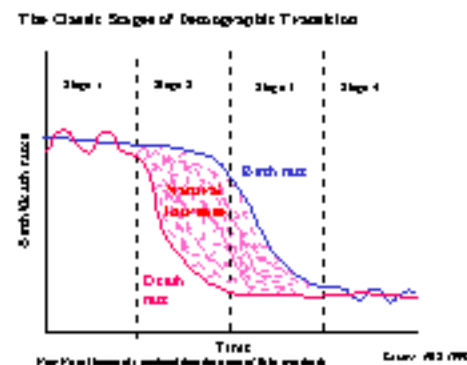
◆ Developing countries

- High pre-transition BR and DR, prior to World War II
- Precipitous decline in mortality post World War II
- Population growth rates peaked in 2nd half of 20th century, at 2.5-3.5% per year

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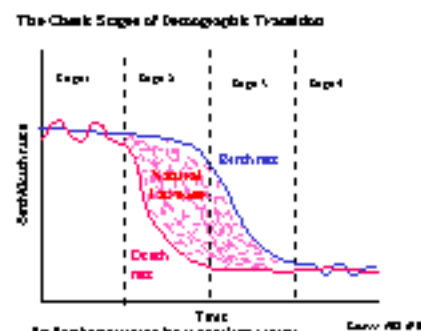
Demographic Transition

Where are we now?



- ◆ Western Europe, US, Canada, Australia, New Zealand, Japan, China– essentially have completed the four stages of demographic transition.
- ◆ East Asia, Latin America, Middle East, South Africa – mostly in Stage 3.
- ◆ South Asia (Pakistan), Sub-Saharan Africa – mostly in Stage 2.

Demographic Transition: What After Stage 4?

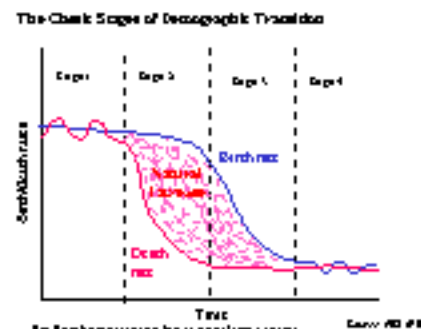


- ◆ Balanced numbers of births and deaths with population size stabilizing ?

OR

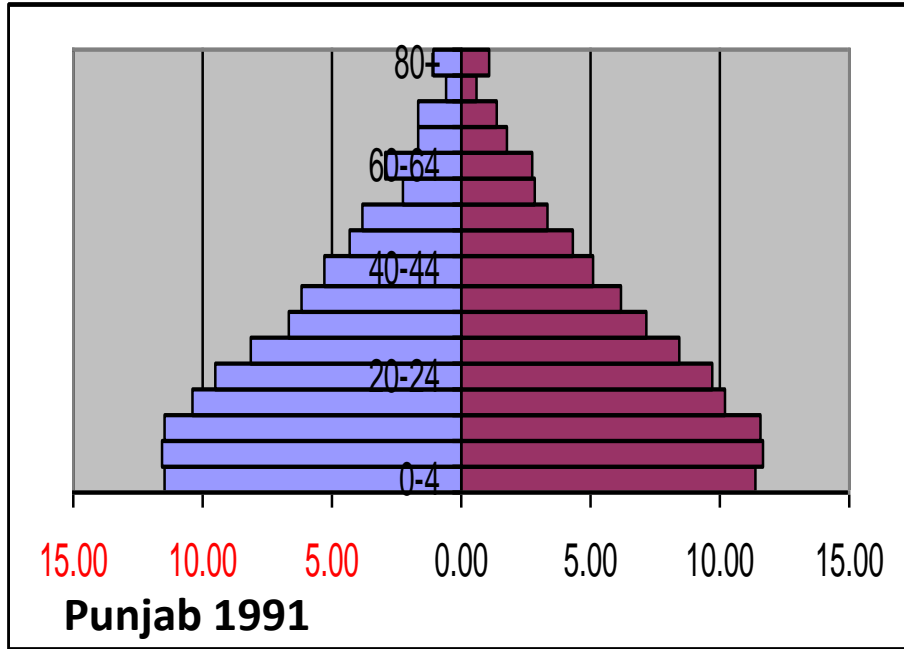
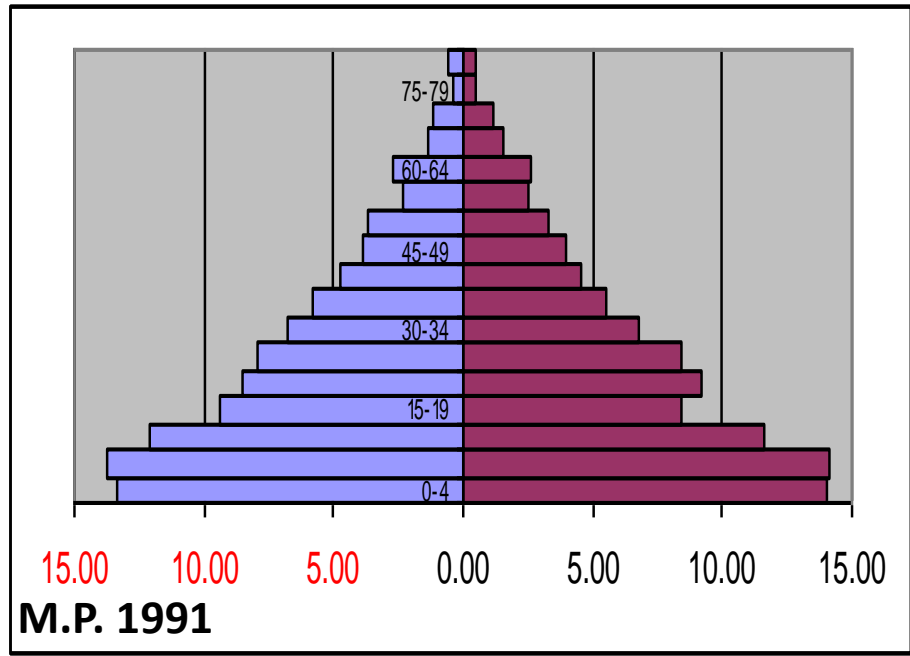
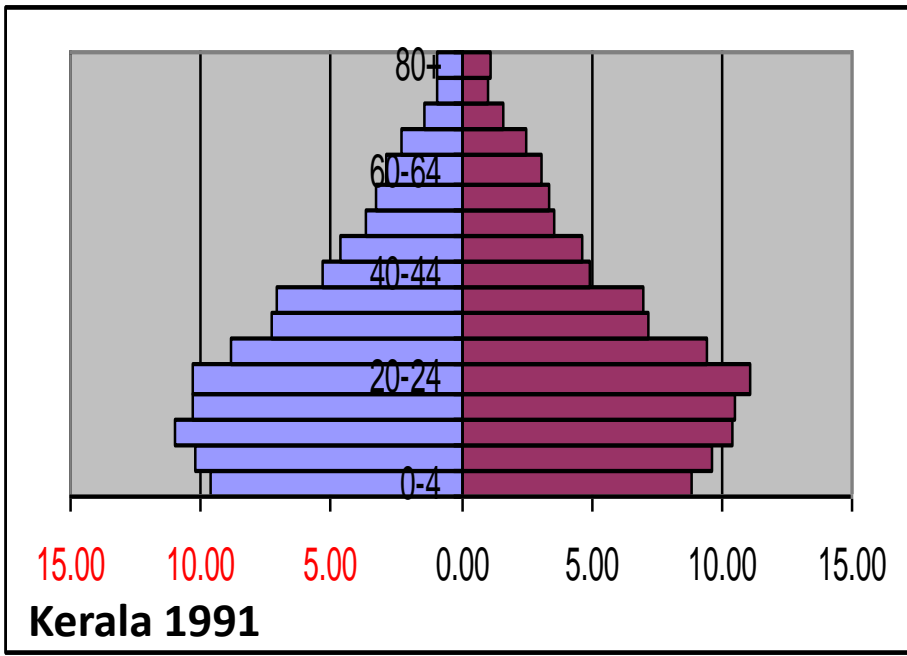
- ◆ Continued declines of birth rates so that population numbers decline?
 - Most of Western Europe has shown a continued birth rate decline below the 2-child family with beginning declines in population size.

