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Inequality in Life Expectancy-Acceleration due to COVID-19

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Abstract

The study of inequality in life expectancy by socio-economic groups has been receiving more and more attention with the rise in inequality. The present study investigates the prevailing situation in Bangladesh by using the age-specific mortality data available from various sources like the Sample Vital Registration System(SVRS) of the BBS and the Bangladesh Maternal Mortality Survey. The BBS, however, has been presenting a life table by sex, and there is a disparity in life expectancy in favour of females presently by three years. Rural life expectancy was lower in Bangladesh from 1981-to 2014, after which it exhibited that the difference in rural and urban life expectancy is being narrowed down. In India, the life expectancy at birth is slightly more than one year higher in urban areas than in rural areas. Life expectancy at birth was computed for seven regions (administrative divisions) using the age-specific mortality rates given in SVRS reports. For the year 2016, the highest value of life expectancy at birth (73.9 years) was found for the Rajshahi division, followed by Khulna division(73.5 years), Rangpur(73.0 years), Barisal(72.8 years), Sylhet(72.6 years) and the lowest for Chattogram division(72.1 years). We also compared the life expectancy and Household average income of the administrative divisions as obtained in the HIES 2016. No systematic relationship between household income and life expectancy was observed. Analysing the mortality of BMMCHS between 2010 and 2016, the life expectancy increased with the increase in wealth quintile for both males and females. The difference in life expectancy between the richest and poorest quintile of the male was 3.37 years, and for females, it was 1.34 years. But the much higher difference in life expectancy at birth between the richest and poorest quintile has been observed in other countries like India, the United Kingdom, the United States and Norway.

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Keywords *Life expectancy · Life expectancy inequality · Bangladesh · India · United Kingdom · U.S.A · Norway*

1. Introduction

The World Health Organization (WHO) defines life expectancy as "the average number of years a person is expected to live based on the current mortality rates and prevalence distribution of health states in a population". Life expectancy at birth, a summary measure of health, is the most popular and widely used indicator cutting across the disciplines; among academia, planners, policymakers and International organisation. It represents the dimensional index of health in the human development index. However, this indicator is usually provided at the national and sub-national level without segregating population social and economic groups, mainly due to data limitations. Estimating life expectancy at birth among social and economic groups helps assess the impact of various programs and policies designed to improve the well-being of the population subgroups. The present study attempts to provide the estimated life expectancy at birth by sex, rural-urban background and various socio-economic groups classified by household income. It is a measure that summarises a country's mortality, allowing us to compare it by generation and analyse trends. Its interpretation and meaning are even more decadent and can provide crucial information on the level of development of a country's welfare state. This indicator is so vital to describing population conditions that, together with the education index and the Gross Domestic Product (GDP) index, it forms the Human Development Index(HDI) used by the United Nations Development Programme (UNDP). There is no better indicator of a country's social development than having a long and healthy life. Life expectancy expansion is a result of, among other things, improvements in nutrition, health and, above all, a decrease in mortality, but also of different reasons that lead to those mentioned previously. Therefore, this indicator's importance is evident, as it provides us with many characteristics of a society and its situation. To sum up, it could lead us to trivialise its significance or assume that a decrease in the life expectancy of a generation (average) only affects the ones who live the longest. To understand the importance of life expectancy in Bangladesh, it is helpful to analyse some data both in the context of other countries and about the past years and focus primarily on where we are going rather than where we come from (Mohanty and Ram, 2010; Asaria et al. 2019).

According to some recent studies, the United States National Academy of Sciences, regarding the implications of life expectancy mentions, "According to many studies, life expectancy has been rising fastest for people with higher education or income, so the gap in longevity by socio-economic status has been increasing. This trend is important, but it also means that higher-income people will increasingly collect government benefits such as Social Security over more years than lower-income people. It also means that some proposed policy changes

to make programs fiscally sustainable, such as raising the normal retirement age for Social Security or raising the eligibility age for Medicare, might disproportionately affect those with lower incomes" (NAS, US 2015).

2. Gender (Female-Male) Inequality: Bangladesh SVRS 1981-2020

2.1 Sample Vital Registration System(SVRS)

The difference in life expectancy at birth according to gender is shown in chart 1. For 1981-2020, as available from the Sample Vital Registration System(SVRS) of the Bangladesh Bureau of Statistics. For the years up to 2000, the male life expectancy was higher than the female life expectancy at birth, after which female life expectancy was higher than male life expectancy. For the year 2020, the expectation of life for males was 71.2 years, and for females, it was 74.5 years, and for the total population, it was 72.8 years. The female life expectancy was higher by 3.3 years.

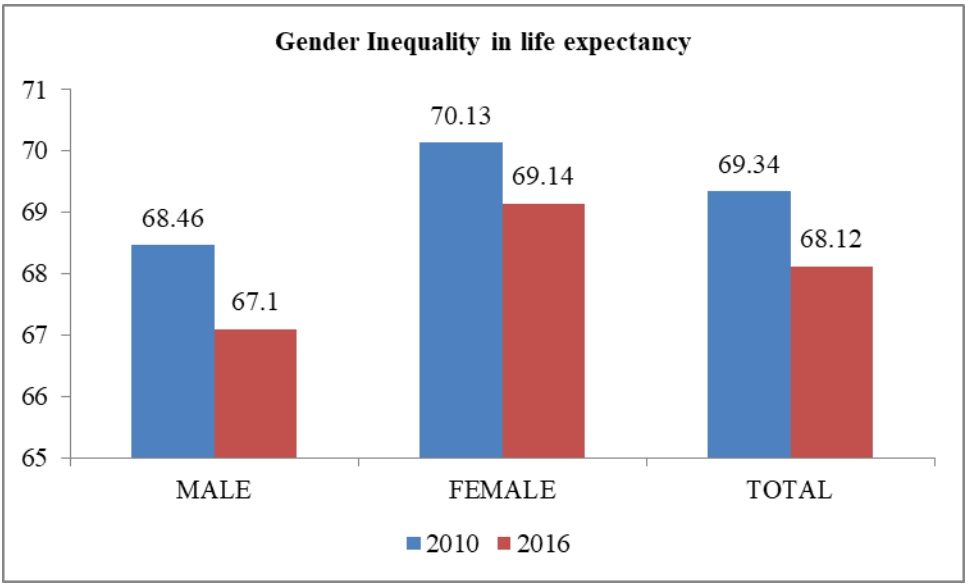
Chart 1: Gender Inequality in Life Expectancy: SVRS

Source and note: Author's analysis. Data source BBS SVRS

2.2 Bangladesh Maternal Mortality and Health Care Survey (BMMHCS)

The trend in life expectancy at birth according to gender inequality is presented in Chart 2. In 2010 male life expectancy was 68.46 years while female life expectancy was 70.13 years, giving a gender inequality of 1.67 years. In 2016 the male life expectancy was 67.10 years while female life expectancy was 69.14 years, thus providing a gender inequality of 2.04 years.

Chart 2: Gender Inequality in Life Expectancy: BMMHCS



Source and note: Author's analysis. Data source BMMHCS

On the sex differences in life expectancy, I am furnishing an article in Box 1 published in the daily star, Dhaka, which is self-explanatory**:**

Box 1: WHAT CAUSES THE INEQUALITY IN LIFE-EXPECTANCY BETWEEN MEN AND WOMEN?

Women are sometimes considered the weaker sex because, on average, men are taller, more muscular, and seemingly more assertive than women. Medical science, however, tells a different story: women are biologically stronger than men. In all countries worldwide, women consistently live longer than men on average. This is also true for many other species of mammals. The natural sex ratio at birth is male-biased, with 105 boys born on average against 100 girls globally. As the offspring grow up, males die in more significant numbers than females at any given age, leading to a more balanced sex ratio in adult age. The population sex ratio reverses in old age, with women outnumbering men in most countries.

