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Regional Mortality and Life Expectancy in Nepal: Implications for Public Health and Policy (NPHC 2021)

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Abstract

Regional differences in mortality and life expectancy are very important in evidence-based public health planning in Nepal. This article aims to examine mortality rates, life expectancy, and the causes of deaths between ecological zones and provinces based on the 2021 National Population and Housing Census (NPHC) and records. The method of the study was a descriptive cross-sectional design, aimed at analyzing life expectancy trends (1954-2021), infant, child, and under-five mortality rates, survival to age 60, and COVID-19 and total deaths, disaggregated by sex, ecological region, and province. General demographic instruments, such as trend analysis and life table measurements, were used to measure disparities and temporal variations, while comparative analysis illuminated disparities across regions and sexes. National life expectancy at birth was 71.4 years in 2021 and the life expectancy of females was 5.6 years longer than that of males. The median age at death was 80 years and the under-five death rate was 22.4 per 1000 live births, with higher death rates being recorded in remote and less affluent provinces. COVID-19 accounted for 4.8 percent of all mortality, a higher rate in urban centers. The other provinces, like Lumbini and Karnali, had lower life expectancy and increased child mortality. Such results highlight the improvements in health in Nepal, as well as display gender and regional disparities. The shift in chronic disease fatality and susceptibility to health catastrophes underscores the necessity of equity-based intervention, health care infrastructure, and multisectoral population health, so that a sustainable, equitable population health improvement can be achieved.

Keywords: *Child mortality, Life expectancy, Mortality, Nepal, NPHC 2021, Public health, regional disparities*

Introduction

The population health of Nepal has also improved significantly in recent decades, as it is reflected in the decreasing mortality rates and the increasing life expectancy. The latest census results show that national life expectancy at birth is approximately 71.3 years in 2021 (National Statistics Office [NSO],2021). Such improvements in gains denote improved access to healthcare, decreased child mortality, and the development of socioeconomic status.

The geographic and socioeconomic diversity of Nepal results in unequal infrastructure, poverty, and healthcare access across different provinces and ecological belts. Sub-national mortality using civil registration and vital statistics (CRVS) data in 2017 showed wide variations: male adult mortality per 1000 ranged between 129 and 224, and female adult mortality per 1000 ranged between 89 and 159. The female life expectancy was lowest in the Karnali (69.6 years) and highest in the Koshi Province 1 (77.0 years), whereas male life expectancy was lowest in the Karnali (64.9 years) and highest in the Madhesh (71.8 years). These findings indicate that there are significant provincial disparities in mortality and longevity in Nepal (Erchick et al., 2023).

These inequalities have a close connection to monetary poverty because the provincial rates of poverty headcounts are associated with adult mortality in a positive and life expectancy in a negative way (Sepúlveda & McLaren, 2025). Karnali and Sudurpashchim, the poorest provinces, also have the most deaths and the lowest life expectancy, and this highlights the contribution of structural socioeconomic issues to the disparities in health in Nepal. Historically, the vital statistics system of Nepal was very weak and the mortality estimates were based on infrequent surveys and census that were not geographically detailed. An important step was made by Pandey and Adair (2022), who adjusted CRVS incompleteness to generate provincial estimates, but their analysis was only based on 2017 data and does not reflect more recent trends, such as those related to the post-COVID-19 effects.

The COVID-19 crisis made it clear that timely and regionally detailed mortality data are necessary (Ashish et al., 2020). In 2019 and 2021, the life expectancy in Nepal dropped by almost three years, compared to before the pandemic, to 68.4 years (70.8 years in females and 66.1 years in males) (Chalise, 2021). This fall represents not only the direct COVID-19 deaths but also the indirect consequences, including the breakdown of healthcare and economic instability and unequal service accessibility, which probably contribute to the existing health disparities in the region.