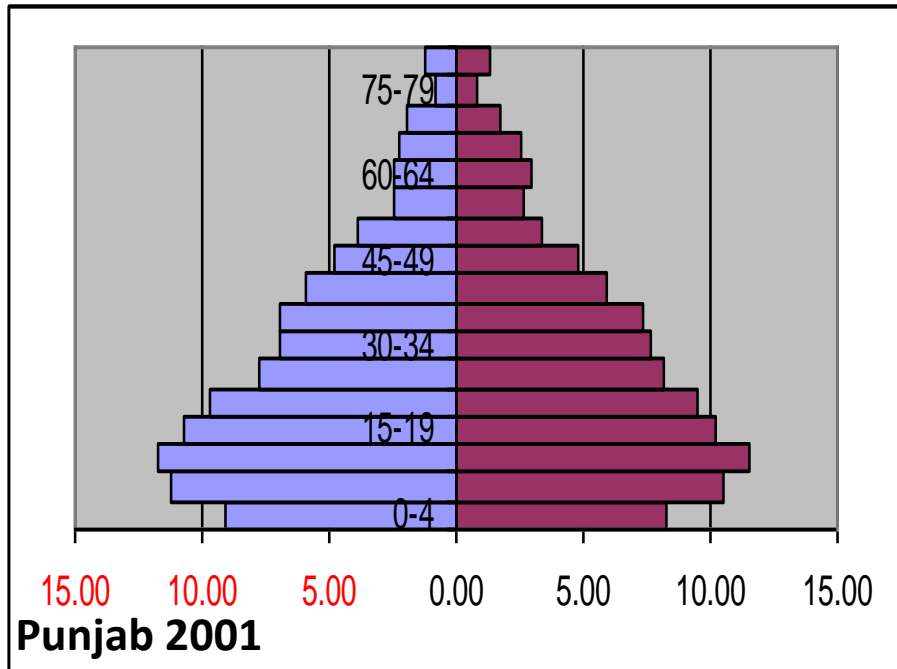
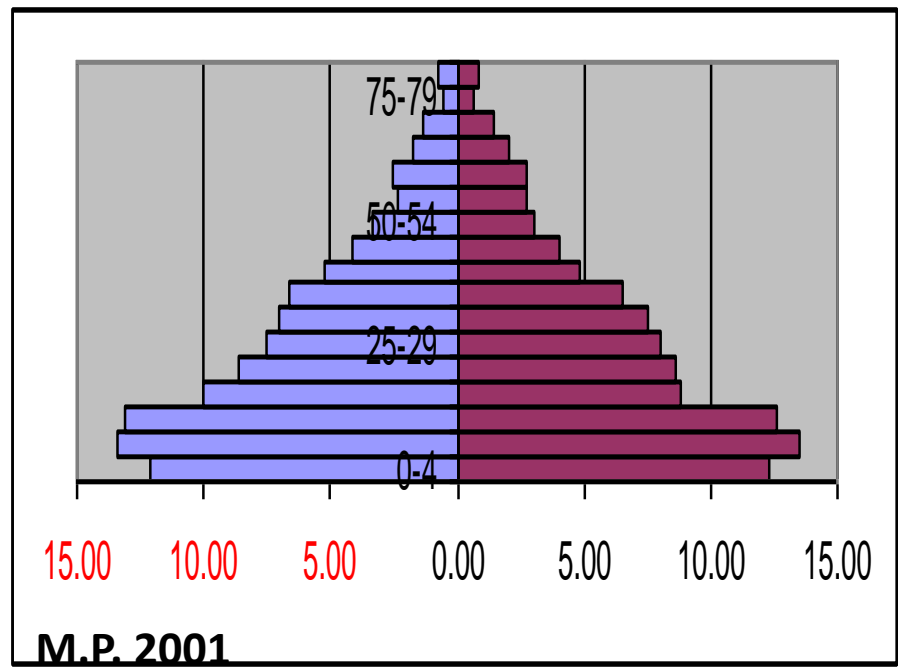
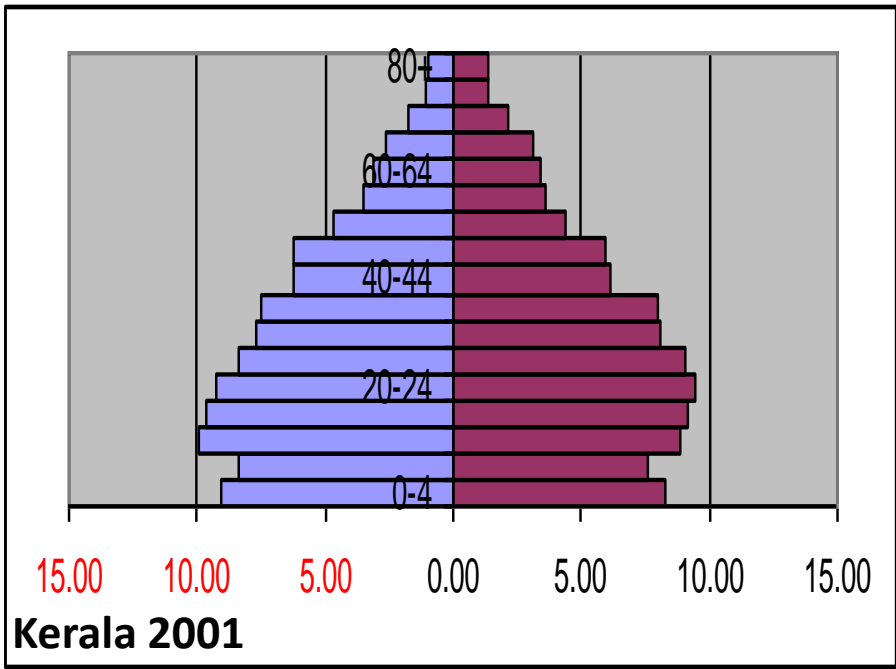
Deviations from Classic Stages of Demographic Transition



