Decomposing and Measuring The Change in Life Expectancies of Ethiopia and Its Regional States Age - Wise: 1990 - 2019

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Extended Abstract

Introduction

This study looks at how life expectancies have changed according to age groups in Ethiopia between 1990 and 2019. Abridged life tables for Ethiopia and its regions were estimated using Brass' logit approach enabling a detailed analysis of mortality levels and trends. The analysis explores the decomposition of life expectancy changes using Arriaga method, identifying age groups that have experienced the most significant improvements or declines. The findings reveal that Ethiopia's life expectancy rose by 16.977 years between 1990 and 2019. The primary positive contributors to this increase were infants and children under five years old, both in terms of age groups and effect types. Addis Ababa showed a negative other effect contribution in the old ages, but no significant regional differences in contribution were found. The small direct effect contribution of the 0 - 4 age group suggests that indirect and interaction effects were more important in the overall increases in life expectancy, requiring further intervention to increase the direct effect contribution.

Objectives

This study decomposed Ethiopia's and its regional states' life expectancies by age between 1990 and 2019. The specific objectives were to measure the relative contributions of age groups to the overall gains in Life Expectancy at Birth (LEB), compare trends and patterns of changes in life expectancies across the regions, and evaluate the relative contributions of each age group and effect type to the variations in the overall life expectancies at birth over the given period of time.

Data, Methods, and Results

To enhance mortality analysis, a system of model life tables for Ethiopia was first generated using Brass' logit approach. The primary input data used to build the model were infant mortality (IMRs) and under five mortality rates (U5MRs) collected from the Global Burden of Disease

Study (GBD) 2019. Standard survival functions (l_x^s) were obtained by averaging survival functions (l_x) that were taken from UN - generated Ethiopian abridged life tables in order to have a home base data for the model development. Following the estimation of abridged life tables by the model, life expectancy decompositions into age and effect specific components were ultimately carried out using Arriaga method, which makes use of the life table functions. Subsequently, results were obtained in an appropriate manner.

Selected Results

Table 1: LEB decomposition of Ethiopia for both sexes: 1990 – 2019

Decomposition of changes in LEB for both sexes combined in Ethiopia during the period 1990 to 2019

Age	1990	2019	Direct	Other	Total	Total
x	ex	ex	effect (years)	effect (years)	effect (years)	*effect (%)*
0	49.3	66.2	0.044	4.5	4.6	26.9
1	54.1	67.5	0.134	2.9	3.1	18.0
5	54.8	65.4	0.051	1.1	1.2	7.1
10	51.8	61.3	0.027	0.6	0.6	3.5
15	47.8	56.7	0.030	0.6	0.6	3.7
20	43.9	52.2	0.039	0.7	0.7	4.3
25	40.2	47.8	0.042	0.7	0.7	4.1
30	36.6	43.5	0.043	0.6	0.7	3.9
35	32.9	39.1	0.046	0.6	0.6	3.7
40	29.3	34.8	0.052	0.6	0.6	3.7
45	25.7	30.6	0.056	0.5	0.6	3.5
50	22.1	26.4	0.067	0.6	0.6	3.6
55	18.8	22.3	0.076	0.5	0.6	3.5
60	15.6	18.4	0.091	0.5	0.6	3.4
65	12.7	14.8	0.100	0.4	0.5	3.0
70	10.1	11.6	0.095	0.3	0.4	2.3
75	8.0	8.8	0.069	0.1	0.2	1.3
80	6.2	6.5	0.032	0.0	0.1	0.4
85	4.9	4.8	0.003	0.0	0.0	0.0
90	3.8	3.6	-0.005	0.0	0.0	-0.1
95	3.1	2.7	-0.003	0.0	0.0	0.0
100	2.5	2.1	-0.001		0.0	0.0
Total Difference in LEB (in years) between 1990 and 2019					16.977	100.00