In addition to the COVID-19 pandemic, Nepal is experiencing an epidemiological transition where noncommunicable diseases (NCDs) such as cardiovascular diseases, diabetes, and chronic respiratory illnesses are increasing at an alarming rate as a result of lifestyle change, urbanization, and ageing of the population, and where infectious diseases are still present (Pandey and Adair, 2022). Deaths caused by injuries, especially road traffic accidents (RTAs), are also high: the 2021 National Population and Housing Census shows that the level of RTA mortality was 13.1 per 100,000 population in the country, and was higher in Lumbini (14.4) and lower in Karnali (10.4) based on disparities in transport

infrastructure, road safety and access to emergency medical services (MoHP, 2022; NPHC, 2021). The relationship between epidemiological transition and subnational inequalities provokes important policy questions of the location of adult mortality and life expectancy minimum, and the influence of poverty, geographic isolation, and health-system capacity on the results. It will present recent, census-adjusted provincial and ecological-belt estimates using NPHC 2021 and other sources of data, showing the inequalities hidden by the national rates and demonstrating the future extensions of the previous analysis using CRVS (Pandey and Adair, 2022).

The study guides policymakers by linking demographic outcomes with structural determinants, including occupational patterns, within Nepal's federal governance framework. Despite notable progress in reducing mortality and increasing life expectancy, substantial regional disparities persist. The findings highlight how differences in occupation and regional context contribute to mortality inequalities and provide evidence for designing targeted, province-specific health policies to achieve more equitable health outcomes across Nepal.

Research Method and Procedures

Research Design

The research design adopted was a quantitative and descriptive, cross-sectional research design through secondary data collected from various official demographic data sources of Nepal. This design was chosen due to the opportunity to measure and compare mortality rates, life expectancy, and COVID-19-related deaths in ecological zones and provinces based on the latest and complete national data. The study is purely descriptive as it draws on census-reported mortality as opposed to modelling estimates.

Data Sources

In this paper, the researcher examines mortality and life expectancy in Nepal using four key datasets of the 2021 National Population and Housing Census (NPHC 2021) and the historical publications of the Central Bureau of Statistics (since the National Statistics Office, NSO) of Nepal. Ecological belt, province and sex Census-based estimates of infant, child and under-five mortality are analyzed. Essentials of longevity, such as life expectancy at birth, survival to age 60 and life expectancy at age 60, are also examined to understand subnational differences in ageing. Moreover, COVID-19 fatality data and overall mortality rates in 2021 are added in order to measure the recent mortality shocks on both provincial and ecological levels (NSO, 2021). These datasets can be used together to have a comprehensive foundation of analyzing long-term trends, recent developments, and inequalities in mortality in Nepal on a regional level.

Study Variables

The present article studies the major demographic indicators that express both recent and long-

term mortality trends in Nepal. The main metrics are life expectancy at birth and at the age of 60, infant, child, and under-five mortality rates, proportion of individuals reaching the age of 60, and death rates attributed to COVID-19. All these factors together give a picture of the overall health decline, age-specific survival, and recent deaths due to various reasons. The research looks into the differences that happen according to sex, geographical location defined by Nepal's three ecological regions, and the country's seven provinces. As for the analysis of the long-term demographic transitions, it makes use of old census data from 1954 to 2021 to demonstrate the changes in mortality and life expectancy over the years.

Information Processing and Creation.

All the tables were entered into a structured database that would give the same format, so that the tables would be organized in a similar way, and also all the variables were standardized so that the sources and years would have similar data. Internal consistency checks of data were conducted, and cross-tabulation forms were reconciled to define and unit of measurement. The adjustment of historical datasets was done to ensure that life-expectancy estimates between 1954 and 2021 are comparable. In the NPHC 2021 mortality datasets, the age- and sex-specific mortality values were directly obtained from the published census tables and were cross-validated with the National Statistics Office reports to obtain the accuracy. The number of deaths due to COVID-19 was compared with the total number of deaths as reported by the census to obtain the proportional pandemic death at the provincial and ecological level. The census is a total enumeration; hence, no imputation or statistical modelling processes were used.

Life-Expectancy and Mortality Analysis.

