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Assessing the Effects of HIV/AIDS on Demographic Factors

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ABSTRACT: The major demographic processes such as mortality and fertility are affected by AIDS. Direct effects on mortality occur because AIDS causes the deaths of adults and children. The effects on fertility are indirect and less well understood. The accumulation of these direct and indirect effects causes changes in other demographic indicators. The most direct demographic consequence is more in mortality. The impact on the U5MR will be more severe, as many infected infants will die before their first birthdays but few will survive beyond their fifth. U5MRs among children of HIV-infected mothers are two to five times higher than those among children of HIV-negative mothers. The impact of HIV/AIDS has been so large in many of sub-Saharan African countries; it has significant effect on life expectancy at birth. In seven countries of sub-Saharan Africa, life expectancy at birth is 40 years or less, because the number of people living with HIV and life expectancy at birth are significantly negatively related (-0.91). The net difference is more than 20 years in male life expectancy and more than 25 years in female life expectancy (Life Expectancy With and Without AIDS). Populations with high fertility tend to have low proportions of older people and vice versa (negatively related). The impact of HIV (where HIV is more, particularly in sub-Saharan countries) on the total fertility rate appears to be positive.

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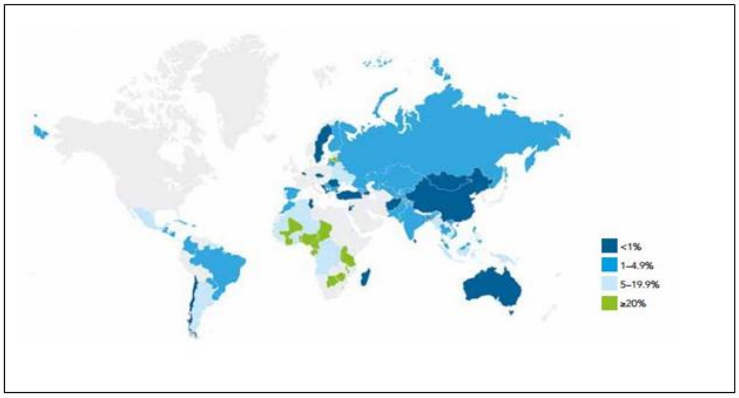
I. INTRODUCTION

The world has committed to ending the human immunodeficiency virus (HIV) and acquired immune deficiency syndrome (AIDS) epidemic by 2030. How to reach this target within the sustainable development goals is the main question facing the United Nations General Assembly High-Level Meeting on Ending AIDS, held from 8 to 10 June 2016. The latest UNAIDS data, covering 160 countries, demonstrate both the enormous gains already made and what can be achieved in the coming years through a Fast-Track approach. Since the first global treatment target was set in 2003, annual AIDS-related deaths have decreased by 43%. The world's most affected region is the sub-Saharan region (eastern and southern Africa), the number of people on treatment has more than doubled since 2010, reaching nearly 10.3 million people. AIDS related deaths in the region have decreased by 36% since 2010. New HIV infections among children have declined by 50% since 2010 (UNAIDS, 2016a). Globally, an estimated 35.3 million people were living with HIV in 2012. In 2015 there were 2.1 million new HIV infections worldwide, adding up to a total of 36.7 million people living with HIV. Worldwide, 2.1 million people became newly infected with HIV in 2015, down from 2.2 million in 2010. Worldwide, 150 000 children became newly infected with HIV in 2015, down from 290 000 in 2010. AIDS-related deaths have fallen by 45% since the peak in 2005. In 2015, 1.1 million people died from AIDS-related causes worldwide, compared to 2 million in 2005 (UNAIDS, 2016b).