Consequently, around 90 per cent of all supercentenarians (110-plus years old) living on the planet today are women. The ongoing coronavirus pandemic further reminds us of the gender gap in mortality. In countries with available data, Covid-19 is killing more men than women (*The New York Times*, February 20, 2020).

In Bangladesh, the number of deaths from Covid-19 is nearly four times higher among men than women. The higher prevalence of fatal diseases in men and the more robust immune system in women presumably drive the gender differences in Covid-19 mortality globally.

Women usually report more psychological problems while men suffer more from severe and life-threatening illnesses like heart diseases, stroke and cancer. These diseases are the major killers of our time and the main culprits for premature deaths and the gender gap in mortality worldwide. Women face gender discrimination in every sphere, limiting their potential to maximise health and well-being. Yet, women paradoxically seem to be the healthier sex. The mechanisms that underlie the gender-health paradox are complex and not fully understood. Several biological and social mechanisms are suggested as explanations. From a biological point of view, men are naturally programmed to die earlier than women at conception.

Available evidence indicates that the male foetus is biologically weaker and more vulnerable to pregnancy complications than the female foetus. Moreover, neonatal and infant mortality rates are higher in boys than girls. These sex differences at birth provide the foundation for the biological explanation of male disadvantage in life expectancy. Sex hormones play a crucial role in the female advantage in longevity. The female sex hormone oestrogen protects against cardiovascular diseases and is partly responsible for the lower incidence of such diseases in women until menopause. By contrast, higher in men, the androgen hormone is associated with a higher risk of cardiovascular diseases. The more robust female immune system is another factor that could contribute to the longevity gap. Female bodies are known to produce more significant amounts of antibodies compared to males. This increases females' capacity to fight off respiratory, bacterial, and viral infections, including the deadly Covid-19.

Moreover, female bodies carry higher amounts of beneficial cholesterol (HDL), protecting against heart diseases. Men are disadvantaged even in fat distribution because they accumulate excess fat around the stomach, while women tend to carry excess fat in the hips and thighs. Excess fat is harmful, but abdominal fat is more dangerous for cardiovascular health. Genetic disorders are sometimes held responsible for different morality in men. A similar gene can naturally compensate for a damaged gene on the X chromosome in the second X chromosome in women but not men due to the lack of double X chromosomes. The higher infections, congenital disorders, and deaths in male babies possibly express their lack of double X chromosomes.

Furthermore, the mitochondrial DNA, known as the powerhouse of cells and is believed to be exclusively inherited from the mother, leads to male-specific harmful mutations in the mitochondria. Mitochondrial dysfunction is associated with ageing and chronic diseases.

If biology were the sole cause behind the gender gap in life expectancy, one could expect the gap to be relatively constant over time and across societies. However, the gender gap in life expectancy considerably varies by time and context, suggesting that social forces are in operation to drive the trends. For instance, a Bangladeshi boy born today is expected to live 3.8 years shorter than a girl, while Russia's corresponding male-female gap is 10.5 years. Thanks to medical advances and improved standard of living, global life expectancy linearly went up by three months per year (i.e., 6 hours a day) from 1841 to 2000. However, it increased at a much slower rate in men than women, resulting in a wider gender gap. Men are more exposed to work-related stress and unhealthy behaviours, e.g., smoking and alcohol abuse, responsible for their lower longevity.

Furthermore, men are typically disadvantaged by occupational hazards and so-called masculine behaviours that are highly risky. As a result, they die disproportionately in work-related accidents, car crashes, war, and sporting activities. The male sex hormone testosterone is responsible for predisposing men to risky behaviours. Perhaps, research finds a link between marriage and increased life expectancy in men but not women. Marriage protects men from risky social habits, whereas women are less prone to risky behaviour regardless of marital status. The gender gap in global life expectancy has narrowed in recent years compared to the past. This is unsurprising given that women are increasingly entering the workforce and adopting health-damaging lifestyles like smoking and drinking. There is an interesting case in Sweden, where females smoke more than males and the relatively low male-female longevity gap. Improved medical management of fatal diseases might also have reduced the gap. Women are the healthier sex and real champions in the ultimate game of life. Nature has given women a biological advantage over men, perhaps to compensate for the structural disadvantages they experience. Biology is only a part of the story since it cannot answer why the female advantage in life expectancy would fluctuate over time. The biological gap in life expectancy between women and men is a natural destiny which no society can avoid. However, the social gap in life expectancy is unjust and unfair. We can rarely alter our biological makeup, but we can promote healthy lifestyles and design a society where both men and women will have a fair chance to maximise their health potential.

Source: *M. Zakir Hossain. The Daily Star, Dhaka August 23, 2020*

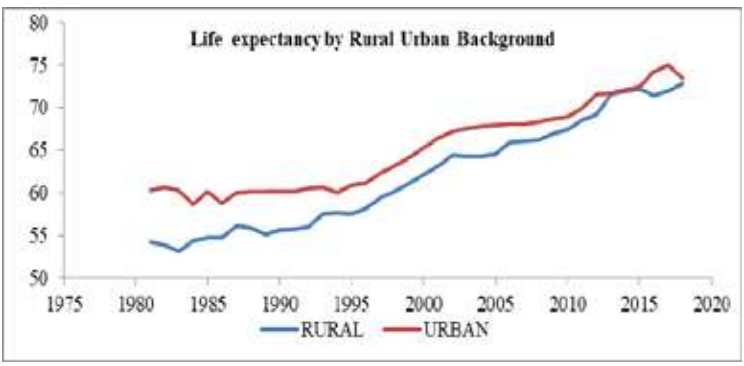
2.3 Rural-Urban Inequality

The trend in life expectancy by Rural-Urban background: SVRS 1981-2018.

The data on life expectancy for the total population according to the rural-urban

region is presented in Chart 3. It may be mentioned here the life expectancy values for the years 1981-2012 have been taken from SVRS Reports. But SVRS Report no longer presents life expectancy values by Rural-urban breakdown since 2013. As such, life expectancy values for 2013-2020 have been computed by the present scribe using the age-specific mortality rates available in the SVRS reports for the respective years. Life expectancy was consistently lower for rural areas from 1981-to 2012. In 1981 the life expectancy for the urban population(60.3 years) was six years higher than their rural counterpart(54.3 years). Over three decades, the difference in life expectancy was greatly minimised to 2.3 years- the urban population now has a life expectancy at birth of 71.7 years, and the rural population has a life expectancy at birth equal to 69.2 years. Since 2013 we have seen a lot of fluctuations in the development of rural and urban life expectancy at birth.

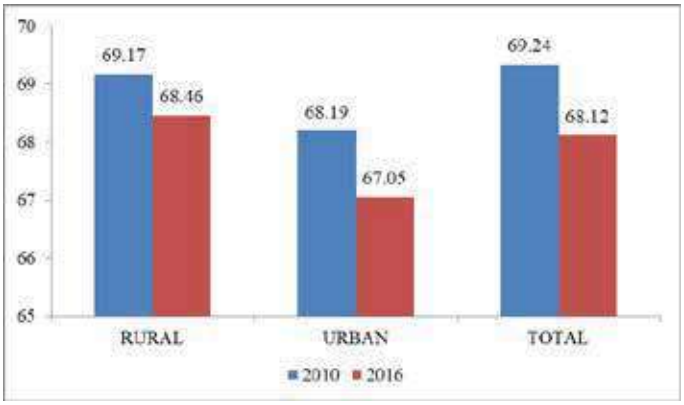
Chart 3: Inequality in Life Expectancy by Rural-Urban Areas