The mortality and life-expectancy analysis were based on the conventional demographic methods. The trend analysis was used to assess long-term longevity changes based on the values of historical life expectancy between 1954 and 2021 and absolute changes between census years and by sex. The modern regional patterns of mortality were investigated in relation to infants, children, and under-five mortality and across the ecological belts, provinces, and sexes in order to discover the geographic and gendered discrepancies. Life-table variables, including life expectancy at birth and life expectancy at age 60, and the proportion of individuals surviving to age 60, were directly derived using the census-based life tables to measure regional differences in the survival of adults and older people. COVID-19 mortality was also evaluated based on the proportion of COVID-19 deaths to the total reported deaths per province, which gives an understanding of the demographic cost of the pandemic.

Comparative Analysis

A comparative study was done on time, sex, ecological zones, and provinces so as to identify systematic differences and inequalities. Such comparisons pointed to the provinces that had a permanently lower life expectancy, high infant mortality, or disproportionately high COVID-19 mortality. The review of the literature highlighted geographic disparities and demographic susceptibility through the relationship between geographic setting and mortality.

Data Analysis Techniques

The research used descriptive statistics, percentage and rate comparison, trend analysis of the historical census years, and cross-regional comparative assessment. All the interpretations were placed into the demographic shift context to put observed mortality trends into perspective against broader population-health processes. All computations were determined solely on direct census estimates and on defined demographic principles and were not done with further statistical modelling.

Ethical Considerations

The research was based on publicly available census and anonymized CBS data. No individual-level identifiers were accessed. Since the secondary data were involved, there was no need to seek ethical approval, and the analysis was guided by the NSO/CBS data-use policies.

Results and Discussion

Life Expectancy in Nepal (1954–2021)

Table 1 shows that the years of life expectancy in Nepal have significantly changed since 1954. The nation used to live on 27.8 years and in 2021 this figure has risen to 71.4, showing that Nepal has made significant advancements in terms of its population health, nutrition, and living standards (Vaidhyanathan and Gaige, 1973; CBS, 19742014; NPHC 2021).

Table 1: *Life Expectancy at Birth For Both Sexes in Various Census Years*

Source	Year / Duration of Estimation	Life Expectancy at Birth		
		Both	Male	Female
Vaidhyanathan & Gaige, 1973	1954	27.8	27.1	28.5
CBS, 1974	1953–61	36.3	35.2	37.4
Gubhaju, 1982	1971	41.1	42.1	40.0
CBS, 1986	1981	49.5	50.9	48.1
CBS, 1993	1991	54.3	55.0	53.5
Dangol, 2003	2001	60.4	60.1	60.7
CBS, 2014	2011	66.6	65.5	67.9
NPHC 2021	2021	71.4	68.7	74.3

Source: Central Bureau of Statistics (CBS), 2014. NSO,2024

Life expectancy at birth of females is always higher than that of males, and the difference stands at 5.6 years in 2021. Increases were particularly observed in the years 19541981 and 20012021, probably because of the increased access to healthcare, vaccination efforts, and infant and child death rates. Altogether, these tendencies are proof of the great progress in longevity and the existence of gender disparities and the necessity of further health policy to maintain the gains.

Infant, Child, and Under-5 Mortality in Nepal (2021)

Table 2, the 2021 census revealed that Nepal's overall infant mortality rate (IMR) was 16.6 per 1,000 live births, child mortality rate (CMR) was 5.9 per 1,000, and under-5 mortality rate (U5MR) was 22.4 per 1,000. It has been found that male mortality exceeds female mortality in all age groups, which is a common demographic pattern.

Table 2 : *Infant, child, and under-5 mortality rates, Nepal, ecological region, province, and district (Direct Estimates), NPHC 2021*

