

Data Analysis I

Factors associated with the decline in under-five mortality in Senegal between 2005 and 2010-11

Utica International



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Contents

	Page
Tables and Figures	iv
Acknowledgements	v
Abstract	vi
1. Introduction.....	1
2. Methods.....	3
2.1 Data	3
2.2 Measurements	3
2.3 Ethics	3
3. Results.....	4
4. Conclusion	10
References.....	11

Tables and Figures

	Page
Table 1	Trend in selected health and socioeconomic indicators that could have influenced early childhood mortality, Senegal 2005 to 2010-11.....5
Table 2	Under-five mortality rate (ten-year rate) preceding the surveys, by selected characteristics, Senegal 2005 and 2010-11.....6
Table 3	Effects of selected factors associated with under-five mortality among children who were born in the five-year period preceding the surveys, by selected characteristics, Senegal 2005 and 2010-11.....8
Table 4	Expected change in under-five mortality rate characteristics, Senegal 2010-11....9
Figure 1	Under-five mortality rate per 1,000 live births, 2005 and 2010.....1
Figure 2	Neonatal, infant, and under-five mortality, five year rates, Senegal 2005 and 2010-11 DHS.....2

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Abstract

Background

The under-five mortality rate (U5MR) is one of the important indicators of population and child health; while a decline in under-five mortality is also one of the Millennium Development Goals (MDGs). U5MRs have declined globally, but the degree of progress varies from country to country. Senegal is a country where there is evidence of substantial decline in childhood mortality in the recent past.

Methods

Using data from the 2005 and 2010-11 Senegal Demographic and Health Survey, this study analyzes the effects of several socio-demographic characteristics of children, mothers and households, as well as health and health care indicators on under-five mortality in Senegal. The data are analyzed using synthetic cohort life tables and survival analysis methods.

Results

The results show that under-five mortality in Senegal declined significantly between 2005 and 2010-11, from 121 to 73 per 1,000 live births. This decline is partly due to the improvement in socio-demographic factors, health, and healthcare during that period. Significant improvements in healthcare have been achieved in antenatal care by adding a health professional, followed by a decline in births to older women and a decrease in the proportion of babies with small birth size. Moreover, improvements in mother's education in the improved sources of drinking water for households significantly contributed to the decline in under-five mortality. Nonetheless, the decline in primary education for mothers and increase in multiplicity of births have offset some improvement in childhood mortality.

Conclusions

Findings from this analysis suggest that other factors, which are not available for this analysis, contribute to the decline in under-five mortality. However, much progress in health and healthcare that is included in the model may also contribute to reducing under-five mortality, even though its effects are not statistically significant in our analysis. This progresses includes a decline in short birth interval, an increase in assistance during delivery, healthcare services, and better access to improved sanitation facilities.