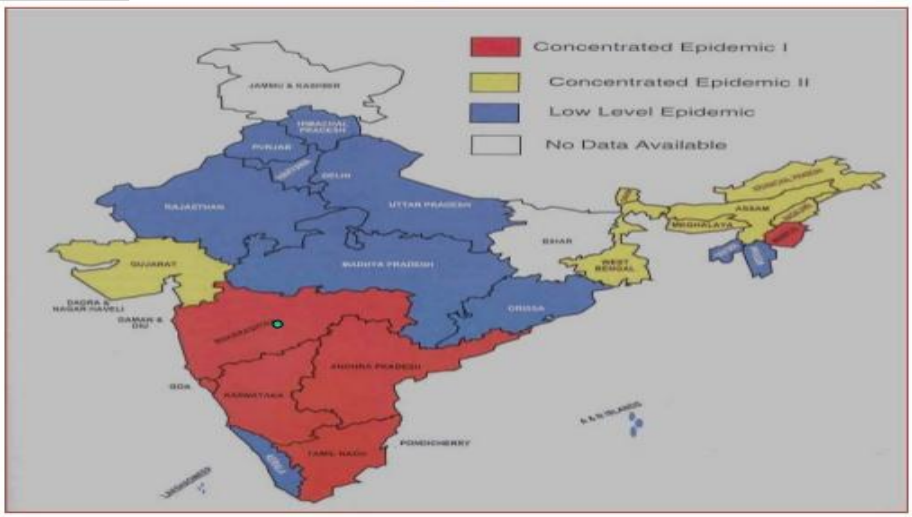
Figure 1: Scenario of HIV/AIDS worldwide



Declines in new HIV infections among adults have slowed alarmingly in recent years, with the estimated annual number of new infections among adults remaining nearly static at about 1.9 million in 2015. The largest reduction in new adult HIV infections occurred in eastern and southern Africa. There were about 40 000 fewer new adult HIV infections in the region in 2015 than in 2010, a 4% decline. More gradual declines were achieved in the Asia and Pacific region and western and central Africa. Rates of new adult HIV infections were relatively static in Latin America and the Caribbean, western and central Europe, North America and the Middle East and North Africa, while the annual numbers of new HIV infections in eastern Europe and central Asia increased by 57% (UNAIDS , 2013), see **Figure 1** for the distribution of HIV/AIDS worldwide.

In India, the numbers of new HIV infections declined by 19 per cent, yet it still accounted for 38 per cent of all new HIV infections in the Asia—Pacific region. India has the third-highest number of people living with HIV in the world with 2.1 million at the end of 2013. According to UN report Indians accounting for about four out of 10 people infected with HIV in the Asia—Pacific region. Six countries - China, India, Indonesia, Myanmar, Thailand, and Vietnam - account for more than 90 per cent of the people living with HIV in the Asia –Pacific region. It said that HIV treatment coverage is only 36 per cent in India, where 51 per cent of AIDS—related deaths occur. The proportions of people who do not have access to antiretroviral therapy treatment are 64 per cent in India. In Asia and the Pacific, the number of AIDS—related deaths fell by 37 per cent between 2005 and 2013. India recorded a 38 per cent decline in AIDS—related deaths between 2005 and 2013. At the end of 2013, more than 700,000 people were on antiretroviral therapy, the second largest number of people on treatment in any single country. In India, HIV prevalence among female sex workers dropped from 10.3 per cent to 2.7 per cent but it increased in the states of Assam, Bihar and Madhya Pradesh (UNAIDS, 2013). The HIV/AIDS is highly concentrated in southern part of India, including Maharashtra state (see **Figure 2**).

Figure 2: Status of HIV epidemic in India



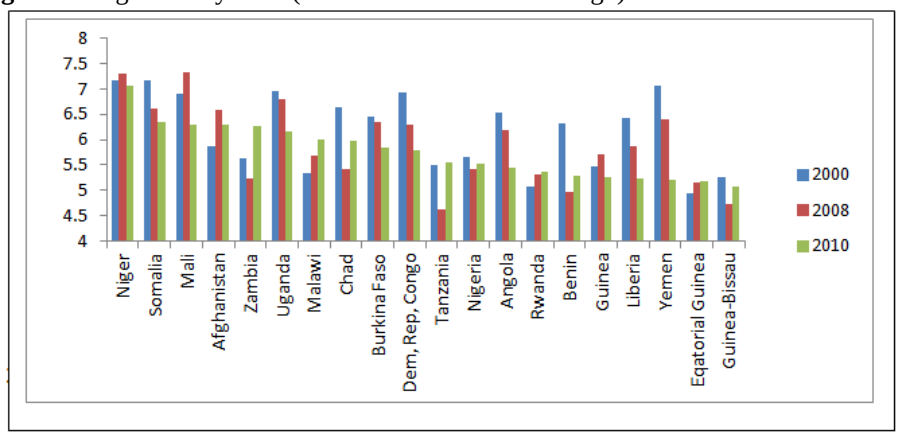
II. DEMOGRAPHIC IMPACT OF HIV/AIDS:

Since the occurrence of HIV/AIDS, researchers and policy-makers have shown a keen interest in assessing its demographic, health, social and economic impact. Demographers and health researchers have tried to resort to indirect methods, including the use of models and projections (Bongaarts , 1988, 1989 and 1995: Way and Stanecki, 1991 and 1994: Bulatao and Bos, 1992: Godinho, et al., 2005).The major demographic processes such as mortality and fertility, are affected by AIDS. Direct effects on mortality occur because AIDS causes the deaths of adults and children. The effects on fertility are indirect. The accumulation of these direct and indirect effects causes changes in other demographic indicators (Whiteside, 2001). The disease obviously affects mortality and it could indirectly affect fertility through behavioral changes such as condom use, number of partners, and so on, or by causing the death of men and women of childbearing age. Patterns of rural-urban migration could also change if the epidemic's effect is different in urban and rural areas (Stoto, 1993). Mathematical models incorporating demographic, epidemiological and behavioral processes are used to assess the potential demographic impact of the disease AIDS (Anderson et al., 1991: Anderson, 1991). The author examines analyses of the possible demographic impact of AIDS in Africa which are based upon the predictions of mathematical models with combination of epidemiological and demographic processes.

The most direct demographic consequence is more in mortality. The impact on the Under five mortality rate (U5MR) will be more severe, as many infected infants will die before their first birthdays but few will survive beyond their fifth (Adetunji, 2000: Stover, 1994). Although HIV/AIDS originally emerged as adult health problems, it has become a major killer of under-5-year-old children, especially in developing countries. U5MRs among children of HIV-infected mothers are two to five times higher than those among children of HIV-negative mothers (Boerma and Whitworth, 1998)

Life expectancy at birth is particularly sensitive to AIDS, as deaths occurring to young adults and young children result in a large number of years of life lost. AIDS also affects population size and population growth. Population aging will become an increasingly important demographic impact of HIV/AIDS, which has affected families and societies throughout the world. The number of people living with HIV and percentage of population aged 60 & above are negatively related (-0.591). The population aged 60 and above is smaller because of the impact of HIV/AIDS on mortality especially in several sub-Saharan African countries (Talawar and Wali, 2008). **Figure 3** gives the countries with high fertility rate and more number of HIV/AIDS cases, where the relationship between them is positive.

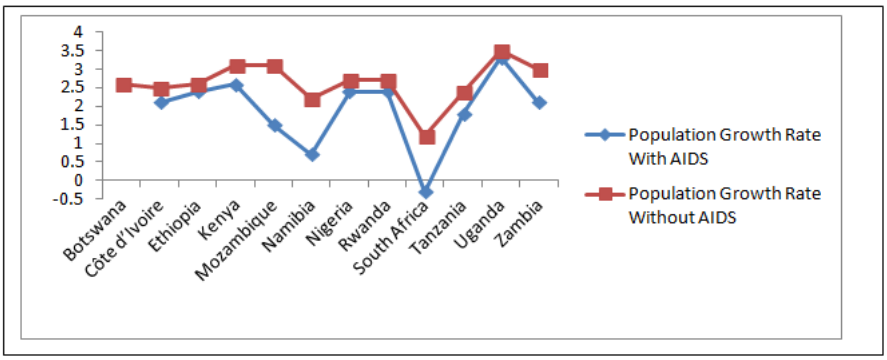
Figure 3: High fertility rates (where HIV/AIDS is also high) for some selected countries