Area	Infant Mortality Rate			Child Mortality Rate			Under-5 Mortality Rate		
	Both sexes	Female	Male	Both sexes	Female	Male	Both sexes	Female	Male
Nepal	16.6	14.7	18.3	5.9	5.6	6.1	22.4	20.2	24.3
Ecological zone									
Mountain	16.9	15.5	18.2	7.8	7.2	8.3	24.6	22.6	26.3
Hill	12.7	11.6	13.7	4.9	4.7	5.0	17.5	16.2	18.6
Tarai	19.2	16.8	21.2	6.3	6.0	6.6	25.4	22.7	27.7
Province									
Koshi	18.0	15.7	20.0	5.9	6.1	5.8	23.8	21.7	25.7
Madhesh	19.5	17.0	21.5	6.4	6.0	6.6	25.8	22.9	28
Bagmati	11.3	10.4	12.0	4.5	4.6	4.4	15.7	15.0	16.3
Gandaki	11.3	10.7	11.9	4.3	3.3	5.1	15.6	14.0	16.9
Lumbini	19.5	17.3	21.6	6.7	6.5	6.9	26.1	23.7	28.4
Karnali	13.9	12.2	15.3	6.1	5.6	6.6	19.9	17.7	21.8
Sudurpashchim	16.7	14.8	18.4	6.4	5.4	7.3	23	20.1	25.6

Source: National Population and Housing Census (NPHC) 2021, Nepal.

There are regional disparities: the Mountain and Tarai regions have under-5 mortality rates of 24.6 and 25.4 per 1,000, respectively, higher than the Hill region's rate of 17.5 per 1,000. Provincial differences in under-5 mortality rates are also very marked. Bagmati and Gandaki provinces have the lowest under-5 mortality rates of 15.7 and 15.6 per 1,000, respectively, while Lumbini and Madhesh provinces have the highest rates of 26.1 and 25.8 per 1,000, respectively. These trends imply that children living in areas that are disadvantaged either geographically or socioeconomically are at a higher risk, which calls for the need for interventions targeted to such areas, not only to reduce mortality but also to promote equity in child health.

Analysis and Interpretation of Life Expectancy and Survival in Nepal (2021)

Table 3, the national life expectancy in Nepal at birth next year is rising to 71.4 years, the longest living among females at 74.3 years, and the shortest among males at 68.7 years. Around 80% of the population lives to be 60, and survival is a little higher for females (84.7%) than for males (75.1%). Life

expectancy at 60 years is 19.4 years on average, with the females having a little more (20.7 years) and the males a little less (18.2 years). The pattern of regions indicates the Mountain and Hill zones with higher life expectancy at birth (72.4 and 72.3 years) than the Tarai (70.6 years).

Table 3 : *Life expectancy at birth, percentage surviving to age 60, and life expectancy at age 60 by sex — Nepal, ecological region, province, and district (NPHC 2021)*

Area	Life expectancy at birth (e_0)			Percentage surviving to age 60			Life expectancy at age 60		
	Both Sexes	Female	Male	Both Sexes	Female	Male	Both Sexes	Female	Male
Nepal	71.4	74.3	68.7	80.0	84.7	75.1	19.4	20.7	18.2
Ecological zone									
Mountain	72.4	75.3	69.8	80.6	84.2	76.9	20.7	22.3	19.2
Hill	72.3	75.5	69.3	81.2	86.3	75.9	19.7	21.2	18.3
Tarai	70.6	73.3	68.2	78.9	83.5	74.4	19.0	20.1	18.0
Province									
Koshi	70.7	73.5	68.1	78.5	83.2	73.9	19.3	20.5	18.2
Madhesh	71.9	73.7	70.2	81.1	83.9	78.3	19.6	20.3	19.0
Bagmati	72.8	75.5	70.2	82.6	87.0	78.3	19.3	20.7	18.0
Gandaki	72.3	75.9	68.6	80.5	87.0	73.4	20.0	21.4	18.6
Lumbini	69.7	72.9	66.6	76.8	82.7	70.6	18.8	20.0	17.7
Karnali	72.4	75.6	69.5	81.7	86.0	77.2	19.8	21.5	18.3
Sudurpashchim	71.3	75.4	67.3	79.1	85.3	72.4	19.8	21.9	17.8

Source: National Statistic Office, 2024

Table 3 shows that the death rate among those over 60 is highest in the Hill zone (81.2%) and lowest in the Tarai (78.9%). Among Provinces, Bagmati and Karnali have the highest life expectancy at birth (72.8 and 72.4 years, respectively with Lumbini having the lowest (69.7 years). The highest survival to age 60 is in Karnali (81.7%) and the lowest in Lumbini (76.8%), reflecting the unbalanced distribution of life expectancies over the years among these regions. The results from this study show that even though longevity is general in Nepal, females still live longer than males, and the differences between geographic areas still exist, with the Tarai and some provinces like Lumbini suffering from lower survival rates and life expectancy. This underlines the need for health and social programs focused on specific regions to eliminate inequalities and promote healthy ageing.