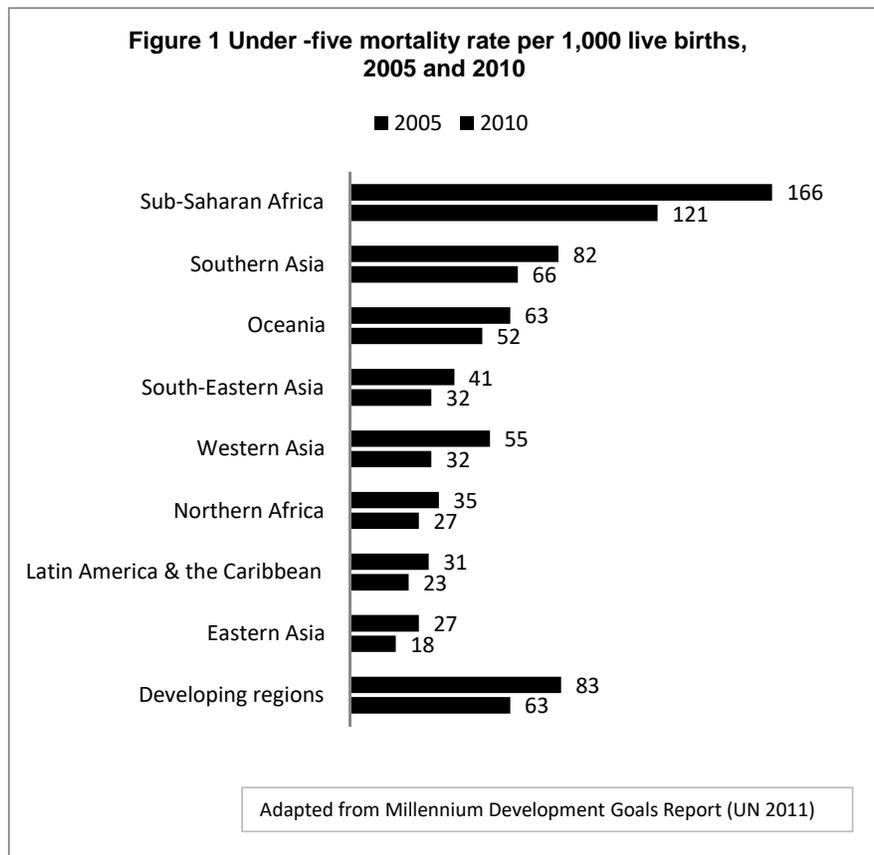
Keywords

Senegal, Under-five mortality, Level, Trend, Determinants

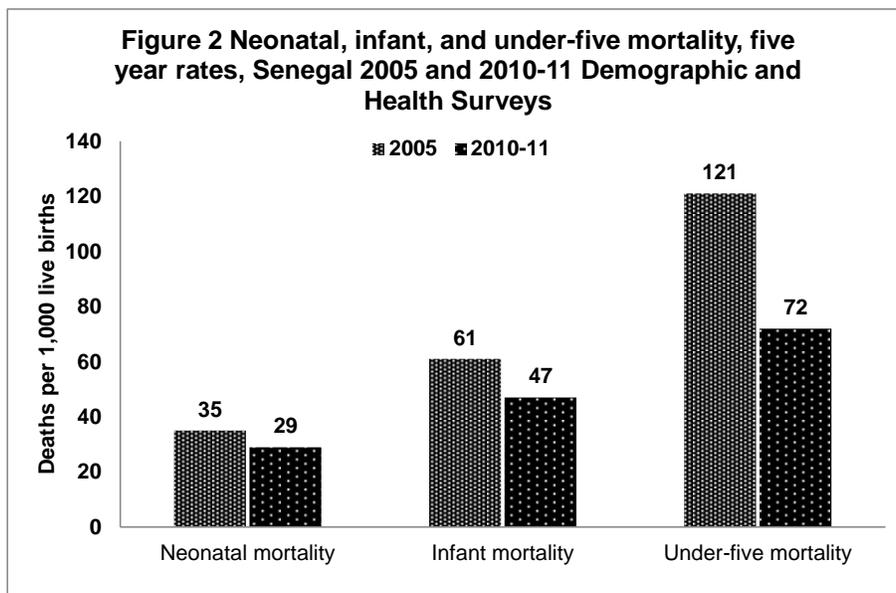
1. Introduction

Infant mortality and under-five mortality are regarded as highly sensitive indicators of population and child health. Reducing mortality and improving the health of young children are important goals for governments and the international community. Under-five mortality is one of the eight Millennium Development Goals (MDGs) that were adopted by the United Nations Member States in 2000. The Millennium Declaration set 2015 as the target date for most of the goals. Under-five mortality is targeted to be reduced by two-thirds, between 1990 and 2015 (United Nations 2008).

Although under-five mortality rates (U5MR) have declined globally, the degree of progress varies across countries and regions. In developing regions, the U5MR has declined very slowly from 83 to 62 per 1,000 live births between 2005 and 2010. The rate is highest in sub-Saharan Africa where 166 and 121 per 1,000 children died before their fifth birthday in 2005 and 2010 respectively (Figure 1.1). Changes in the levels of infant and child mortality also differ widely by socioeconomic status of the household and level of education of the mother. Moreover, in many countries in sub-Saharan Africa, progress in reducing childhood mortality has been hindered by epidemics of HIV/AIDS and malaria or by war and conflicts, all of which have recently been among the leading causes of death among young children (United Nations 2011).