Source and note: Author's analysis. Data source BBS SVRS

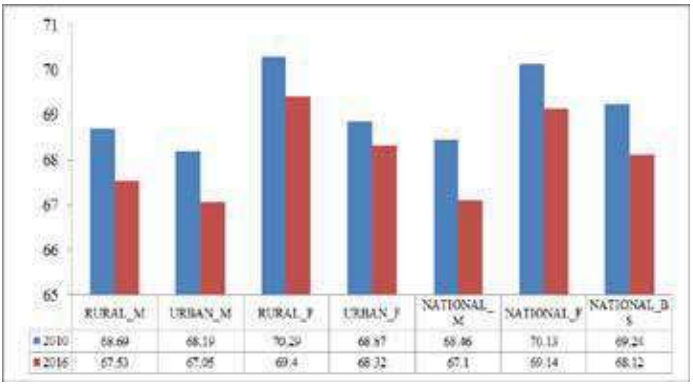
The trend in life expectancy according to gender and rural-urban background obtained from the analysis of Bangladesh Maternal Mortality and Health Care Surveys is given in Chart 4. The life expectancy was found to be lower in 2016 compared to 2010. The decline in life expectancy in rural areas was 1.14 years. In an urban area, the fall was 0.71 years, and for the total population, the loss in life expectancy at birth stood at 1.12 years. Similar synchronous loss of life expectancy is also visible in chart 5 according to gender and regional background.

Chart 4: Life Expectancy Inequality by Rural-Urban Area



Source and note: Author's analysis. Data source BMMHCS

Chart 5: Trend in Life Expectancy by gender and Rural-Urban Area



Source and note: Author's analysis. Data source BMMHCS

3. Urban-Rural Inequality in Life Expectancy in Various Countries

3.1 The United States

Singh and Siahpush (2014), in a study on rural-urban inequality in life expectancy at birth in the United States between 1969 and 2009, found that when stratified by gender, race, and income, life expectancy ranged from 67.7 years among poor black men in nonmetropolitan areas to 89.6 among poor Asian/Pacific Islander women in metropolitan areas. Rural-urban disparities widened over time. From 1969-to 1971, life expectancy was 0.4 years longer in metropolitan than in nonmetropolitan areas (70.9 vs 70.5 years). By 2005-2009, the life expectancy difference had increased to 2.0 years (78.8 vs 76.8 years). The rural poor and rural blacks currently experience

survival probabilities that urban rich and urban whites enjoyed four decades earlier. Causes of death contributing most to the increasing rural-urban disparity and lower life expectancy in rural areas include heart disease, unintentional injuries, COPD, lung cancer, stroke, suicide, and diabetes. Between 1969 and 2009, residents in metropolitan regions experienced more significant gains in life expectancy than those in nonmetropolitan areas, contributing to the widening gap.

3.2 The United Kingdom

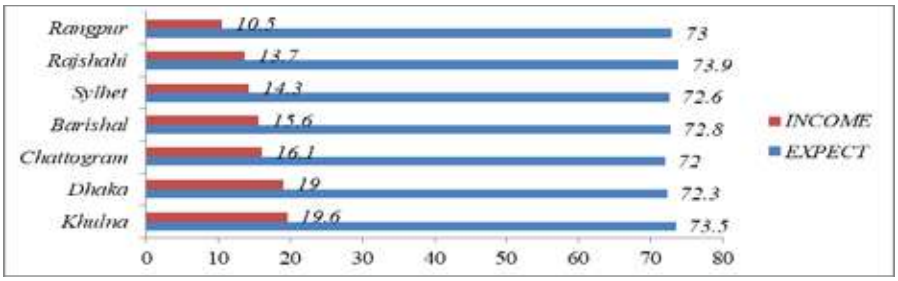
(Kyte and Wells, 2010). examined inequalities in health outcomes in rural areas. It investigated variations in life expectancy at birth between rural and urban areas of England, taking the effect of deprivation into account. The study aimed to produce results which provide specific evidence of the needs of rural communities, as they have often been overlooked in previous research. For the 2001-07 period, life expectancy at birth in England was 76.9 years for males and 81.3 years for females. However, when deprivation was examined, results between the most deprived and least deprived quintiles varied by 7.8 years for men and 5.4 years for women. Overall, life expectancy was higher in rural areas than in urban areas. Deprivation greatly impacted the results, and vast inequalities were evident, particularly in men and the urban regions. In both places, males living in the less deprived quintiles had similar life expectancies to females living in the more deprived quintiles. Life expectancy was higher in the village and dispersed settlements than in town and fringe areas within rural areas. There were significant differences between the village's fourth and fifth (most deprived) quintiles and dispersed settlements, which shows that there may be acute pockets of deprivation within this area type that need to be addressed. In terms of sparsity, there was little difference in life expectancy between densely and less densely populated localities within rural and urban areas. However, variations were observed when deprivation was considered, and more significant differences were evident in less sparse areas than in sparse areas.

4. Inequality in Life Expectancy Between Males and Females

Women have always lived longer than men, but the gender gap in 1841 (2 years) was relatively small because of the high prevalence in the 19th century of diseases that killed men and women indiscriminately. In the late 19th and early 20th centuries, the gender gap in life expectancy started to widen, peaking at 6.3 years by 1971. Reasons for the widening gender gap included poor working conditions and smoking among men in contrast to improved life chances for women, for example, lower risk of dying in labour and tuberculosis, which affected women more than men. The gender gap narrowed from the 1970s to 3.7 years in 2019, with mortality falling faster in males than females because of decreases in smoking and mortality from cardiovascular diseases among men. However, the gender gap widened in 2020 to 4 years because mortality rates from Covid-19 were higher in males than females.

4.1 Regional Disparity

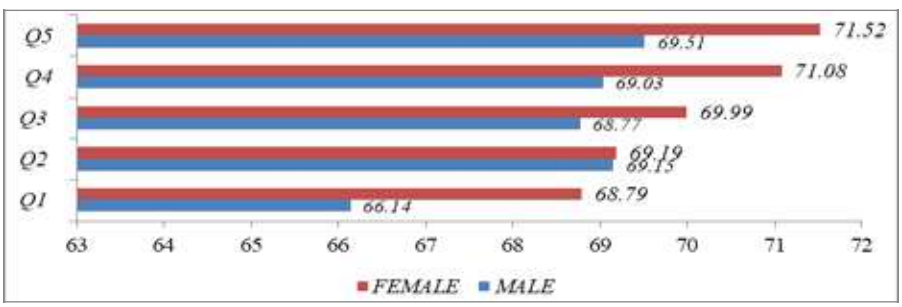
Chart 6: Household Income and Life expectancy: Bangladesh SVRS 2016



Source and note: Author's analysis. Data source BBS SVRS and HIES

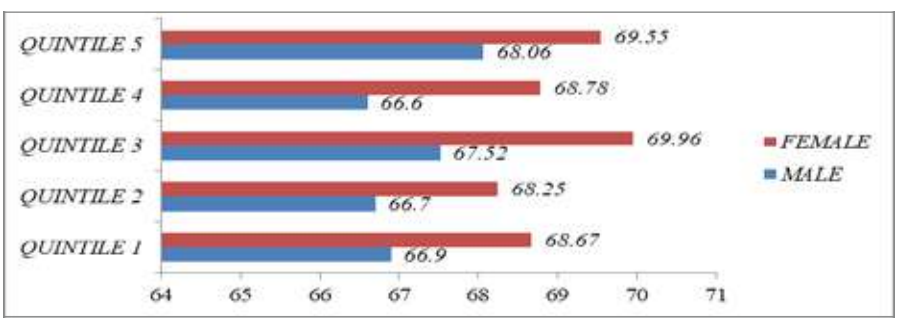
The Pearson correlation coefficient between Income and life expectancy was -0.170, statistically highly insignificant (P=.716).