Analysis and Interpretation of COVID-19 Mortality in Nepal (2021)

Table 4 shows that the COVID-19 death toll for the year 2021 was 9,463, which represented 4.77% of the total deaths (198,463) for the same year (National Statistics Office, 2024). The geographical distribution of COVID-19 deaths was very different for the provinces.

Table 4: *Deaths due to COVID-19 and overall deaths by ecological zone, province, and district*

Area	COVID-19 Deaths (NPHC 2021)		Total Deaths (NPHC 2021)	
	N	%	N	%
Nepal	**9,463**	**100.0**	**198,463**	**4.77**
Province				
Koshi	1,276	13.50	38,275	3.33
Madhesh	737	7.79	34,319	2.15
Bagmati	4,039	42.68	43,872	9.21
Gandaki	992	10.48	20,406	4.86
Lumbini	1,568	16.60	36,207	4.33
Karnali	410	4.33	8,396	4.88
Sudurpashchim	441	4.66	16,988	2.6

Source: National Statistic Office, 2024

The province of Bagmati recorded the highest number of COVID-19 deaths (4,039 deaths or 42.7% of all COVID deaths) and the highest percentage of total deaths (9.21%), showing that it was the most affected area. the provinces of Lumbini and Koshi also had significant shares, with 16.6% and 13.5% of the total COVID deaths reported in those regions. On the other hand, the provinces of Karnali and Sudurpashchim had the lowest pandemic death toll in both absolute terms (410 and 441 deaths) and as a percentage of total deaths (4.33% and 4.66%). The distribution of deaths across Nepal's regions indicates the heterogeneous impact of the epidemic on different demographic groups, which can be attributed to factors such as population density, healthcare quality, and testing/reporting capacities. The more urbanized and densely populated areas of Bagmati suffered very high mortality rates from COVID-19, while the remote provinces were less affected. This indicates a need for differing approaches in public health as well as resource allocation across regions in order to limit pandemic-related deaths.

Analysis and Interpretation of Child Mortality Trends in Nepal

The comparison of the 2022 Nepal Demographic and Health Survey (NDHS) with the 2021 National Population and Housing Census (NPHC) presented in Table 5 indicates a steady decline in child mortality throughout the period.

Table 5 : *IMR, CMR, and U5MR per 1000 live births — NDHS 2022 and NPHC 2021 (CEBCS Far East model)*

	NDHS 2022 IMR			NPHC 2021		
Province		**CMR**	**U5MR**	**IMR**	**CMR**	**U5MR**
Koshi	28	6	34	18	3	21
Madhesh	38	5	43	17	3	20
Bagmati	21	3	24	15	3	17

Gandaki	19	5	23	16	3	19
Lumbini	34	8	41	21	4	25
Karnali	36	10	46	29	7	36
Sudurpashchim	40	9	49	20	4	24

Note: All values rounded to whole numbers.

Table 5 shows that there are significant provincial and data-source disparities in child mortality in Nepal. The highest U5MR is detected in Sudurpashchim (49 per 1,000) and in Karnali (46), next are Madhesh (43) and Lumbini (41), Bagmati (24) and Gandaki (23) have the lowest rates. By contrast, on NPHC 2021, the proportion is much lower in all provinces, such as Karnali (36) and Sudurpashchim (24), indicating that census-based mortality estimates are underestimated. Although these differences are magnitude-wise, similarities can also be found in the fact that both sources and Karnali and Sudurpashchim are mentioned as high-mortality provinces and highlight the continued regional disparities in child survival and the necessity of health-specific health activities.