Some current trends –

- ◆ Former Soviet Union, Eastern Europe – since 1989, a demographic “reversal” with a return of high mortality, continued low fertility and population decline
- ◆ Reversal in mortality gains with HIV epidemic in Sub-Saharan Africa

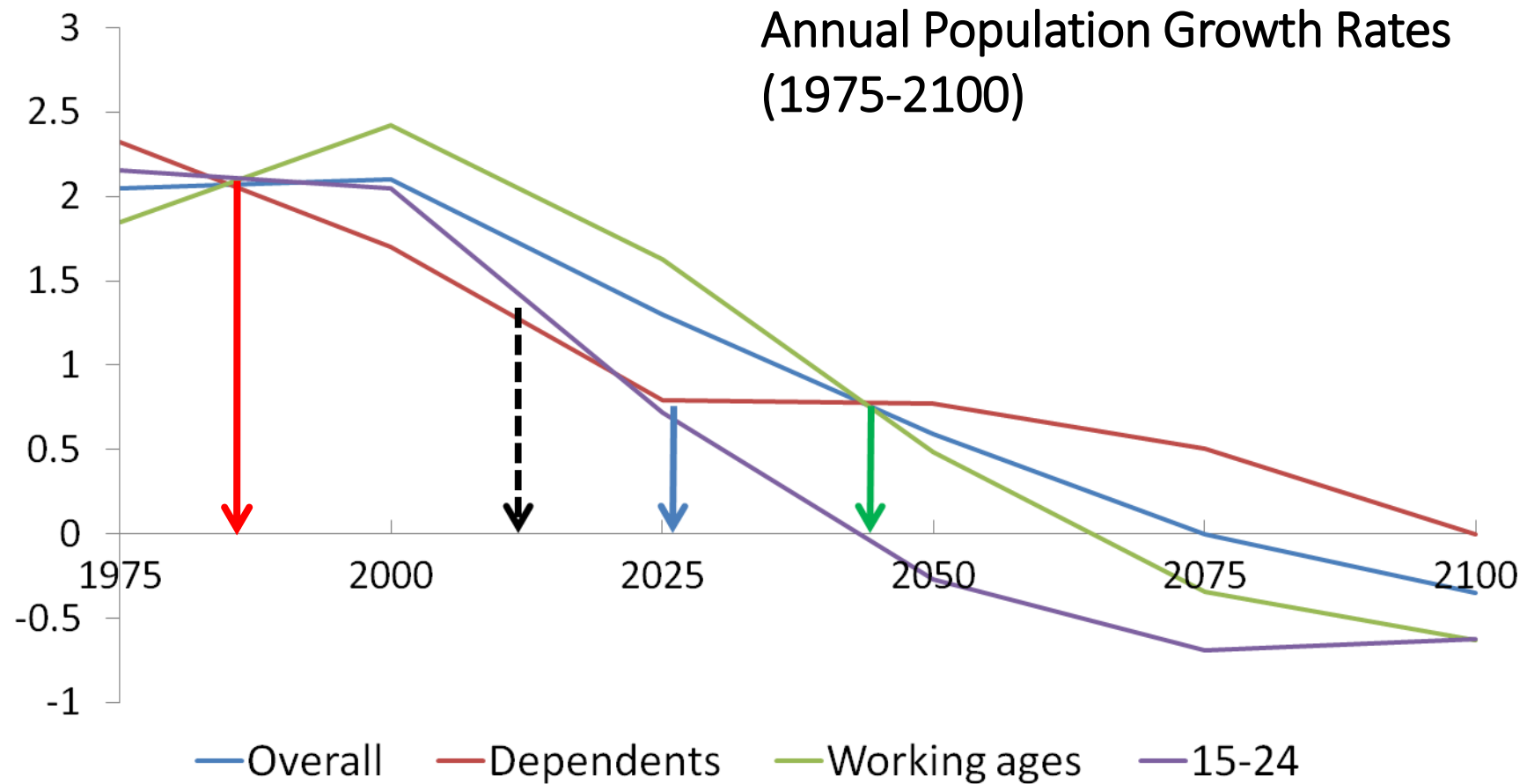




Demographic Window of Opportunity

- Time duration (TP growth is less than working population growth (19-59))