Chart 7: Life Expectancy by Household Wealth Quintile :Bangladesh: BMMHCS 2010



Source and note: Author's analysis. Data source BMMMHCS 2010

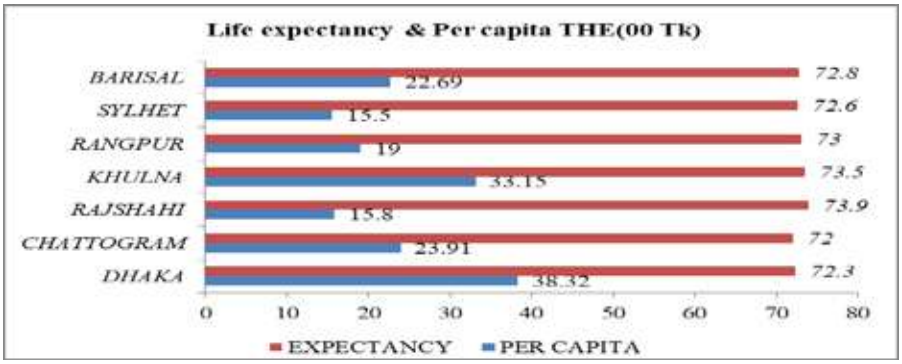
Chart 8: Life Expectancy by Household Wealth Quintile :Bangladesh: BMMHCS 2016



Source and note: Author's analysis. Data source BMMMHCS 2016

4.2 Health Care Expenditures and Life Expectancy

Chart 9: Life Expectancy band Per Capita THE (Hundred Tk)



Source and note: Author's analysis. Data source SVRS and BNHA.

We observe that the highest value of life expectancy at birth of 73.9 was found for the Rajshahi division, followed by 73.5 years for Khulna and 73.0 years for Rangpur. The lowest life expectancy at birth, 72.0 years, is observed for Chattogram division. The correlation coefficient between Percent THE and life expectancy was low, negative (-.384), and statistically insignificant(P= .395). The correlation coefficient between per capita PHE and life expectancy was positive, low (.040), and statistically insignificant(P=0.932). They are based on only seven observations. That's all we have for the time being.

5. Life Expectancy in India

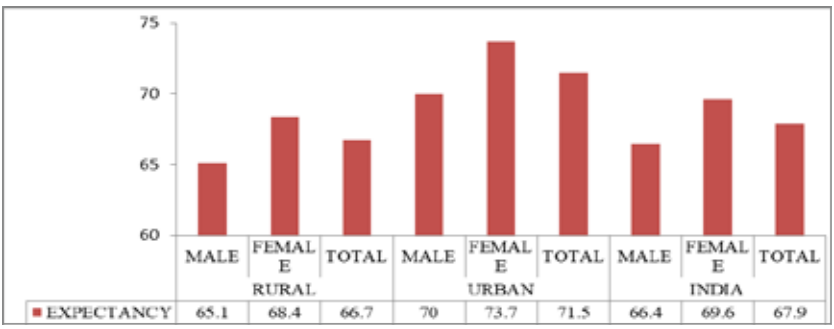
Regarding Rural-urban inequality in life expectancy in India, we observe that Urban life expectancy of 71.5 years is 4.8 years higher than the rural area life expectancy of 66.7 years. We have also presented the data for four states- West Bengal, Assam, Bihar and Odisha. The difference in urban to rural life expectancy is 1.2 years for West Bengal, 4.6 years for Odisha, 5.5 years for Bihar and 7.3 years for Assam.

Table 1: Life Expectancy in India 2010-14

Rural			Urban			Total		
Male	Female	Total	Male	Female	Total	Male	Female	Total
				India				
65.1	68.4	66.7	70.0	73.2	71.5	66.4	69.6	67.9
				West Bengal				
68.0	70.8	69.4	71.0	73.5	72.2	68.9	71.6	70.2
				Assam				
61.9	64.5	63.0	69.1	71.8	70.3	62.7	65.5	63.9
						Bihar		
64.1	66.5	65.2	70.2	71.3	70.7	67.8	68.4	68.1
						Odisha		
64.1	66.5	65.2	68.7	71.0	69.8	64.7	67.1	65.8

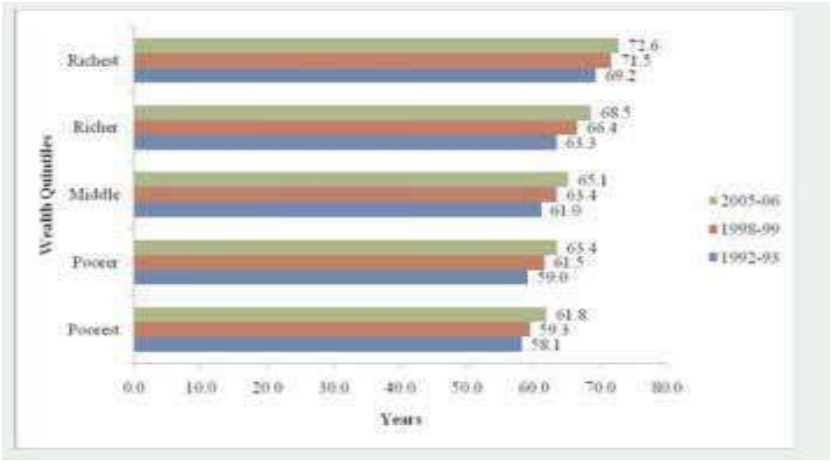
Source and note: https://www.disabled-world.com/calculators-charts/in-lifespan.php
Data Sources: Human Development Index Report, United Nations Development Program (UNDP) India and Sample Registration Survey (SRS) based life table 2010-14

Chart 10: Life expectancy by Gender and Residence, India



Source and note: https://www.disabled-world.com/calculators-charts/in-lifespan.php
Data Sources: Human Development Index Report, United Nations Development Program (UNDP) India and Sample Registration Survey (SRS) based life table 2010-14

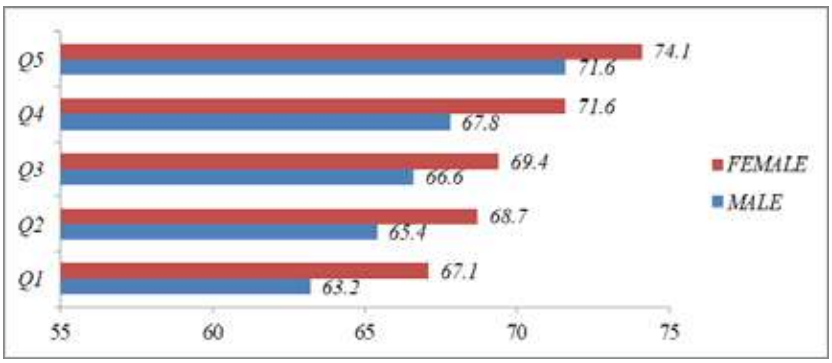
Chart 11: Trends in life expectancy at birth by Wealth Quintile in India:1992-2006



Source and note: Chart adapted from Mohanty and Ram, 2010

In a study on socio-economic inequality in India, Asaria et al. (2019) found that life expectancy is higher for women than men and higher in urban areas than rural areas. Women had a higher life expectancy at birth and narrower wealth-related disparities in life expectancy than men. Life expectancy at birth was higher across the wealth distribution in urban households than in rural households, with inequalities in life expectancy widest for men living in urban areas and narrowest for women living in urban areas. At birth, the life expectancy was 65.1 years for the poorest fifth of households in India compared with 72.7 years for the wealthiest fifth of households. This constituted an absolute gap of 7.6 years and a relative gap of 11.7 %.

Chart 12: Life Expectancy by Household Wealth Quintile: India 2011-15



Source: BMJ Global Health 4 (3). 2019.