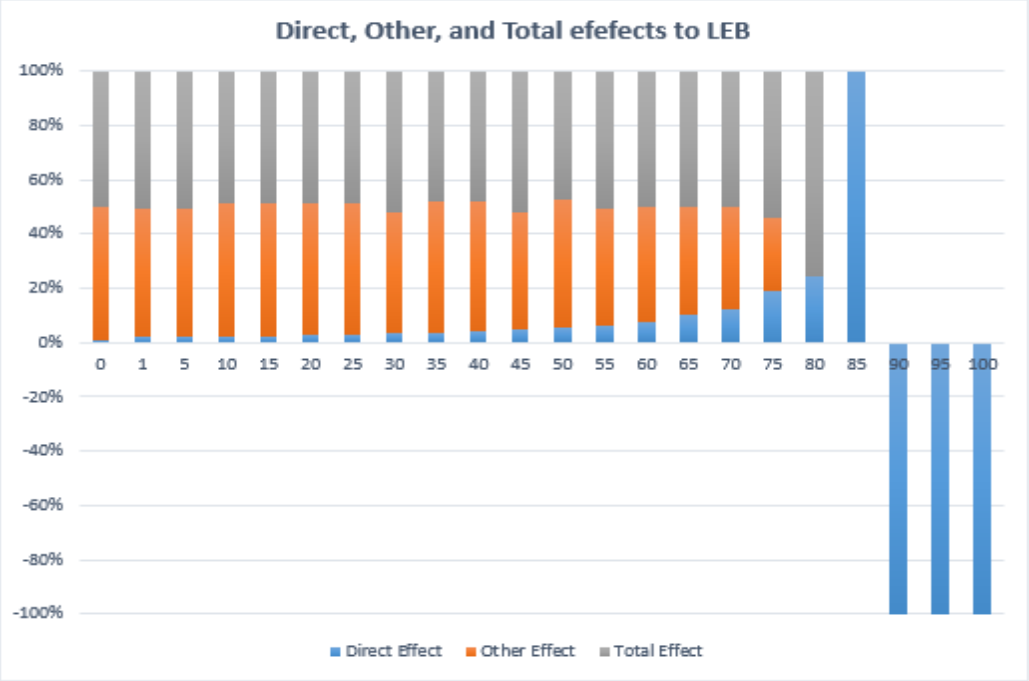


Figure 1: Effect decomposition of LEB for Ethiopia: 1990 – 2019

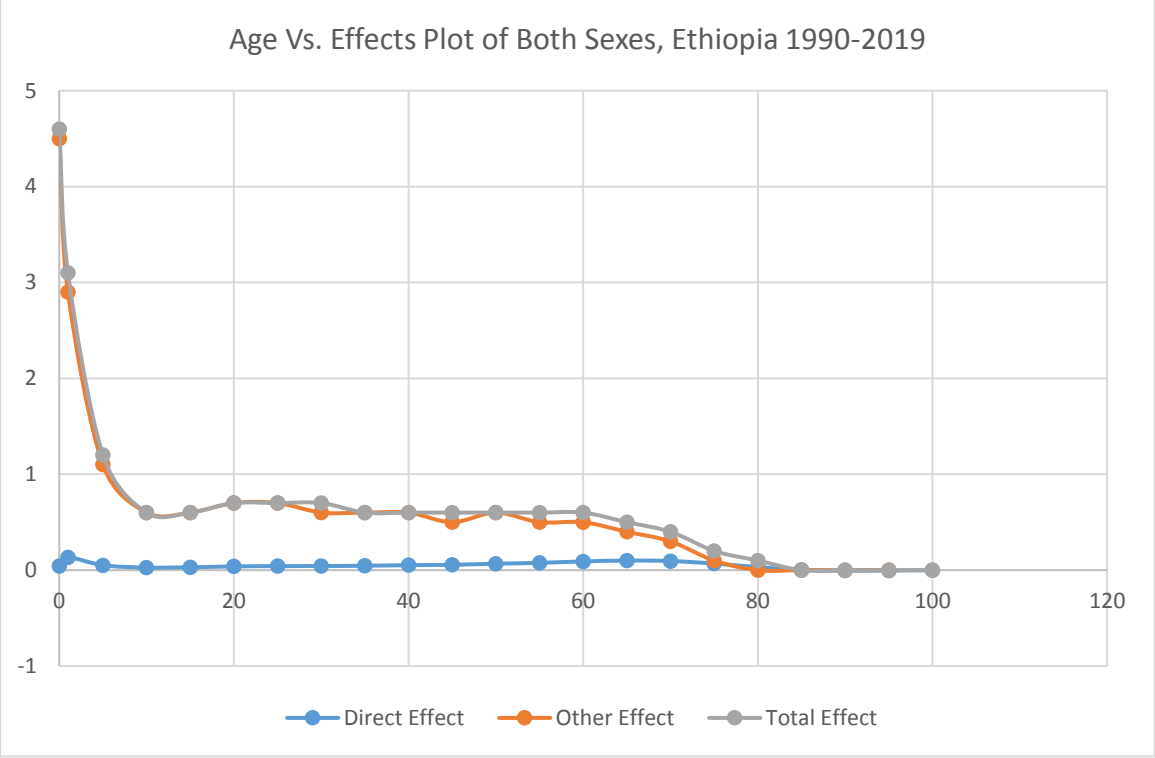
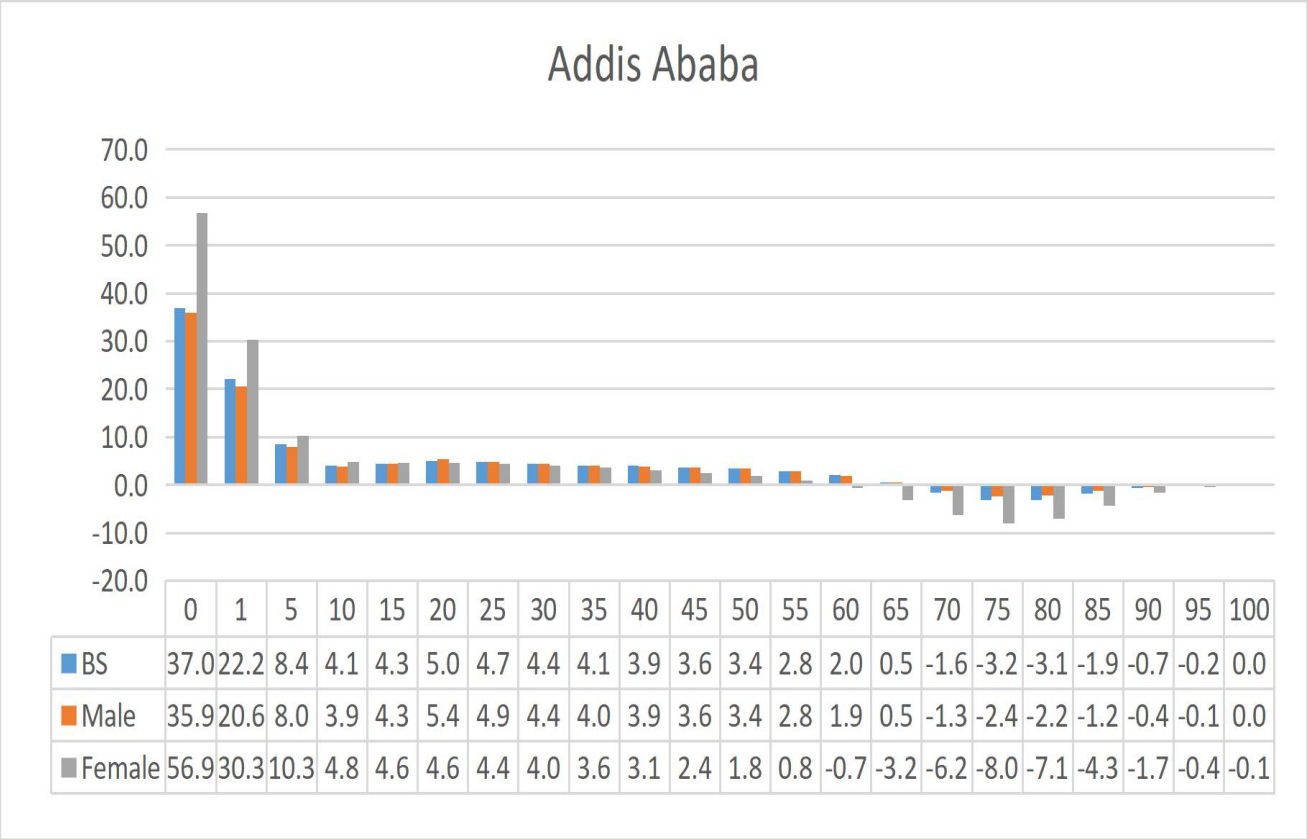


Figure 2: Direct Effect, Other Effect, and Total Effect Life Expectancy decomposition plot of Ethiopia, Both sexes, 1990-2019



	0	1	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
BS	37.0	22.2	8.4	4.1	4.3	5.0	4.7	4.4	4.1	3.9	3.6	3.4	2.8	2.0	0.5	-1.6	-3.2	-3.1	-1.9	-0.7	-0.2	0.0
Male	35.9	20.6	8.0	3.9	4.3	5.4	4.9	4.4	4.0	3.9	3.6	3.4	2.8	1.9	0.5	-1.3	-2.4	-2.2	-1.2	-0.4	-0.1	0.0
Female	56.9	30.3	10.3	4.8	4.6	4.6	4.4	4.0	3.6	3.1	2.4	1.8	0.8	-0.7	-3.2	-6.2	-8.0	-7.1	-4.3	-1.7	-0.4	-0.1

Figure 3: Percentage decomposed changes in Life Expectancy at birth (LEB) for both sexes, males, and females of Addis Ababa, 1990-2019

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