In Senegal, surveys conducted over the past decade have shown progress in the evolution of life expectancy rising from 44 years in 1999 to 64 in 2012 (WHO 2014). Early childhood mortality has shown significant evolution, in particular during the period 2005 to 2010-11 (Figure 2).



Policy in the health sector remains on track to achieve the objectives of the Millennium Development Goals (MDGs) and the priority goals of the second National Health Development Plan (NHDP-II, 2009-2018) including the specific goals of reducing maternal mortality and infant/child mortality, fertility control and increased access to basic services for the poor. In addition, The NHDP-II also attaches great importance to epidemiological surveillance, reproductive health, STDs/AIDS and control of endemic diseases such as malaria. The latter endemic, one of the principal causes of morbidity, is particularly in retreat as a result of the proactive stance of the National Malaria Control Program. The relatively low level of HIV prevalence in the general population aged 15 to 49 years (0.7% in 2010-2011) remains stable (EDS Senegal 2012).

The priority given to the health sector has resulted in a steady rise in the budget of the Ministry of Health which went from approximately 58 million US dollars in 2000 to more than 221 million US dollars in 2010, an increase of more than 280 percent. This budget represents 10.4 percent of the operating budget of the State.

In 2012, Senegal had 35 hospitals, 89 health centers, two mental health centers, 1,257 health posts, and 1,703 health huts (*cases de santé*). However, in terms of health infrastructure coverage, Senegal has not yet achieved the standards recommended by the World Health Organization.

With regard to maternal and child health indicators, in 2010-2011, more than 9 out of 10 mothers (93%) received antenatal care from trained medical personnel during pregnancy. This proportion was 87 percent in 2005. For births in the last 5 years, 65 percent of mothers benefited from the assistance of trained medical staff at delivery in 2010-11 against 52 percent in 2005. Immunization coverage among children under five has also shown an improvement (59% in 2005 and 63% in 2010-2011) (Continuous DHS 2013).

The objective of this analysis is to assess and describe the levels and trends of under-five mortality in Senegal and present differentials in mortality rates by several key factors that are likely to

influence mortality. This analysis also evaluates determinants associated with the probability of death before the age of 5 years (under-five mortality).

2. Methods

2.1 Data

Data for this study come from the 2005 and 2010-11 Senegal DHSs (SDHS), nationally representative surveys. The SDHS adopted a two-stage sample design. The first stage involved randomly selecting clusters with probability proportional to size from a national master sample frame. Data from the 2005 and 2010-11 SDHS are used to assess and describe levels and trends of infant and under-five mortality in Rwanda and present differentials in mortality rates by several key indicators that are likely to affect mortality in children. Data from the 2010-11 SDHS are used to evaluate determinants associated with the probability of dying before the age of five years (under-five mortality).

2.2 Measurements

Calculation of mortality: In the SDHSs, the Individual Questionnaire for eligible women age 15-49 includes questions on the total number of children ever born to a woman and a complete maternal birth history. Birth history questions include date of birth for every live birth,⁵ survival status, current age of surviving children, and age at death of deceased children. Data on age at death were collected in days for children who died with a month of birth, in months for children who died within 2-23 months of birth, and in complete years for children who died after 23 months of birth. All inconsistencies on birth history were checked and resolved by interviewers.

A synthetic cohort life table approach is used to calculate the probabilities of dying for small age segments based on real mortality experience. These mortality probabilities are then combined to estimate the more common and larger age segments. The small age segments adopted by DHS are 0, 1-2, 3-5, 6-11, 12-23, 24-35, 36-47, 48-59 months. The analysis of this report uses under-five mortality, one of the important indices of childhood mortality: It is the probability of dying between birth and exact age five years ($5q_0$);

These calculations will be based on all birth data from the 2005 and 2010-11 surveys and will be used in descriptive statistics on levels, trends, and differentials of infant and under-five mortality.