Causes of Death in Nepal (2021)

Table 6, the data from the census conducted in 2021, points out that the main reason for death in Nepal is non-communicable diseases (NCDs), which represented 49.8% of the total death cases, the next being communicable diseases, which represented 12.6%. There is also a percentage of mortality from accidental deaths, which include road accidents (1.9%) and other accidents (4%), while at the same time suicide (2.7%), deaths due to crimes (0.6%), deaths due to pregnancy (0.3%), and natural disasters (4.8%) each make up a small percentage. Besides this, it is noteworthy that a large number of deaths were reported under "other" causes (22.7%), which might indicate either multiple causes of death or incomplete reporting.

Table 6 : *Distribution of number of deaths by cause (row percent), NPHC 2021*

Area	Communicable	Non-communicable	Road accident	Other accident	Pregnancy	Crime	Suicide	Natural disaster	Other	Not stated
Nepal	12.6	49.8	1.9	4.0	0.3	0.6	2.7	4.8	22.7	0.7
Province										
Koshi	11.2	56.6	1.9	3.3	0.3	0.5	3.1	3.2	19.7	0.4
Madhesh	11.3	40.6	2.4	4.5	0.4	0.7	1.9	10.0	27.4	1.0
Bagmati	14.4	52.9	1.6	3.1	0.2	0.3	2.5	3.1	20.9	0.9
Gandaki	11.3	53.7	1.5	3.4	0.2	0.4	2.7	3.9	22.2	0.6
Lumbini	13.5	46.9	2.1	4.2	0.4	0.6	2.6	4.9	24.1	0.6
Karnali	14.1	46.7	2.1	6.6	0.7	0.9	3.7	4.5	20.0	0.7
Sudurpashchim	13.1	47.4	1.9	5.4	0.4	1.0	3.2	3.8	23.2	0.5

Source: National Population and Housing Census (NPHC) 2021, Nepal.

Table 6 shows that Different provinces exhibit different patterns, with Koshi and Bagmati having the highest shares of NCD-related deaths (56.6% and 52.9%, respectively). Madhesh has the least among others (40.6 %), but has a larger proportion of deaths due to communicable diseases (11.3%) and natural disasters (10%). Karnali has reported higher proportions of accident-related deaths with other accidents (6.6%) and suicides (3.7%), making it a region with specific risk factors. The above results may show a rising trend of NCDs as the main public health issue in Nepal, but at the same time, they are pointing out provincial differences in the discussed diseases, accidents, and environmental or social risks. They imply the necessity of health interventions that are focused on both chronic and acute mortality causes, in addition to good death reporting and monitoring systems, which would facilitate policy and resource allocation decisions.

Discussion

The life expectancy in Nepal has significantly increased at a wonderful rate since it was only 27.8 years in 1954, and currently, it stands at 71.4 years, which is a significant change in health and demographics. This jump is a global trend observed in developing and developed countries. The major drivers are: enhanced accessibility to health services, increased immunization, and decreased infectious diseases. The life expectancy increased by approximately 5 years in the period between 2011 and 2021, to a high of 71.3 years (NSO, 2024). The reduction of early deaths has been majorly facilitated by the public health activities, particularly the vaccination campaigns, and the development of maternal and child care (NDHS, 2023). However, there is still a gender gap: in 2021, women were, on average, 5.6 years older than men (74.3 vs. 68.7 years old), which evidences the existing biological and social inequality (National Statistics Office, [NSO], 2024).

The Nepalese longevity gap between women and men, as it is common across the world, with women living a 4-6 year longer life than men, is further increased by the hazardous work in the countryside and construction sites, increased tobacco use, and alcohol consumption (WHO, 2024). The increased lifespan of women has the advantage of reduced exposure to external risks, with limitations by the reproductive health burden and gender-based nutritional inequality (McKinney et al., 2024). These differences can be seen in the survival patterns: 84.7% of women make it to age 60, and 75.1% of men. The same pattern is evident when both are at age 60; women live an extra 20.7 years, and men live 18.2 years (NSO, 2024).