- Demographic Dividend/Bonus (Working P growth – TP growth)
 - Ensure everyone in working age has employment (GDP w go up)
- Demographic Bonus Using workers (L pop gr – TP gr)
 - Skill development
 - Increase employability
 - New opportunity to engage local talents

Opportunity clock ticking fast



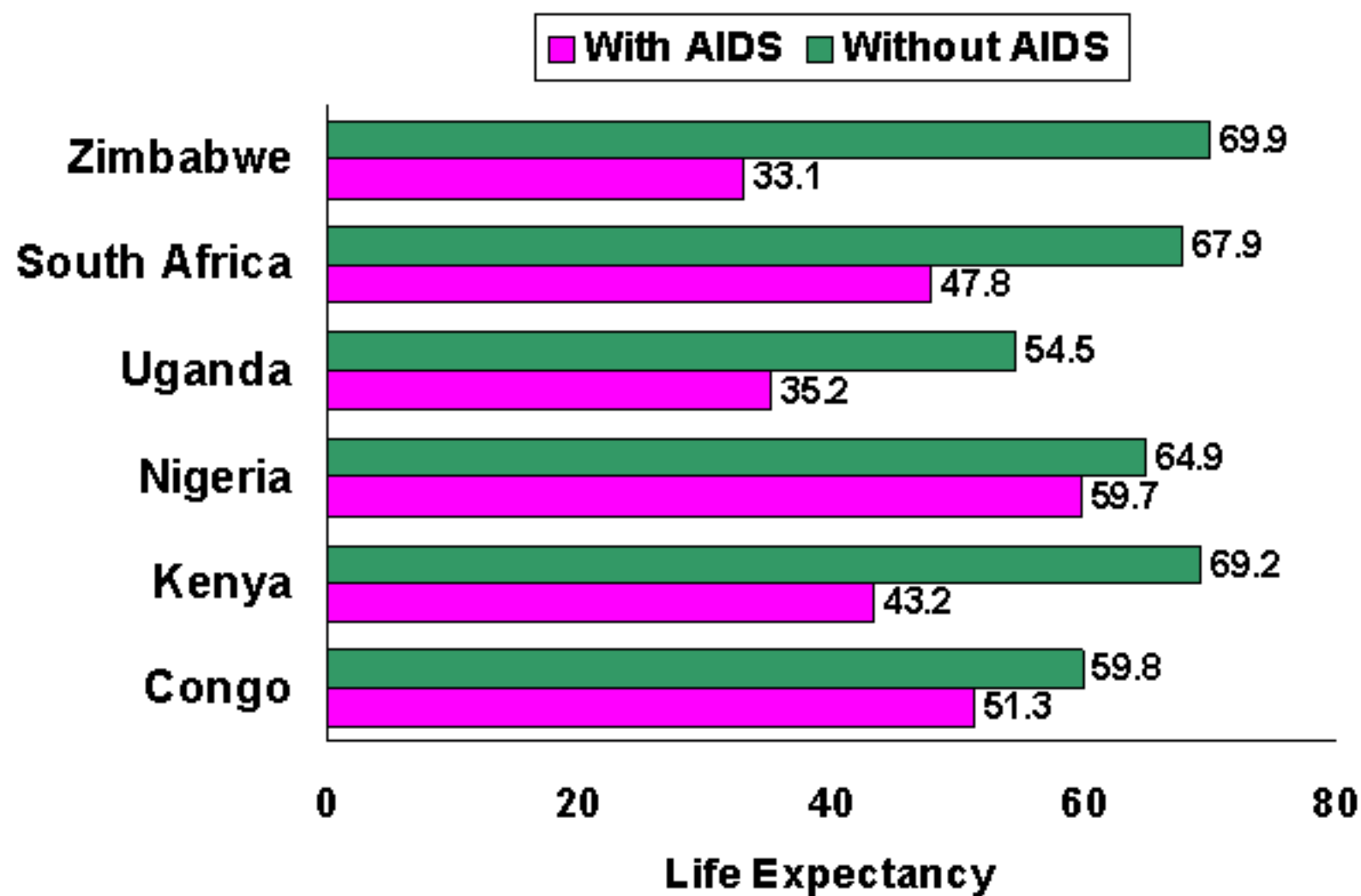
Source: Calculated from World Population Prospects: The 2010 Revision