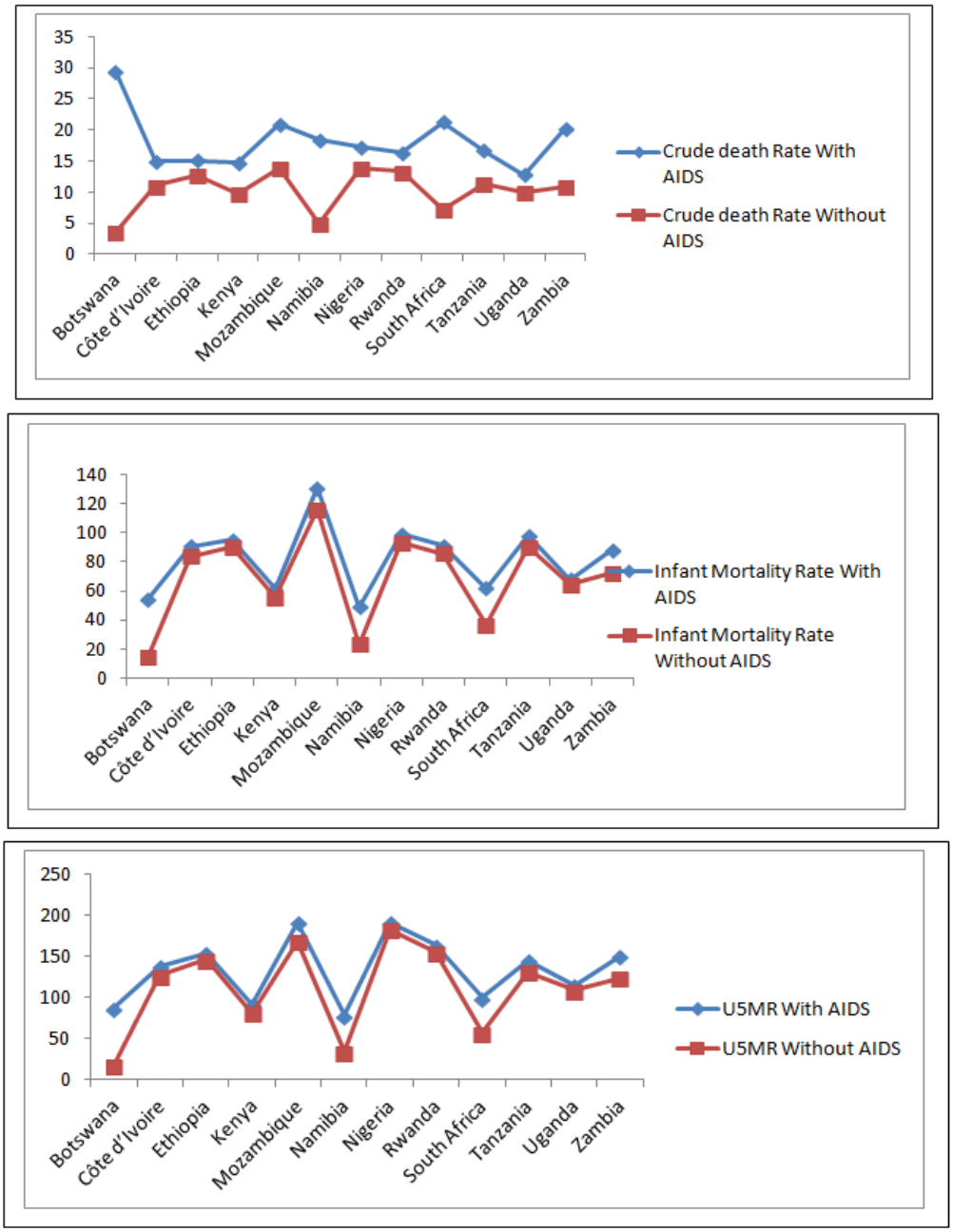


III. MORTALITY AND AIDS

The objective of the study is to investigate whether there is a link between various mortality rates and the HIV prevalence among adults. AIDS will also affect infant and child mortality. In the nine most severely affected countries in Africa AIDS has already increased the infant mortality rate by about 10 deaths per 1,000, from 76 to 86 infant deaths per 1,000 live births (UN Report, 1999). Results Under-5 mortality rates showed an increase in most countries with high adult HIV prevalence, but a decrease in almost every country with moderately high or low prevalence (**Figure 4 (a-d)** & **Table 3**, see **Figures 5-6,** for India for some selected states). There are many ways in which adult HIV/AIDS could affect the level of under-5 mortality including, at the household level, the death of or frequent illness of the care-giver or breadwinner, unexplained trauma, and depletion of essential material (economic) and nonmaterial resources. The time, energy and financial resources needed to care for children might be diverted to caring for sick adults. Loss of income because of illness of the breadwinner can lead to poverty and deprivation. Adult death may result in single parenthood. The consequences of these possible scenarios could lead to negative health outcomes (Bariagaber , 2001; Adetunji, 2000 ; Gregson, et al., 1998).

Figure 4 (a-d): Mortality and HIV/AIDS of some selected sub-Saharan Countries, 2005.





Source: Source: U.S. Census Bureau (2007)

IV. POPULATION GROWTH AND AIDS:

AIDS will have important effects on the annual rate of population growth in many countries (Mekonnen, at el., 2002). In the 29 African countries considered, the rate of growth is projected to decline from about 2.4 per cent today to 2.1 per cent by 2015. Without AIDS it would have declined from 2.8 today to 2.4 per cent in 2015. Although