Survival analysis: The data for all births in the last five years 2010-11 SDHS will be used to create a synthetic cohort life table for survival analysis using the Weibull Hazard function to estimate the risk of dying (expressed in Hazard Ratios with a significant level) before the age of 5 years (under-five mortality).

Limitations: Indicators related to health services/programs such as antenatal care, and delivery services were asked for births in the last five years. Indicators other than health services/programs such as vaccinations were only asked for surviving children who were born in the last five years before the interview dates. Similarly, indicators related to health such as symptoms of acute respiratory infection (ARI), fever, and diarrhea; and their treatment by health facilities or providers were limited only to surviving children who were born in the last five years.

⁵ Each live birth of a multiple birth is considered a separate live birth.

2.3 Ethics

The Institutional Review Board of ICF International, Inc. reviewed and approved the MEASURE Demographic and Health Surveys Project Phases V and VI, and the 2015 and 2010-11 Senegal Demographic and Health Surveys are categorized under those approvals. The Institutional Review Board of ICF International complied with the United States Department of Health and Human Services regulations for the protection of human research subjects (45 CFR 46).

3. Results

Some socioeconomic status and health indicators are believed to have an impact on mortality in children. Indicators include household availability of improved toilet facilities, access to safe drinking water, improved sources of water, and women's education. Health indicators include health status and health services. Health status indicators include prevalence of diarrhea and ARI among children, nutritional status of children and women, and birth intervals. Health service indicators are child immunization coverage, modern contraceptive prevalence, treatment of diarrhea and ARI among children, antenatal care, delivery assistance, household possession of mosquito nets, and mosquito net usage.

Table 1 presents a list of these indicators (and their indicated denominators) as well as their levels according to the four surveys. Results show that full immunization coverage for children 12-23 months increased from 59 percent in 2005 to 63 percent in 2010-11. The percentage of children who had diarrhea or ARI within two weeks before the survey has declined over that period; and the proportions of children with diarrhea and ARI for whom help was sought from a healthcare provider increased.

Malnutrition among children has somewhat increased over the period, however. The proportion of stunted children in 2005 and 2010-11 was 20 percent and 27 percent respectively. The proportion of under-weighted children was 14 percent and 18 percent during the same periods. Nutritional status of women and birth interval did not change appreciably. Maternal healthcare improved markedly during that period; however the percentage of pregnant women who received two or more doses of tetanus vaccine declined from 66 percent in 2005 to 57 percent in 2010-11. The proportion of households with access to an improved source of drinking water and improved toilet facilities has increased substantially. The education level of women has improved slightly between 2005 and 2010-11, as one-fifth of women had secondary education or higher in 2010-11 as compared to 15 percent in 2005.

Malaria is one of the major public health concerns in Senegal. It is one of the leading causes of morbidity and mortality. The disease especially affects children under 5 years of age and pregnant women. In such a situation, the use of bednets is an important protection against the bite of the Anopheles mosquitoes that carry malarial parasites that transmit the disease. Approximately one-quarter (24 percent) of households had bednets in 2005 and the proportion increased to 72 percent in 2010-11. In 2005 only 14 percent of children under age five slept under a bednet the night before the survey, while in 2010-11 this figure increased to 41 percent.

Table 1 Trend in selected health and socioeconomic indicators that could have influenced early childhood mortality, Senegal 2005 to 2010-11