Demographic Bonus

Table 2.5: Demographic Bonus Derived from the Growth of Working Age Group Population and Workers for the Period 1991–2001

State	Growth Rate of Population	Growth Rate of Working Population	Demographic Bonus	Growth Rate of Workers	Demographic Bonus using Workers
Andhra Pradesh	1.4	1.9	0.5	1.7	0.3
Karnataka	1.7	2.3	0.6	2.3	0.7
Kerala	0.9	1.3	0.3	1.2	0.3
Tamil Nadu	1.1	1.5	0.4	1.3	0.2
Assam	1.8	2.2	0.4	1.6	-0.1
Bihar	2.5	2.4	-0.1	3.1	0.6
Goa	1.4	1.8	0.4	2.3	0.9
Gujarat	2.1	2.5	0.4	2.5	0.4
Haryana	2.5	3.1	0.6	5.0	2.5
Himachal Pradesh	1.6	2.3	0.6	2.9	1.2
Madhya Pradesh	2.1	2.2	0.1	2.3	0.2
Maharashtra	2.1	2.4	0.3	1.9	-0.2
Odisha	1.5	1.8	0.3	1.8	0.3
Punjab	1.8	2.2	0.4	3.7	1.9
Rajasthan	2.5	2.6	0.1	3.1	0.6
Uttar Pradesh	2.3	2.2	-0.1	2.3	0.0
West Bengal	1.7	2.1	0.4	3.0	1.3
India	1.9	2.2	0.3	2.4	0.4

Projected Effect of AIDS on Life Expectancy in Sub-Saharan Africa by the Year 2010