Table 2: Life expectancy at birth for India by sex, Geography and Wealth Quintile

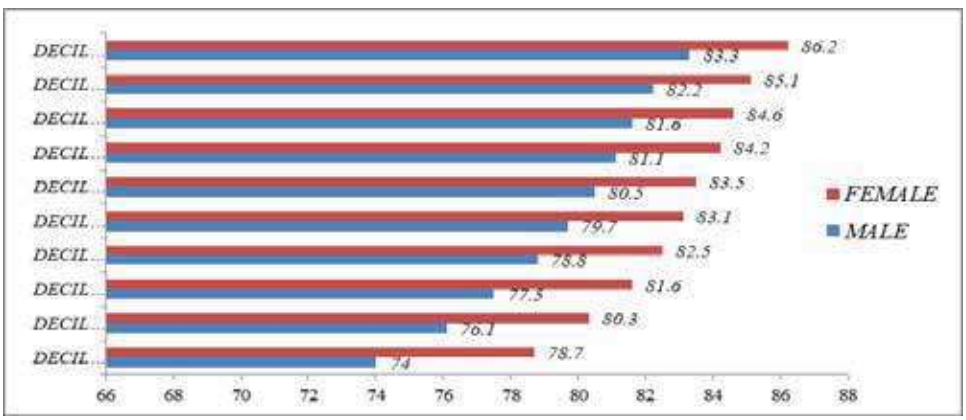
Table 1 Life expectancy at birth for India by sex, geography and wealth quintile

	Urban			Rural			Overall		
	Male	*Female*	*Overall*	*Male*	*Female*	*Overall*	*Male*	*Female*	*Overall*
Wealth quintile									
Q1 Poorest	66.4	70.8	68.4	62.2	65.9	64.0	63.2	67.1	65.1
Q2 Poorer	67.7	71.9	69.6	63.7	67.3	65.5	65.4	68.7	67.0
Q3 Middle	70.3	73.7	71.9	65.2	68.5	66.7	66.6	69.4	67.9
Q4 Richer	72.3	74.8	73.5	66.9	69.8	68.2	67.8	71.6	69.6
Q5 Richest	75.5	77.0	76.3	69.7	72.5	71.1	71.6	74.1	72.7
Total	**70.5**	**73.5**	**71.9**	**65.6**	**68.7**	**67.1**	**66.9**	**70.0**	**68.3**
Inequality									
Absolute: Q5–Q1	9.1	6.2	7.8	7.5	6.6	7.1	8.3	7.0	7.6
Relative: (Q5/Q1)–1	13.8%	8.8%	11.4%	12.1%	10.0%	11.0%	13.2%	10.5%	11.7%

*Note national wealth quintiles used for overall columns, national urban wealth quintiles for urban columns and national rural wealth quintiles for rural columns.

Source: Adapted from BMJ Global Health 4 (3). 2019.

Chart 13: Life Expectancy by Deprivation Deciles: England 2015-17



Source and note: Author's analysis. Data Source: https://www.ons.gov.uk. Decile 1: Most deprived area, Decile 10: Least deprived area

People in more affluent areas live significantly longer than those in deprived areas. In 2015–17, males in the least deprived 10 per cent of areas in England could expect to live to 83.3 years, almost a decade longer than males in the 10 per cent most deprived areas (74.0 years). Females in the least deprived 10 per cent of areas in England could expect to live to 86.2 years, compared with 78.7 years for females in the most deprived areas, a difference of almost eight years. Much of this inequality is caused by higher mortality from heart and respiratory disease and lung cancer in more deprived areas. The male-female difference in life expectancy is greater in more deprived areas. For example, females in the most deprived areas live 4.6 years longer than males, compared with 2.9 years in the least disadvantaged areas.

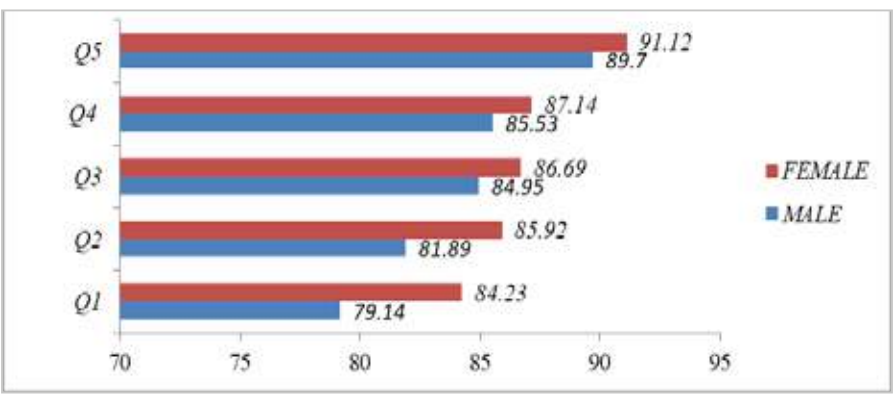
Socio-economic inequalities in life expectancy are widening due to more significant gains in life expectancy in the least deprived populations. Males and females living in the least disadvantaged areas of England saw a substantial increase in life expectancy between 2014–16 and 2017–19; in the most deprived areas, no significant changes were observed (Raleigh, 2021).

5. Covid-19 and inequalities in mortality in England

Mortality from Covid-19 has had an unequal impact on different population sub-groups and exacerbated inequalities. Between 2019 and 2020, life expectancy in males fell by almost two years in the poorest decile of areas (from 74.3 to 72.4 years) compared with 1 year in the richest decile (from 83.6 to 82.6); for females in the poorest areas it fell by 1.6 years (from 78.9 to 77.3) compared with 1 year in the richest (86.8 to 85.8). As a result, the gap in life expectancy between the richest and the poorest areas widened in 2020 to 10.2 years for males and 8.5 years for females, compared with 9.3 and 7.9 years, respectively, in 2019. Although 2020 life expectancy data isn't yet available for all population sub-groups, mortality data for other groups also shows inequalities, which will impact life expectancy. For example, learning disabilities: mortality from Covid-19 is about 1.5 times higher among people with a learning disability or self-reported disability than those without a disability.

Ethnicity: although most ethnic minority groups had lower overall mortality than the white population before the pandemic, that differential was reversed in 2020 in some groups because of their higher risk of infection and mortality from Covid-19 (Raleigh, 2021).

Chart 14: Life Expectancy by household Income Quintile: United States. 2014



Source and note: Author's analysis. Data source. www. healthinequality.org , www. health- ineqonlinetable2

6. COVID 19 and Life Expectancy in the United States

COVID-19 has resulted in a staggering death toll in the United States: over 215,000 by mid-October 2020, according to the Centers for Disease Control and Prevention. Black and Latino Americans have experienced a disproportionate burden of COVID-19 morbidity and mortality, reflecting persistent structural inequalities that increase the risk of exposure to COVID-19 and mortality risk for those infected. We estimate life expectancy at birth and age 65 y for 2020, for the total US population and by race and ethnicity, using four scenarios of deaths—one in which the COVID-19 pandemic had not occurred and three including COVID-19 mortality projections produced by the Institute for Health Metrics and Evaluation. Our medium estimate indicates a reduction in US life expectancy at birth from 1.13 y to 77.48 y, lower than any year since 2003. We also project a 0.87-y decrease in life expectancy at age 65 y. The Black and Latino populations are estimated to experience declines in life expectancy at birth of 2.10 and 3.05 y, respectively, which are several times the 0.68-y reduction for Whites. These projections imply an increase of nearly 40% in the Black-White life expectancy gap, from 3.6 y to over five y, eliminating progress in reducing this differential since 2006. Latinos, who have consistently experienced lower mortality than Whites (a phenomenon known as the Latino or Hispanic paradox), would see more than a 3-year survival advantage reduced to less than one year (Andrasfay and Goldman, 2021).