AIDS clearly will have a serious impact on population growth rates, it is not expected to lead to negative population growth in any country (**Figure 4 (a-d**)). The age selectivity of the HIV/AIDS pandemic has highly significant demographic implications. In Ethiopia, 94 percent of 10,374 reported HIV/AIDS cases were in the age group of 15 to 49 years; and in case of Botswana it was about 86 percent out of 10,775 cases. For India among the some selected states, refer **Table 3**. **Figure 7 (a-c)** gives the comparison of HIV/AIDS with growth of population and are negatively related.

V. LIFE EXPECTANCY AND HIV/AIDS:

The most dramatic effect of AIDS is on life expectancy at birth (life expectancy is defined as the number of years a newborn child would be expected to live if the prevailing mortality conditions remained constant). In the 23 African countries considered, life expectancy has already been reduced by about 5 years due to AIDS. The most severe impacts are seen in Southern Africa. In Botswana, life expectancy is expected to drop from 61 years in 1990-1995 to 41 years by 2000-2005, almost 29 years less than it would have been in the absence of AIDS. In Namibia, life expectancy is projected to fall from 58 years in 1990-1995 to 38 years in 2000-2005 (UN Report, 1999). The impact of HIV/AIDS on life expectancy at birth in Botswana, Lesotho, Namibia, South Africa, Swaziland and Zimbabwe is large. The net difference is more than 20 years in male life expectancy and more than 25 years in female life expectancy. Levels of life-expectancy have been cut cruelly by HIV/AIDS in sub-Saharan Africa. The pandemic has cut between 29 and 31 years off the life-expectancy projected for female in Botswana, Zimbabwe, South Africa, Swaziland, Lesotho and Namibia. In the Southern African sub-region it has cut off from 13 years for Uganda to 30 years for male life expectancy (refer **Table 1**).