Source: U.S. Bureau of Census International Programs, 1997

Population Issues and Paradox



- Inequality
- Equity

Social, Economic and Reproductive Health Status



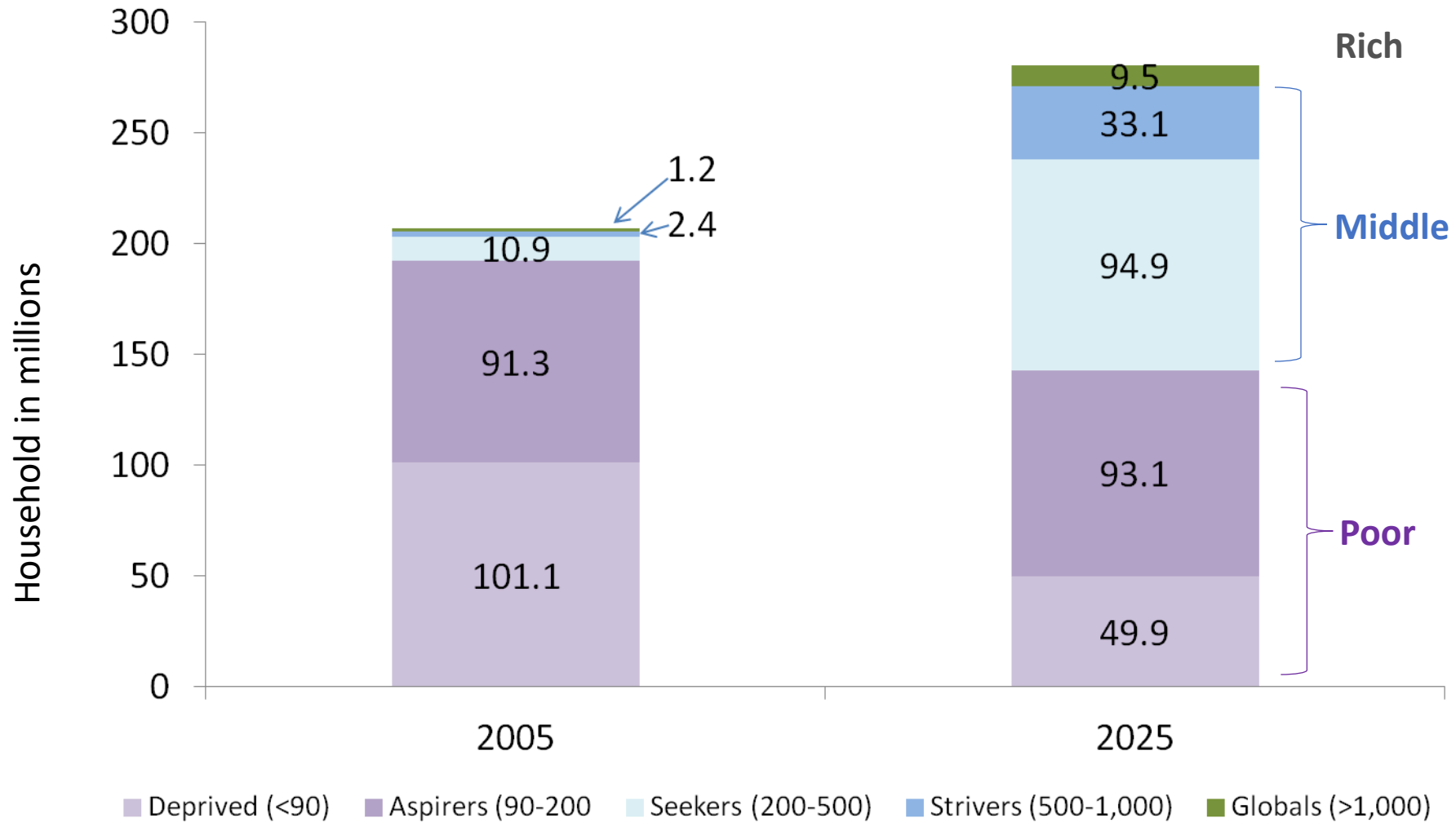
India: Land of paradox

Inter-state variations (Maxima-Minima Range)	Bright side of India?	Other-side of India?
Per Capita Income (at current prices-2010))	USD 2,949 (Goa)	USD 358 (Bihar)
Poverty (2004-05 revision)	13.1% (Delhi)	57.2% (Orissa)
Female Labour Force Participation (2005-06)	48% (HP)	8% (Delhi)
Literacy (2011)	94% (Kerala)	64% (Bihar)
Child Sex Ratio (2011) (Girls 0-6 yrs per 1000 boys 0-6 yrs)	971 (Mizoram)	830 (Haryana)
Sex Ratio at Birth (2008) (Girls per 1000 boys)	968 (Kerala)	836 (Punjab)
Early Marriage (2005-06) (proportion females marrying by exact age 18)	11.4% (Goa)	63.7% (Bihar)
Migration Rate	-4.2 (Kerala)	8.1% (J&K)
Urbanization (2011)	48.4% (Tamil Nadu)	11.3% (Bihar)

India: Land of paradox

Inter-State variations (Maxima-Minima Range)	Bright side of India?	Other-side of India?
Total Fertility Rate, 2008	1.7 (Kerala/TN)	3.9 (Bihar)
Teenage Fertility, 2005-06 (per 1000 women)	25 (Goa)	128 (Bihar)
Modern Contraceptive Prevalence Rate, 2005-06	67% (AP)	19% (Meghalaya)
Unmet Need for Family Planning, 2005-06	5% (AP)	35% (Meghalaya)
Skilled Birth at Attendance, 2005-06	99% (Kerala)	27% (UP)
Maternal Mortality Ratio, 2009 (per 100,000 live births)	81 (Kerala)	390 (Assam)
Infant Mortality Rate, 2009 (per 1000 live births)	12 (Kerala)	67 (MP)