Table 3: Life expectancy Projections for the United States in 2020 by Race and Ethnicity under different COVID-19 mortality Scenarios

Table 1. Life expectancy projections for the United States in 2020 by race and ethnicity under different COVID-19 mortality scenarios

	Total population life expectancy		Non-Latino White life expectancy		Non-Latino Black life expectancy		Latino life expectancy	
Race and ethnicity	At birth (e_0)	At age 65 y (e_{65})	At birth (e_0)	At age 65 y (e_{65})	At birth (e_0)	At age 65 y (e_{65})	At birth (e_0)	At age 65 y (e_{65})
Absent COVID-19 (referent)	78.61	19.40	78.52	19.32	74.88	18.09	81.82	21.44
IHME current projection (medium scenario)	77.48	18.53	77.84	18.69	72.78	16.36	78.77	19.20
Difference (years)	−1.13	−0.87	−0.68	−0.63	−2.10	−1.73	−3.05	−2.24
IHME mandates easing scenario (higher mortality scenario)	77.39	18.46	77.79	18.64	72.62	16.23	78.54	19.03
Difference (years)	−1.22	−0.94	−0.73	−0.68	−2.26	−1.86	−3.28	−2.41
IHME universal masks scenario (lower mortality scenario)	77.63	18.65	77.93	18.78	73.05	16.58	79.16	19.48
Difference (years)	−0.98	−0.75	−0.59	−0.54	−1.83	−1.51	−2.66	−1.96

Source is authors' calculations of life expectancy projections in 2020. Difference refers to the difference between the projection and the absent COVID-19 scenario. Calculations are based on IHME projections that were updated October 9, 2020.

Source and note: Adapted from Andrasfay and Goldman, 2021

7. Life Expectancy and Income in Norway

Kinge et al. (2019), in a study on life expectancy in Norway, observed that life expectancy was highest for women with income in the top 1%, which was 8.4 years longer than women with income in the lowest 1%. Men with the lowest 1% income had the lowest life expectancy- 70.6 years, 13.8 years less than men with the top 1% income. From 2005 to 2015, income differences in life expectancy increased, mainly attributable to deaths from cardiovascular disease, cancers, chronic obstructive pulmonary disease, and dementia in older age groups and substance use deaths and suicides in younger age groups. Over the same period, life expectancy for women in the highest income quartile increased by 3.2 years, while life expectancy for women in the lowest income quartile decreased by 0.4 years. Life expectancy increased by 3.1 years for men in the highest income quartile and 0.9 years in the lowest income quartile. In Norway, there were substantial and increasing gaps in life expectancy by income level from 2005 to 2015.

8. COVID-19 and Cross-National Study on Life Expectancy in 29 Countries

The cross-national study involving data from 23 countries by Aburto et al. (2021) on the impact of COVID-19 on life expectancy reveals that Life expectancy at birth declined from 2019 to 2020 in 27 out of 29 countries. Males in the USA and Lithuania experienced the most considerable losses in life expectancy at birth in 2020 (2.2 and 1.7 years, respectively). Still, reductions of more than an entire year were documented in 11 countries for males and eight among females. Reductions were primarily attributable to increased mortality above 60 years and official COVID-19 deaths. The COVID-19 pandemic triggered significant mortality increases in 2020, a magnitude not witnessed since World War II in Western Europe or the breakup of the Soviet Union in Eastern Europe. Females from 15 countries and males from 10 ended with lower life expectancy at birth in 2020 than in 2015.

Chart 15: Loss/Gains in Life Expectancy at Birth

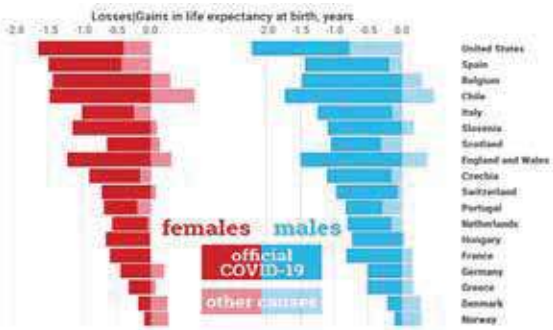


Figure 5 Contributions (in years) to changes in life expectancy at birth from 2019 to 2020 attributable to official COVID-19 deaths and remaining causes of death. Countries are sorted from largest to smallest losses. The sum of both components adds to the total change from 2019 to 2020 in a given country. All data points are provided in a table in Supplementary File 3, available as Supplementary data at *IJE* online.

Source and note: Chart Adapted from Aburto et al. (2021)

Key Messages

- This is the first study to assemble a high-quality data set of harmonized mortality estimates, life tables and age by cause decomposition for 29 countries representing most of Europe, Chile and the USA to provide novel evidence of the cumulative, comparative impacts of the pandemic on population health.
- Out of 29 countries analysed, the COVID-19 pandemic led to losses in life expectancy in 27, with large losses of life expectancy of >1 year in 11 countries for males and 8 among females.
- Losses in life expectancy observed in Central and Eastern European countries in 2020 exceeded those observed around the dissolution of the Eastern Bloc (with the exception of Lithuania and Hungary), whereas similar magnitudes of losses in Western Europe were last seen around World War II.
- Compared against recent trends, females from 15 countries and males from 10 ended up with lower life expectancy at birth in 2020 than in 2015—a year when life expectancy was adversely impacted already due to an especially bad flu season.
- Losses in life expectancy were largely attributable to increased mortality above age 60 years and linked to official COVID-19 deaths.

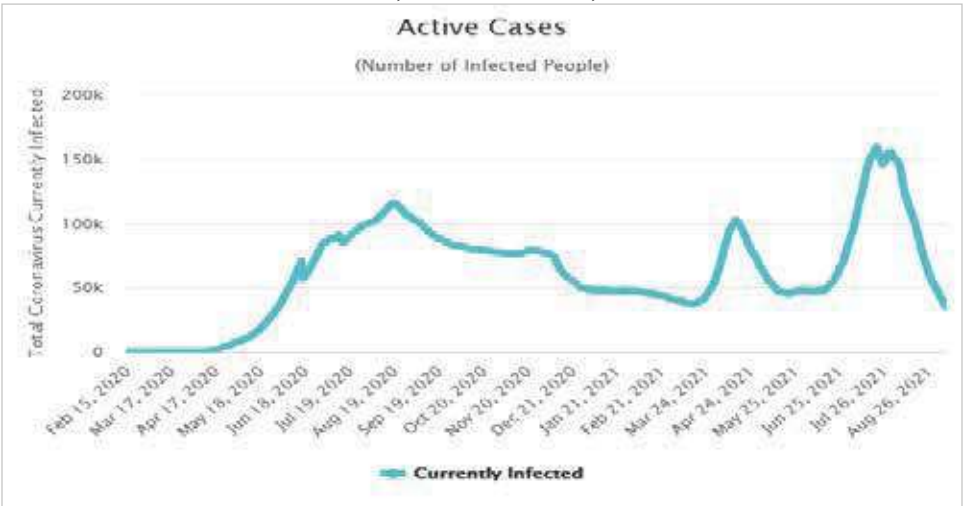
9. COVID-19 in Bangladesh

The transmission of novel coronavirus (Covid-19) broke out in Bangladesh on March 8, 2020, when three active cases were detected. Some indicators of the COVID-19 pandemic for Bangladesh and the World are given in table 4 and charts 16-18. The number of daily active cases kept increasing and reached a peak of 115779 on August 18, 2020, after which it gradually declined to 37155 on March 14, 2021. This period is the 1st wave of the COVID-19 pandemic in Bangladesh. The number of daily active cases then started rising again and reached a high level of 102128 on April 13, 2021, after which it gradually declined to 47088 on June 5, 2021. The number of daily active cases started rising again, reaching the highest level so far to 159224 on July 20, 2021, after which the number of active instances gradually declined to a group of 11752 on October 31, 2021- time of writing this article. From mid-March to the present(October 31), the period is usually considered the 2nd wave of COVID-19. Experts are pretty apprehensive of a possible 3rd wave beginning in late 2021. According to DGHS and Worldometer COVID-19 Dashboard, as of October 31, 2021, the total number of confirmed cases in Bangladesh was 1569539; the total deaths due to COVID-19 has been 27868, and the total cases recovered was 1553423. From the DGHS Covid-19 Dashboard, 17226 tests were conducted on October 31, 2021, out of which 211 were confirmed (positive), giving a daily positivity rate of 1.22%. The positivity rate has hovered below 5% in the last few weeks. COVID-19 was first identified in Wuhan, China, in December 2019. Since then, it has spread to 221 countries and territories, and as many as 247.46 million persons have been infected with the COVID-19, out of which 224.13 million have recovered, and 5.01 million have died (October 31, 2021). There is widespread apprehension that many infections and deaths are grossly under-reported. The actual figures should be 5-10 times higher than those revealed.