Figure 5: Estimated number of AIDS related deaths of South India, during 2007-2011

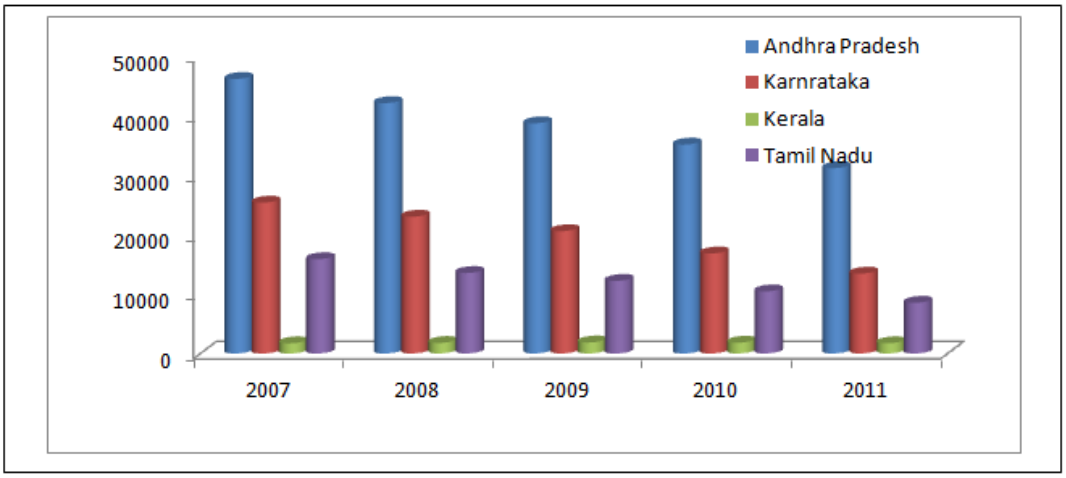


Figure 6: Estimated number of new HIV infections among adults (15 + years) of South India during 2007-2011