Changing Income Pattern(INR in 000s) - India

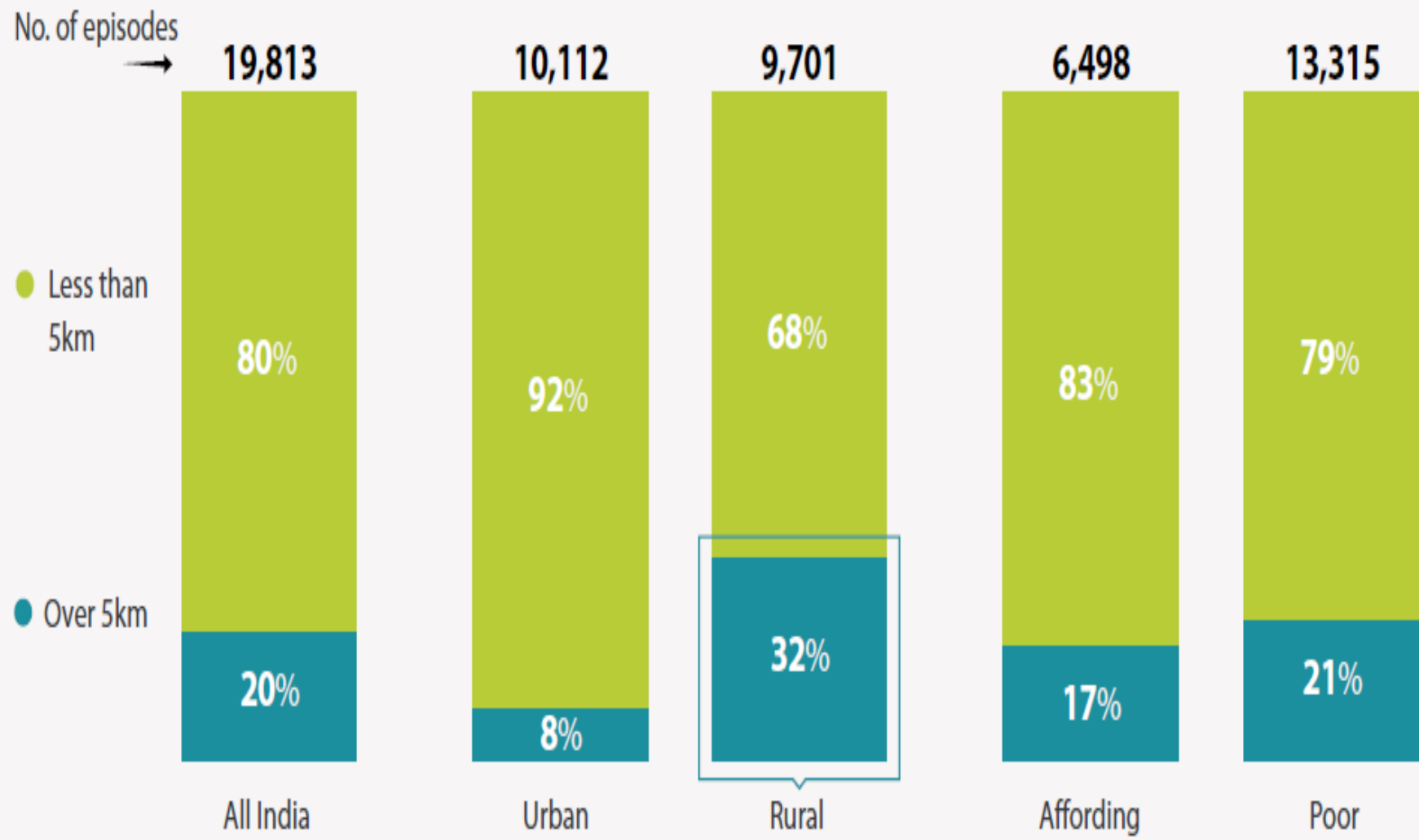


Data source: McKinsey Global Institute, 2007

Health Issues

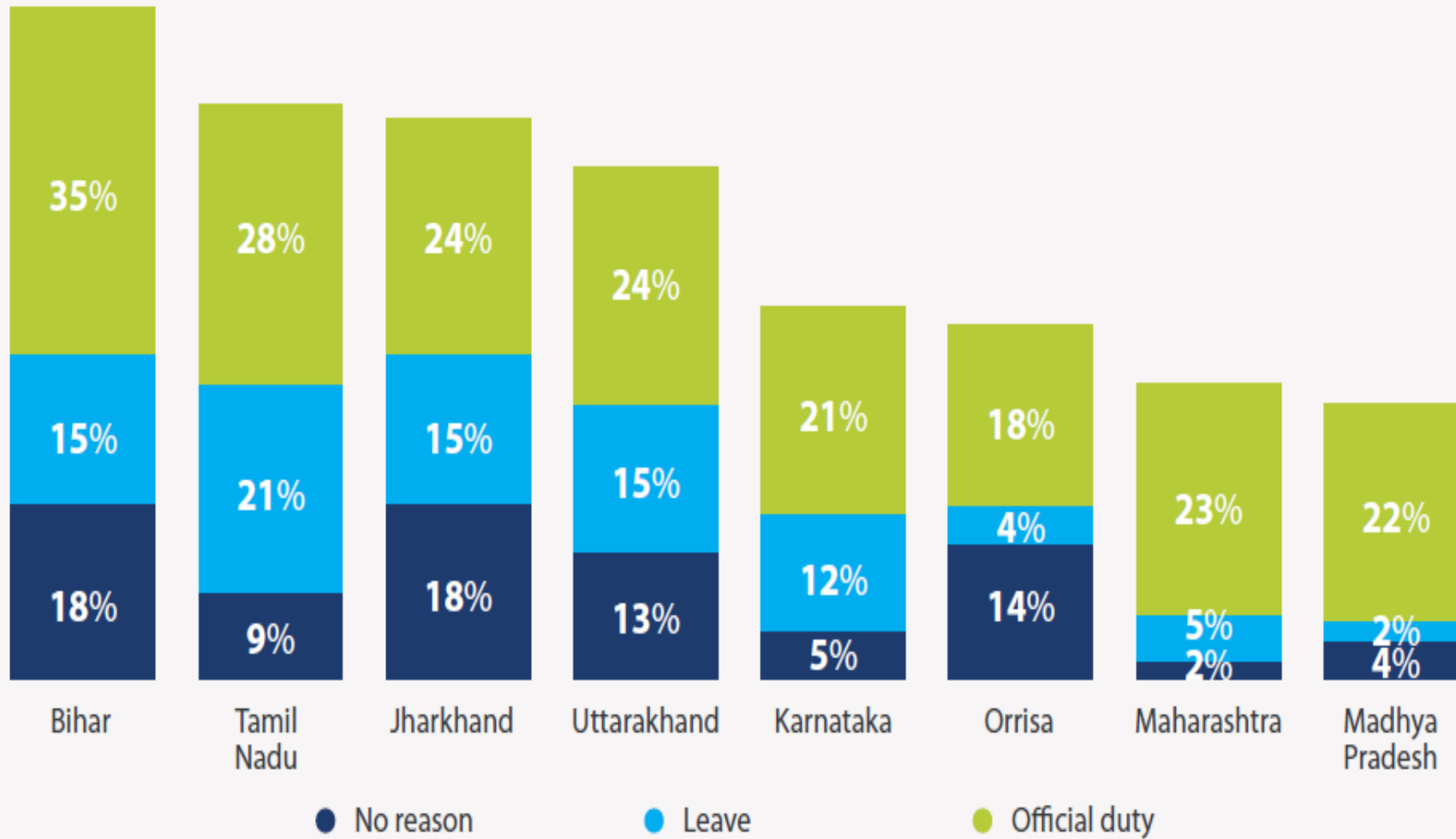
- Coverage (Spending)
- Accessibility
 - Public Government
 - Private
- Quality/Infrastructure
- Manpower
- National Strategy/Approach