Table 4: Selected Indicators of COVID 19 Pandemic

Indicators	Bangladesh		World
	October 31(GMT), 2021	From March 3, 2020, to October 31(GMT), 2021	From Dec 2019 to October 31(GMT), 2021
(1)	(2)	(3)	(4)
Lab test	17,226	10,349,879	698,692,194
Confirmed cases	211	1,569,539	247,463,665
Recovered cases	276	1,553,423	224,135,456
Deaths	6	27,868	5,014,977
Active cases/a	11,752/a	11,752/a	18,313,232/a
Recovery rate(%)	-	98.97	90.57
Case/infection rate(%)	1.22	15.16	34.41
Death rate(%)/b	2.84	1.77	2.02
Vaccination	64,596	13,977,045	6,838,727,352

Chart 16: Graph of Daily Active cases of COVID-19 in Bangladesh: March 8, 2020-October 31, 2021



Source & note: Worldometers. https://www.worldometers.info/coronavirus/country/

bangladesh Active cases: The number of confirmed cases minus the number of recovered cases and deaths. It is the number of patients still considered to be infectious.

Chart 17: Graph of Total Infected Cases of COVID-19 in Bangladesh from March 8, 2020, to October 31, 2021

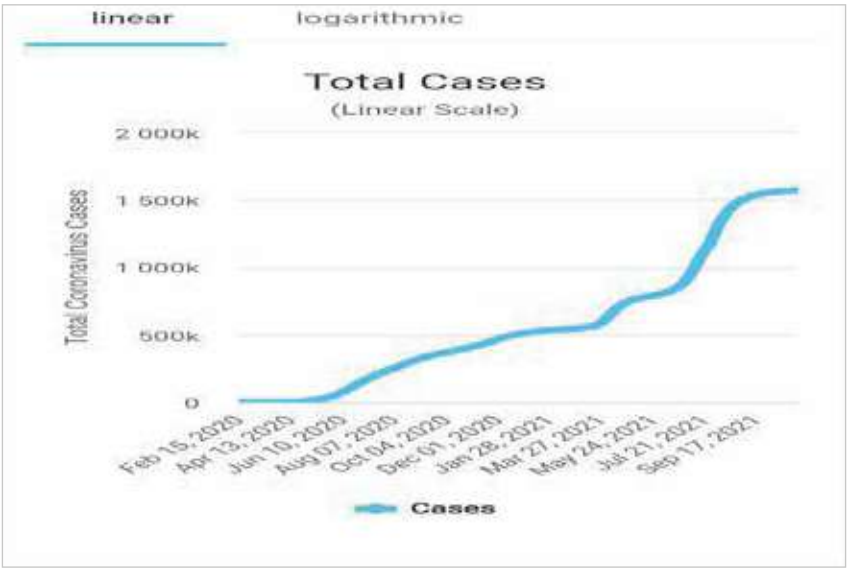
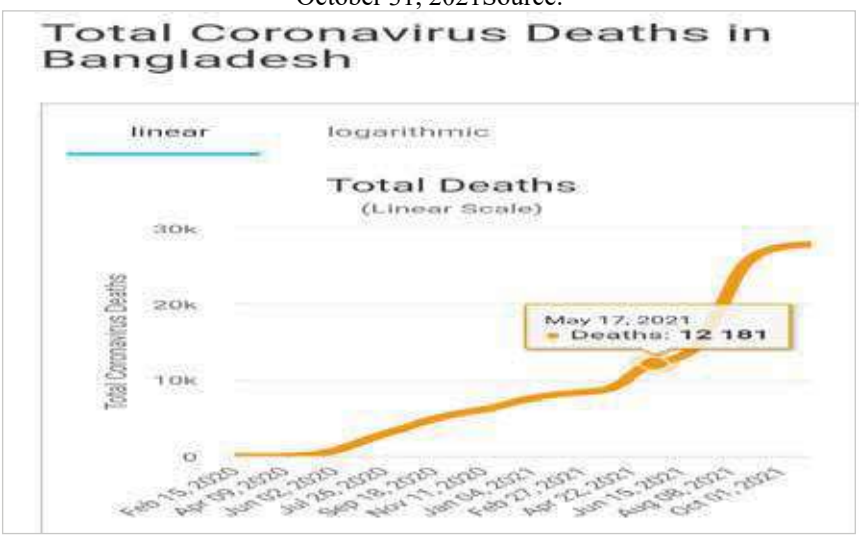


Chart 18: Total COVID-19 Deaths in Bangladesh, March 8, 2020, to October 31, 2021Source:



Worldometers. https://www.worldometers.info/coronavirus/country/bangladesh

10. Discussion and Conclusions

There are substantial socio-economic health inequalities in Bangladesh, like in many other countries. There is no reason to believe that inequality is inherent and eventual. If the government wants to tackle these, targeted policies with clear impacts on reducing health disparities should be identified and pursued. Monitoring health inequalities over time will help determine whether such policies have been successful and provide a first step towards understanding the determinants of these inequalities and the effectiveness of interventions in tackling them.

The increase in life expectancy has become a global phenomenon mainly due to improved medical technology and quality of life. The increase in life expectancy and the survival rate into old age, coupled with decreasing birth rates and lower death rates, impacts the population structure and has led to an increase in the proportion of the total population older than 65 years. In 1950, just 5% of the world's population was over 65; in 2015, the share was 8%, and it is expected to rise to 16% by 2050. The proportion of the total population above 65 is higher in developed countries. In Bangladesh, the population of 65 years and above will be 8.5% in 2021, and it is expected to be 20.4% in 2050, according to WPP 2019. Improvements in healthcare have increased life expectancy. Better healthcare technology is vital for maintaining and improving the health characteristics of the older population and future generations. It will enable the elderly to be economically active beyond 65.

The conclusion can be made that the most critical factors that will determine the impact of increased life expectancy in the 21st century are: The ability of an ageing population to extend the duration of their participation in economic activities over their life expectancy, and Improvements in healthcare technologies, especially for the aged.

These two factors are relevant for building insightful scenarios because the economic participation of the ageing population will decrease the pressure on government spending on health care and pension pay-outs due to the increased life expectancy. In contrast, technology improvements will determine the ageing population's ability and quality to participate in economic activities.

Our analyses of life expectancy show that the pandemic exacted a striking toll on population health in 2020 across most of Europe, the USA and Chile. Only males and females in Denmark and Norway and females in Finland successfully avoided drops in life expectancy in our cross-national comparison of 29 countries. Recent research from the USA, for example, shows that socially disadvantaged populations such as Blacks and Latinos experienced losses three times higher than those reported here at the national level. Emerging evidence further indicates that non-COVID-19 excess mortality was concentrated in working ages. However, a lack of data currently limits direct and more disaggregated comparisons across a broader range of countries. Still, these are urgently needed to understand the full mortality impacts of the pandemic (Aburto et al., 2021).