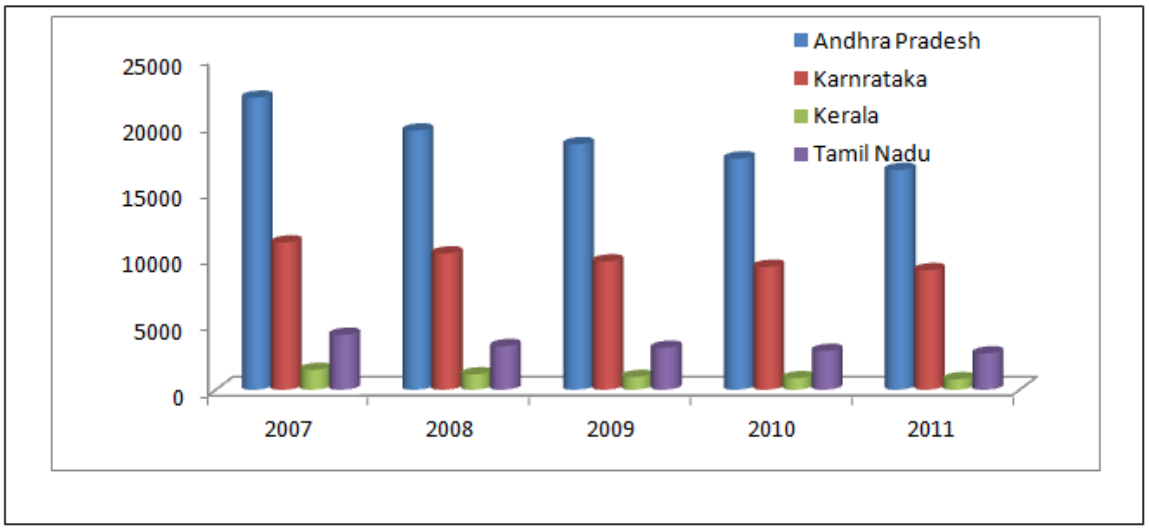


Figure 7 (a-c): Comparison of growth rate of the populations

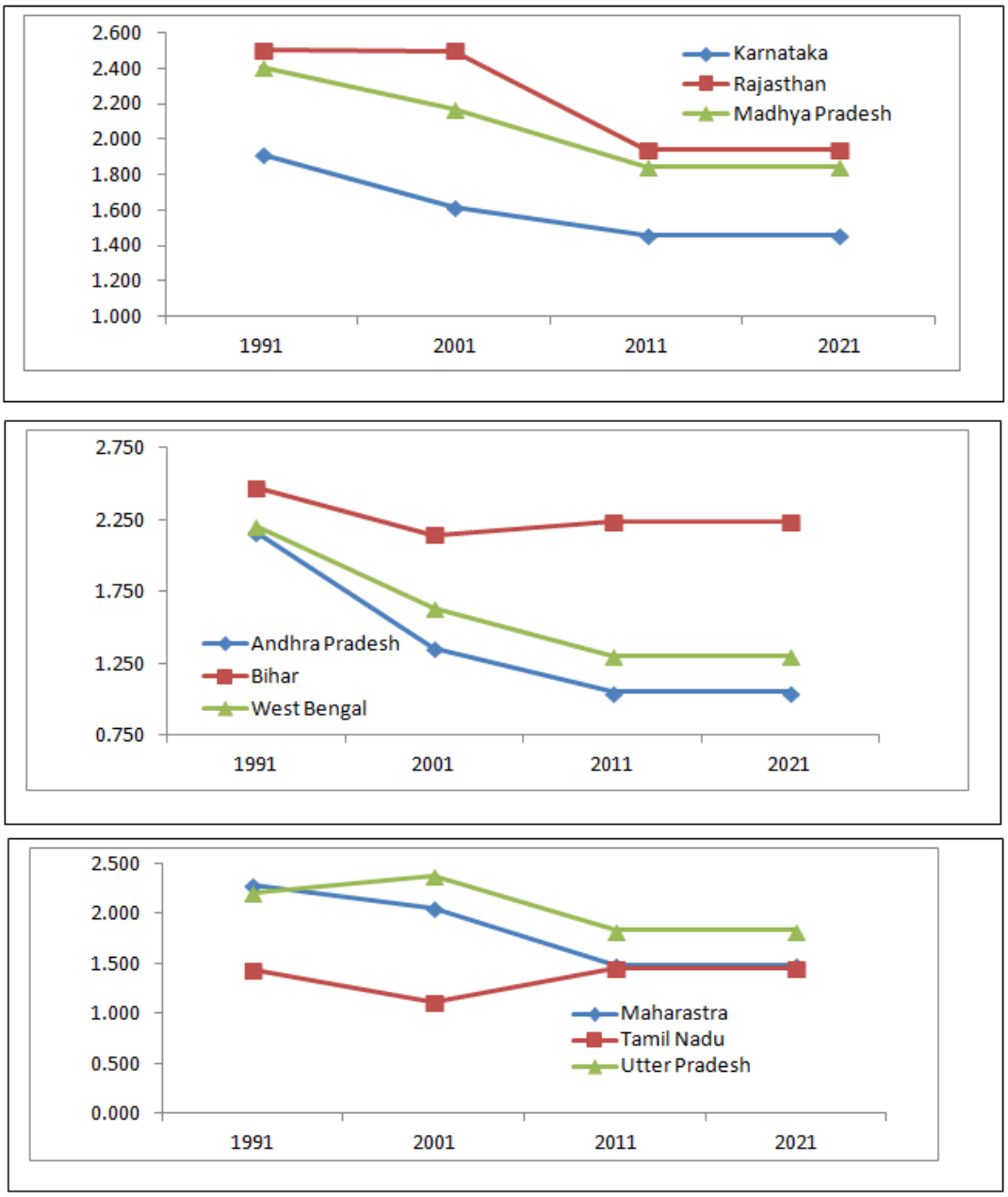


Table 1: Life Expectancy at birth with and without AIDS for some selected sub-Saharan African countries by sub-region country, 2006.