Distance travelled to seek OPD treatment



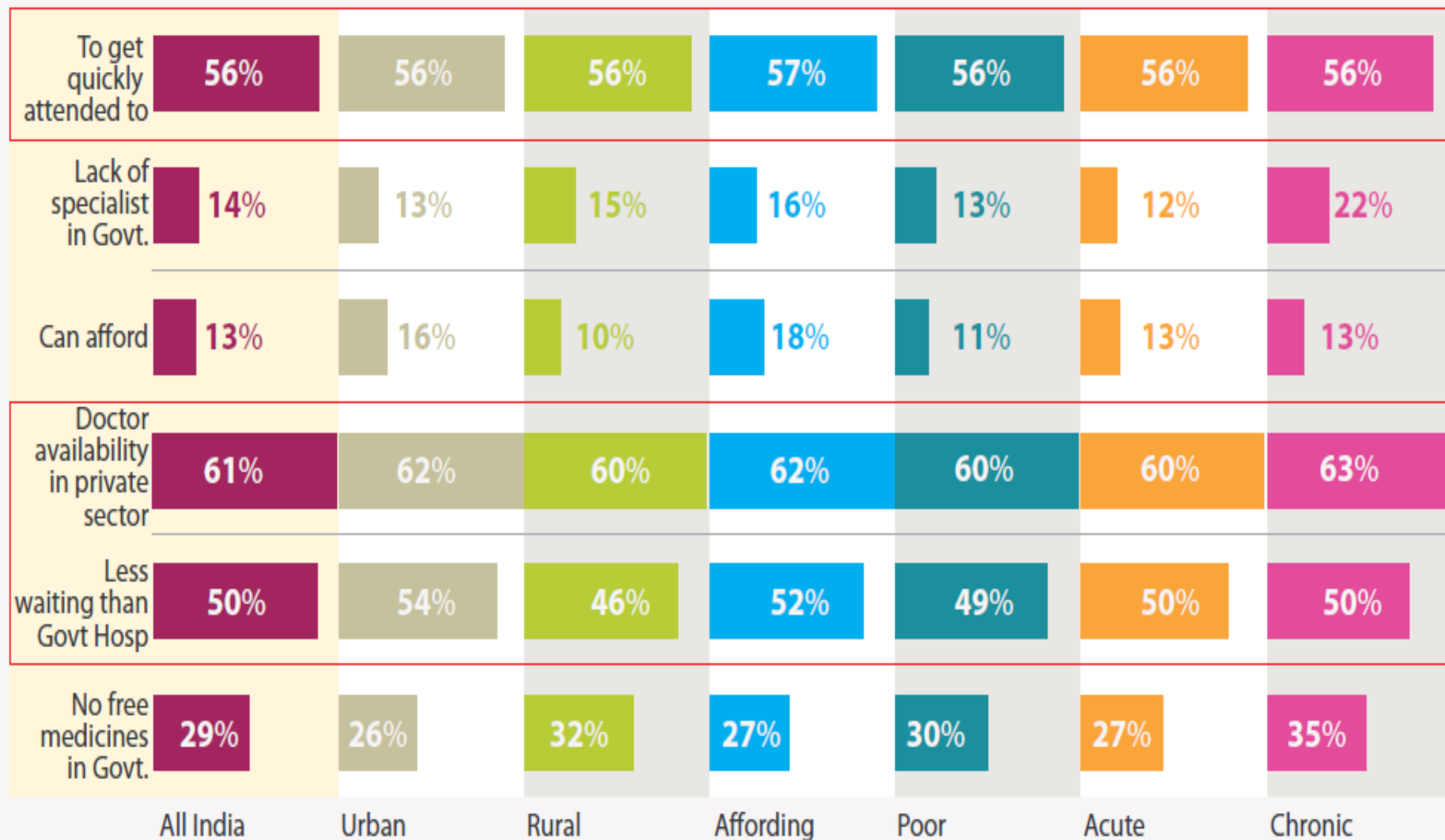
Source: Household Healthcare Access Survey Conducted by IMS Consulting Group, 2012

Absenteeism amongst doctors in PHCs (%)



Source: India Health Report 2010

Key reasons cited for selecting private sector for OP treatment



Source: Household Healthcare Access Survey Conducted by IMS Consulting Group, 2012

Reference

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- Reports and related material from net-search
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Thanks

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