A regional analysis indicates that a 10 percent shift in gender equality would gain an average life expectancy of 3.5 and 4.3 months in both males and females. The pattern is different in childhood, whereby girls are more likely to survive the neonatal period, but from 1 to 4, more girls die due to son-preference practices such as the early-weaning of the girls with older brothers (Bhusal & Khanal, 2025). In the meantime, the decrease in the mortality of boys accelerated more accelerated since 2006, increasing the disparity between boys and girls in later infancy (Ministry of Health and Population [Nepal], New ERA & ICF, 2023). Such results of the 2021 NPHC highlight the importance of gender-

responsive policies that address discriminatory feeding behaviors and empower women to have more control over their healthcare, and such actions have the potential to reduce adult gender disparities and enhance infant survival (NGO Federation of Nepal, 2025).

The unequal health outcomes are also seen through regional and provincial differences: the maximum life expectancy is the highest in the Hill zone (72.3- 72.4 years), and the lowest in the Tarai (70.6 years), with the highest survival to age 60 (81.2% in the Hill zone) (National Statistics Office, 2024). Bagmati and Karnali have a leading position in the province (72.8 and 72.4 years), whereas Lumbini is underrepresented (69.7 years), which is caused by geographic remoteness, socio-economic disparities, and lack of infrastructure. Rural-urban inequalities are still significant, with the rural child mortality being 20-30 percent greater than in the urban regions (NGO Federation of Nepal, 2025). Far-flung areas like Karnali and Sudurpashchim are compounded by the inability to access the road and lack of health facilities, leading to a low survival rate (Bhusal & Khanal, 2025). Evidence of the health system has indicated that 0.5-1 year of life expectancy would be achieved with higher per-capita health expenditure; however, rural Mountain and Tarai areas are allotted 60-70 percent of the allocation than central provinces (Mohapatra,2022). Such trends indicate a geography of risk, in which the Tarai settlement is more exposed to floods and environmental risks, whereas the Mountain isolation postpones saving measures (NGO Federation of Nepal, 2025). These gaps need to be narrowed by targeted resource devolution, such as telemedicine and mobile clinics (Khadka & Paudel, 2025).

The 2021 NPHC -IMR 16.6, CMR 5.9, and U5MR 22.4 per 1,000 present child mortality indicators, which indicate accelerated progress towards SDG 3.2 and are better than those seen in low- and middle-income nations on average (National Statistics Office, 2024). The level of male mortality is still higher due to biological vulnerability, as the gender gap has narrowed recently, which suggests better equity in vaccination coverage (Sharma & Shakya, 2025).

When compared to the 2022 NDHS, all the key child mortality indicators (IMR) decreased in 2021: to 18.9 (instead of 28), to 3.5 (instead of 5), and to 22.3 (instead of 33) per 1,000. These decreases are tightly associated with the expanded programme on immunization that reached 85 90% national level by 2021 (Ministry of Health and Population [Nepal], New ERA, and ICF, 2023). The overall decrease of U5MR (72 percent) between 1996 and 2014 also aligns with provincial data demonstrating that the reduction in U5MR (an estimated 15 to 20 percent) occurred as a result of the rise in case management of sick children.

Although these gains have occurred, Neonatal mortality has been at a standstill at around 21 per 1000 since 2016. Such stagnation is contributed to a large part by the causes that are preventable, including those related to complications of preterm births and intrapartum asphyxia, which combined constitute 6070% of deaths among neonates (NGO Federation of Nepal, 2025). There are still significant disparities in geography: The U5MR in Karnali (36 in NPHC; 46 in NDHS) remains infinitely higher than the one in Bagmati (15.7), and the U5MR in the Mountain and Tarai ecological regions (24.6-25.4)

is also higher than that in the Hill region (17.5) (National Statistics Office, 2024; Ministry of Health and Population [Nepal], New ERA, and ICF, 2023).