Country	Living with HIV (0-49 years) ('000) (2005)	Life Expectancy of Male		Life Expectancy of Female		Number of years lost due to AIDS	
		With AIDS	Without AIDS	With AIDS	Without AIDS	Male	Female
East Africa							
Botswana	270	52	74	50	79	22	29
Ethiopia	-	48	52	50	56	4	6
Kenya	1300	54	63	54	65	9	11
Uganda	1000	50	58	52	62	8	10
Burundi	150	50	57	52	61	7	9
Eritrea	59	57	61	61	66	4	5
Rwanda	190	47	51	49	55	4	6

Tanzania	1400	49	56	51	60	7	9
Middle Africa							
Cameroon	510	52	57	53	60	5	7
CAR	250	44	57	44	61	13	17
Congo (DR)	1000	52	58	54	62	6	8
Southern Africa							
Zambia	1100	38	51	38	55	13	17
Zimbabwe	1700	40	70	38	74	30	36
South Africa	5500	43	64	42	71	21	29
Swaziland	220	32	71	33	76	29	33
Lesotho	270	40	63	39	69	23	30
Namibia	230	45	69	42	73	24	31
Malawi	940	43	56	42	60	13	18
West Africa							
Cote d'Ivoire	750	46	52	52	61	6	9
Nigeria	2900	47	52	48	55	5	7
Burkina Faso	150	47	52	50	56	5	6
Liberia	-	38	42	41	47	4	6
Guinea B	32	45	49	49	54	4	5

Source: UNAIDS (2006) and U.S. Census Bureau (2007), Talawar and Wali (2008)

Table 2 : Estimated number of Adults and Children living with HIV ('000) and some its impact on some selected variables for South Asia and South –East Asia, 2003.

Country	Estimated number of Adults and Children living with HIV ('000)		Under 5-year Mortality Rate (U5MR)	Infant Mortality Rate (IMR)	Life Expectancy at birth	Crude Death Rate (CDR)	Total Fertility Rate (TFR)
	2003	2005	2003	2003	2003	2003	2003
Bangladesh	11	7.5	69	46	62	8	3.4
India	5700	5300	87	63	64	8	3
Indonesia	170	110	41	31	67	7	2.3
Iran	66	37	39	33	70	5	2.3
Malaysia	69	57	7	7	73	5	2.9
Myanmar	360	390	107	76	57	11	2.8
Nepal	75	65	82	61	60	10	4.2
Pakistan	85	56	103	81	61	10	5
Philippines	12	9.5	36	27	70	5	3.1
Thailand	580	590	26	23	69	7	1.9

Source: UNAIDS, 2006; UNICEF, 2005

Table 3: Distribution of HIV Incidences of Some Selected States by Age Groups

State	Age Group			
	<15 Years (%)	15-49 Years (%)	50+ Years (%)	Total PLHIV
Andhra Pradesh	6.56	87.25	6.18	432643
Bihar	7.39	87.34	5.26	124544
Gujarat	6.58	87.62	5.8	128811
Karnataka	6.96	86.74	6.3	212612
Kerala	5.24	87.66	7.11	25925
Maharashtra	9.38	84.08	6.54	332342
Rajasthan	7.51	86.77	5.72	73910
Tamil Nadu	4.92	86.7	8.38	137458
Uttar Pradesh	9.89	84.52	5.59	123695
West Bengal	7.16	87.36	5.48	139364

Source: NACO and NIMS, 2012

VI. CONCLUSION

The major demographic processes such as mortality and fertility are affected by AIDS. Direct effects on mortality occur because AIDS causes the deaths of adults and children. The effects on fertility are indirect and less well understood. The accumulation of these direct and indirect effects causes changes in other demographic indicators. Although HIV/AIDS originally emerged as adult health problems, it has become a major killer of under-5-year-old children, especially in developing countries. U5MRs among children of HIV-infected mothers are two to five times higher than those among children of HIV-negative mothers The impact of HIV/AIDS has been so large in many of sub-Saharan African countries; it will significantly affect life expectancy at birth. In seven countries of sub-Saharan Africa, life expectancy at birth is 40 years or less, because the number of people living with HIV and life expectancy at birth are significantly negatively related (-0.91). The net difference is more than 20 years in male life expectancy and more than 25 years in female life expectancy (Life Expectancy With and Without AIDS). We find increase in fertility where HIV/AIDS is more. Populations with high fertility tend to have low proportions of older people and vice versa (negatively related). The impact of HIV on the total fertility rate is positive.

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