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Early Estimate of Life Expectancy Reduction in China Following the End of the Zero-COVID Policy

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Introduction

After three years of strict control to contain the spread of COVID-19, China relaxed and ultimately ended the zero-COVID policy on December 7th 2022. The abrupt policy shift is believed to have left both the public and healthcare facilities unprepared, exacerbating the surge in cases and straining medical resources. Despite high overall vaccination rates before the policy change, vaccine completion among older adults remained relatively low[1]. While anecdotal reports and indirect estimates indicate increased mortality[2,3], no direct, nationally representative data have been available. This study utilizes the recently released 2024 National Sample Survey on Population Changes to provide the first representative estimate of mortality, offering a reassessment of life loss and the decline in life expectancy following the policy change.

Method

The National Sample Survey on Population Changes, sampling one-thousandth of the national population, was conducted in the years between the national censuses. The survey respondents were asked to report any household death in the past year (November 1, 2022–October 31, 2023). This period precisely captures the full year following the end of the zero-COVID policy. The National Bureau of Statistics aggregated and weighted population and death counts at the national level and published them in the 2024 China Population and Employment Statistical Yearbook. Age-specific mortality data from the 2023 and 2024 surveys were used to construct period life tables. Arriaga's decomposition was applied to assess age-group contributions to changes in life expectancy. Monte Carlo simulations and the delta method were used to estimate confidence intervals for life table estimates and Arriaga's decomposition results, respectively[4].

Results

Table 1 presents the inputs of life table, and life expectancy estimates by age from two periods before and after the cease of zero-covid policy, as well as the Arriaga's decomposition results. The estimated life expectancy at birth has declined by 1.26 years (95% CI: [0.95, 1.57]) from November 1, 2021, to October 31, 2022 to November 1, 2022, to October 31, 2023. Figure 1 virtualizes the Arriaga's decomposition results. The results indicate that the decline in life expectancy at birth is mainly driven by the increase in mortality after age 75, which accounts for 83% of the total reduction.

Discussion

Using data from a nationally representative survey, this study provides the first direct estimate of the change in life expectancy before and after the lifting of China's zero-COVID policy. This study finds that, from the year following the policy change to the year before, life expectancy declined by 1.26 years, with 83% of this decline attributable to increased mortality among

individuals aged 75 and older. The estimated life expectancy reduction is lower than the 1.87-year decline in the US but higher than the 0.58-year average reduction across 21 other developed economies during the initial impact of COVID-19 from 2019 to 2020[5]. Our estimates of life expectancy and its change are conservative, as previous studies suggest that household death reports from surveys consistently underestimate mortality levels[6]. Nevertheless, our estimates provide a valuable reference for the health emergency following the lifting of the zero-COVID policy. Future research should reassess these estimates once data from the civil registration and vital statistics system or the national disease reporting system become available.

Reference

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Table 1. Life Table Inputs, Estimates, and Age Decomposition of Differences in Life Expectancies at Birth

	2021.11.1-2022.10.31					2022.11.1-2023.10.31					Arriaga decomposition		
Age group	nNx	nDx	nmx (per 100,000)	ex	CI	nNx	nDx	nmx (per 100,000)	ex	CI	nΔx	CI	% contribution
0	9223	12	130.1	83.4	(83.2, 83.6)	7324	11	150.2	82.1	(81.9, 82.4)	-0.02	(-0.1, 0.1)	1%
1	57100	17	29.8	82.5	(82.3, 82.7)	50282	9	17.9	81.2	(81.1, 81.5)	0.04	(0.0, 0.1)	-3%
5	92206	10	10.8	78.6	(78.4, 78.8)	91615	6	6.5	77.3	(77.1, 77.5)	0.02	(0.0, 0.0)	-1%
10	89377	10	11.2	73.6	(73.4, 73.8)	94117	14	14.9	72.3	(72.1, 72.5)	-0.01	(0.0, 0.0)	1%
15	81238	27	33.2	68.7	(68.5, 68.9)	85341	22	25.8	67.4	(67.2, 67.6)	0.02	(0.0, 0.1)	-2%
20	71705	13	18.1	63.8	(63.6, 64.0)	74854	18	24.0	62.5	(62.3, 62.7)	-0.02	(-0.1, 0.0)	1%
25	86884	24	27.6	58.8	(58.6, 59.0)	84991	29	34.1	57.5	(57.4, 57.7)	-0.02	(-0.1, 0.0)	1%
30	121383	44	36.2	53.9	(53.7, 54.1)	115397	58	50.3	52.6	(52.4, 52.8)	-0.03	(-0.1, 0.0)	3%
35	106741	47	44.0	49.0	(48.8, 49.2)	116583	91	78.1	47.8	(47.6, 48.0)	-0.08	(-0.1, 0.0)	6%
40	96418	83	86.1	44.1	(43.9, 44.3)	101232	114	112.6	42.9	(42.7, 43.1)	-0.05	(-0.1, 0.0)	4%
45	107552	192	178.5	39.3	(39.1, 39.5)	103593	172	166.0	38.2	(38.0, 38.3)	0.02	(0.0, 0.1)	-2%
50	126201	351	278.1	34.6	(34.4, 34.8)	129480	428	330.6	33.5	(33.3, 33.6)	-0.08	(-0.1, 0.0)	6%
55	118945	474	398.5	30.1	(29.9, 30.3)	120350	500	415.5	29.0	(28.8, 29.1)	-0.02	(-0.1, 0.0)	2%
60	69374	483	696.2	25.6	(25.4, 25.8)	80608	526	652.5	24.5	(24.4, 24.7)	0.05	(0.0, 0.1)	-4%
65	79430	945	1189.7	21.4	(21.3, 21.6)	81774	943	1153.2	20.3	(20.1, 20.4)	0.03	(-0.1, 0.1)	-2%
70	55971	1042	1861.7	17.6	(17.4, 17.8)	63240	1244	1967.1	16.3	(16.2, 16.5)	-0.06	(-0.2, 0.0)	5%
75	34808	1048	3010.8	14.1	(13.9, 14.3)	38837	1346	3465.8	12.7	(12.6, 12.9)	-0.19	(-0.3, -0.1)	15%
80	21879	1128	5155.6	11.0	(10.8, 11.1)	23551	1463	6212.1	9.7	(9.5, 9.8)	-0.27	(-0.4, -0.2)	21%
85	12024	1027	8541.3	8.5	(8.3, 8.6)	13321	1292	9699.0	7.3	(7.2, 7.5)	-0.16	(-0.3, -0.1)	13%
90	4905	731	14903.2	6.7	(6.7, 6.7)	5627	1036	18411.2	5.4	(5.4, 5.4)	-0.43	(-0.6, -0.2)	34%

Note: The average number of years lived in the age interval (nax) is set as half of the age interval, assuming deaths occur midway through the interval.