Poverty and low maternal education are the strong determinants of child mortality gradients in Nepal, with rural Tarai districts registering U5MR rates over 50 per 1,000 (NGO Federation of Nepal, 2025). The modeling study of NDHS in 2025 highlights short birth intervals (<24 months; IRR = 1.21), high birth order (≥4; IRR = 3.57), and maternal smoking (IRR = 1.21) are the key predictors, which are concentrated in the disadvantaged provinces, where the prevalence of under-5 loss is estimated 8.6% by mothers (Bhusal & Khanal, 2025). The disparities in equity are increasing, with the poorest quintile of neonatal death rates increasing by 27.3 to 27.8 per 1,000 between 2016 and 2022, particularly in the most uneducated Maithili-speaking mothers in Madhesh (NGO Federation of Nepal, 2025). The NPHC-NDHS convergence evidence suggests the effectiveness of the community-based neonatal care variables in Karnali and nutritional fortification in the Tarai, which could lower the mortality by 20-30 percent (Bhusal & Khanal, 2025).

The structural inequities were also revealed by COVID-19. In 2021, Nepal had 9,463 deaths (4.77% of all deaths), and the highest in Bagmati because of population density and reporting completeness (Shrestha et al., 2023). Even though Karnali and Sudurpashchim had fewer deaths, the case-fatality rates were the highest in the hilly districts of Koshi and Gandaki (Aryal et al., 2025). More than fifty percent of the COVID-19 deaths fell in the category of adults 60 years and above, which is in line with the estimated 70 percent of deaths due to comorbid conditions. The 2021 surges exposed the lack of capacity due to the overwhelming of hospitals in Bagmati (Adhikari et al., 2023). The analysis conducted after the pandemic demonstrated that the excess mortality decreased by 15 percent with the increase of provincial fiscal freedom, which highlights the importance of integrated surveillance (Acharya et al., 2025).

Nepal's mortality profile indicates that it is in an active epidemiological transition: NCDs are the leading cause of death at 49.8%, followed by communicable diseases (12.6%) and accidents (5.9%). NCDs are expected to account for 79% of deaths by 2040 (National Statistics Office, 2024). Dominant NCDs include cardiovascular diseases, consistent with provincial hypertension screening rates of 38.5% among adults 40 and older (Khadka & Paudel, 2025). Provinces have different trends: Koshi and Bagmati have high NCD burdens (52.956.6%), whereas Madhesh experiences more deaths from communicable diseases and disasters due to poor sanitation and flooding (National Statistics Office, 2024). High accidental mortality (6.6%) and suicidal rates of 3.7% in Karnali are signs of migration stress and isolation due to geographic isolation (NGO Federation of Nepal, 2025). Obesity (10.9%) and dyslipidemia (52.2%) are the top risk factors, accounting for 66% of deaths from NCDs (Khadka and Paudel, 2025). Persistent gaps in death registration, as reflected in a 22.7% other cause category, mirror WHO benchmark results (World Health Organization, 2024).

These results paint a picture of significant gains in the country as life expectancy tripled and child mortality plummeted, as well as existing disparities caused by gender, geography, and the growing burden of NCDs (NSO, 2024). The COVID-19 vulnerability revealed itself, yet also instigated the adaptive federal reforms (Shrestha et al., 2023). The priority actions comprise equity-based budgeting, redistributing 20 percent of health resources to underserved districts of Tarai and Mountains, gender-responsive NCD screening with the inclusion of nutrition programs, and enhanced death-registration systems (Khadka and Paudel, 2025; Adhikari et al., 2023). To continue the movement towards the SDGs, it will be necessary to implement multisectoral approaches that can cut across rural-urban gaps, empower women, and counteract the rising trend towards the NCD epidemic (NGO Federation of Nepal, 2025).

Conclusion

This research paper shows that there has been a significant improvement in population health in Nepal, where life expectancy and the reduction in child mortality have significantly improved in the last several decades. Continued gender inequalities and geographical inequalities, however, indicate disparate access to health services and other social resources. The prevalence of non-communicable diseases and the effects of the recent health crisis, including COVID-19, suggest a changing health burden and necessitate strong, context-dependent public health action. To resolve these disparities, specific policies, investment in health care infrastructure, and regionally specific programs should be designed to enhance the maternal, child, and chronic disease outcomes. Future studies ought to be directed towards tracking new health-related trends, the effectiveness of interventions, and modeling the effects of demographic transition as the drivers of evidence-based planning of health policy.

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