References

Aburto, Jose Manuel , Jonas Scho ¨ ley , Ilya Kashnitsky, Luyin Zhang, Charles Rahal, Trifon I Missov, Melinda C Mills, Jennifer B Dowd., & Ridhi Kashyap. (2021). Quantifying impacts of the COVID-19 pandemic through life-expectancy losses: a population-level study of 29 countries. *International Journal of Epidemiology*, 2021, 1–12 doi: 10.1093/ije/dyab207.Original article

Andrasfay, Theresa., & Noreen Goldman. (2021).Reductions in 2020 US life expectancy due to COVID-19 and the disproportionate impact on the Black and Latino populations. PNAS 2021 Vol. 118 No. 5 e2014746118 https://doi.org/10.1073/pnas.2014746118.A

Asaria, Miqdad, Sumit Mazumdar, Samik Chowdhury, Papiya Mazumdar, Abhiroop Mukhopadhyay., & Indrani Gupta. (2019). Socio-economic inequality in life expectancy in India. *BMJ Global Health* 2019;4:e001445. doi:10.1136/bmjgh-2019-001445

BBS. (2019). *Statistical Yearbook of Bangladesh 2018*. Bangladesh Bureau of Statistics. Statistics and Informatics Division. Ministry of Planning. Dhaka

BBS.(2019*). Report on Household Income and Expenditure Survey(HIES) 2016*. Also, previous Reports. Bangladesh Bureau of Statistics. Statistics and Informatics Division. Ministry of Planning. Dhaka

BBS.(2020). *Report on Bangladesh Sample Vital Statistics 2020*. Also, previous Reports. Bangladesh Bureau of Statistics. Statistics and Informatics Division. Ministry of Planning. Dhaka.

Chetty, Raj, Michael Stepner, Sarah Abraham, Shelby Lin, Benjamin Scuderi, Nicholas Turner, Augustin Bergeron., & David Cutler. (2014). The Association Between Income and Life Expectancy in the United States, 2001–2014: JAMA. 2016 April 26; 315(16): 1750–1766. doi:10.1001/jama.2016.4226.

Deaton, Angus. (2003). Health, Inequality, and Economic Development. *Journal of Economic Literature* Vol. XLI March 2003) pp. 113–158

Gwatkin, Davison R et al. (2005). Reaching the Poor With Health, Nutrition and Population Services: What works, what Does not and Why. The World Bank. The Washington D. C.

Amouzou, Agbessi, Gwatkin, Davidson R, Johnson, Kiersten Blair, Rutstein, Shea, Suliman, Eldaw Abdalla, Wagstaff, Robert Adam Stephen (2007). Socio-economic Difference In Health, Nutrition and Population Within Developing Countries: Ghana. The World Bank. Washington D. C.

Hossin, M. Z. (2020). What causes the inequality in life-expectancy between men and women? *The Daily Star/Dhaka. August 23, 2020.*

Husain, A. R. (2002). Life expectancy in developing countries: a cross-section analysis. The Bangladesh Development Studies, 28(1/2), 161-178.

Isaacs, Katelin P., & Sharmila Choudhury. (2017). The Growing Gap in Life Expectancy by Income: Recent Evidence and Implications for the Social Security Retirement Age. *Congressional Research Service 7-5700. www.crs.gov. R44846 (May12, 2017)*

Kalediene, R., & Petrauskiene, J. (2000). Regional life expectancy patterns in Lithuania. *The European Journal of Public Health, 10*(2), 101-104.

Matin, K. A. (2014). Income Inequality in Bangladesh. Paper presented at the 19th Biennial Conference of the Bangladesh Economic Association(BEA) held in Dhaka during 25-27 November 2014.

National Institute of Population Research and Training (NIPORT), MEASURE Evaluation, and icddr,b. (2012). *Bangladesh Maternal Mortality and Health Care Survey 2010.* Dhaka, Bangladesh: NIPORT, MEASURE Evaluation, and icddr,b.

National Institute of Population Research and Training (NIPORT), International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b), and MEASURE Evaluation. (2017). *Bangladesh Maternal Mortality and Health Care Survey 2016: Preliminary Report*. Dhaka, Bangladesh, and Chapel Hill, NC, USA: NIPORT, icddr,b, and MEASURE Evaluation.

National Institute of Population Research and Training (NIPORT), and ICF. (2019). *Bangladesh Demographic and Health Survey 2017-18: Key Indicators.* Dhaka, Bangladesh, and Rockville, Maryland, USA: NIPORT, and ICF. Also, previous BDHS Reports.

NAS, US. National Academy of Sciences, US. (2015). *The Growing Gap in Life Expectancy by Income: Implications for Federal Programs and Policy Responses*. National Academies Press. Washington DC.

Kinge JM, Modalsli JH, Øverland S, Gjessing HK, Tollånes MC, Knudsen AK, Skirbekk V, Strand BH, Håberg SE., & Vollset SE.(2019) Association of Household Income With Life Expectancy and Cause-Specific Mortality in Norway, 2005-2015. *JAMA, 13 May 2019;321(19):1916-1925. doi:10.1001/jama.2019.4329.*

Krugman, P.(1992). The Rich, The Right and the Facts: Deconstructing Income Distribution Debate*. The American Prospect. The Fall Issue.*

Kyte, Lunsey., & Ckaudie Wells. (2010). Variations in life expectancy between rural and urban areas of England, 2001-07. *Health Statistics Quarterly. Summer* 2010(46);25-50. doi:10.1057/hsq.2010.10.

MoF. (2021). *Bangladesh Economic Review)* 2021. Finance Division. Ministry of Finance. Dhaka.

Mohanty, S. K. & F. Ram. (2010). Life expectancy at birth among social and economic groups in India. *IIPS Research Brief No.* 13. IIPS. Bombay**.**

OECD.(2014). Income Inequality Update June 2014. OECD Publishing, Paris

OXFAM. (2017). An Economy for the 99%. Oxfam briefing paper. January 2017.London

Planning Commission. (2020). *8th Five Year Plan July 2020-June 2025. Promoting Prosperity and Fostering Inclusiveness.* General Economics Division. Bangladesh Planning Commission Ministry of Planning. Dhaka.

PHE. (2017). Public Health England. Public Health Outcomes Framework: *Health Equity Report. Focus on ethnicity.*

Raleigh, V. (2021).What is happening to Life Expectancy in England. Blog. Last updated April 15, 2021. https://www.kingsfund.org.uk/publications/whats-happening-life-expectancy-england.

Sanzenbacher, Geoffrey T, Anthony Webb, Candace M. Cosgrove, & Natalia S. Orlova (2007).*Rising inequality in life expectancy by socio-economic status*. CRR WP 2017-2. Center for Retirement Research at Boston College. MA

Singh, G K., & M. Siahpush . (2014). Widening rural-urban disparities in life expectancy, U.S., 1969-2009. *American Journal of Preventive Medicine46(2):19-29.*

Stephens, Alexandre S. Leena Gupta, Sarah Thackway., & Richard A Broome . (2017). Socioeconomic, remoteness and sex differences in life expectancy in New South Wales, Australia, 2001–2012: a population-based study. *BMJ Open 2017;7:e013227. doi:10.1136/bmjopen-2016-013227*

WHO. (2011). Nutrition- Nutrition of women in the preconception period, during pregnancy and the breastfeeding period. Report by the Secretariat. EB130/11. Geneva.

Yunus, M. (2014). Redesigning Economics to Redesign the World. Why are we missing a collective destination?. The Financial Express and the Daily Star. Dhaka 18-19 November 2014.

Zhuang, J, R. Kanbur., & C. Rhee. (2014). Rising inequality in Asia and policy implications. Working Paper 2014-14. Charles H. Dyson School of Applied Economics and Management. Cornell University. Ithaca. New York.