	Percent		Number	
	2005	2010-11	2005	2010-11
Immunization¹				
Fully immunized	59	63	2,040	2,199
Morbidity²				
Had diarrhea in past 2 weeks	22	20	9,709	10,893
Had ARI in past 2 weeks	13	5	9,709	10,893
Treatment of sick child				
Diarrhea: taken for treatment ³	20	35	2,168	2,246
ARI: taken for treatment ⁴	47	50	1,279	589
Nutritional status of child²				
Stunting (height-for age < -2SD)	20	27	2,883	3761
Wasting (weight-for height < -2SD)	9	10	2,883	3761
Underweight (weight-for age < -2SD)	14	18	2,883	3761
Nutritional status of women⁵				
Normal BMI (18.5-24.9 kg/m ²)	60	57	4,168	5,187
Birth spacing⁶				
Birth interval < 24 months	19	18	8,215	8,859
Birth interval 24-35 months	38	38	8,215	8,859
Birth interval > 35 months	42	44	8,215	8,859
Maternal health services				
Prenatal care from health care professional ⁷	87	93	6,927	7,678
2+ tetanus toxoid injections ⁸	66	57	6,927	7,678
Delivery by health care professional ⁹	52	65	10,530	11,479
Delivery in health care facility ⁹	62	73	10,530	11,479
Education level of women¹⁰				
Primary	25	22		15,688
Secondary or higher	15	20		15,688
Household characteristics¹¹				
With bednets	24	72	7,412	7,902
With improved toilet	48	60	7,412	7,902
With safe source of drinking water	70	79	7,412	7,902
Children <5 slept under a bednet				
Slept under a bednet previous night ¹²	14	41	10,453	12,395

¹Children age 12-23 months
²Children under five years from the woman's birth history
³Children under five years who had diarrhea in the two weeks preceding the survey
⁴Children under five years who had symptoms of ARI in the two weeks preceding the survey
⁵All women aged 15-49, excluding pregnant women and women with a birth in the preceding 2 months
⁶Total number of live births in the five years preceding the survey, excluding first born
⁷Pregnancy for the most recent birth of women who had a live birth in the five years preceding the survey
⁸Pregnancy for the most recent birth of women who had a live birth in the five years preceding the survey
⁹Total number of live births in the five years preceding the survey
¹⁰All interviewed women aged 15-49
¹¹All interviewed household
¹²Children under five years from household schedule

Differentials in infant and under-five mortality rates by selected variables for children, mothers, health, health care and households are presented in Table 2. The determinants or risk/protecting factors are: child's characteristics (sex, multiplicity of birth, birth order, prior birth interval and size at birth); prenatal care and delivery indicators (delivery by health care professional, prenatal care, and receiving two doses of tetanus vaccine); mother's characteristics (age at child birth, marital status, education, and use of contraception); and household characteristics (residence, household wealth status, safe drinking water, type of toilet facility, and possession of bednet).

The results indicate that differences in mortality rates by child's and mother's characteristics are relatively large, in particular those related to multiplicity of birth, birth order, birth interval, mother's age at child's birth, mother's education, and mother's use of contraceptives. For example, infant mortality for children of mothers with a secondary education or higher was always lower than for children whose mothers had never attended school. In the 2005, children of mothers with a secondary education or higher had an infant mortality rate of 60 per 1,000 live births compared to 152 per 1,000 live births for

children of mothers who had never attended school. In the 2010-11 SDHS, infant mortality rates for children of mothers with a secondary education or higher was 36 per 1,000 live births, while it was 97 per 1,000 live births for children whose mothers had never attended school. In another example, infant mortality for children of mothers who currently use contraceptive methods is always lower than for children of mothers who have never used contraceptives.

Background characteristic	Year	
	2005	2010-11
Child's characteristics		
Child's sex		
Boy	143	91
Girl	127	83
Multiple birth		
Single	129	80
Multiple	300	248
Child's birth order		
1	143	86
2-3	118	76
4-6	132	91
7+	164	113
Prior birth interval		
First born	188	134
<24 months	136	83
24-35 months	100	65
36+ months	81	58
Child's size at birth¹		
Average or larger	101	61
Smaller than average	138	80
Antenatal care and delivery		
Delivery by health care professional¹		
No	145	94
Yes	92	59
Mother received antenatal from health professional for last birth in preceding 5 years²		
No/not by health professional	149	97
Yes	89	48
Mother received at least two tetanus injections during pregnancy for last birth in preceding 5 years²		
No	86	65
1 dose	56	45
2+ doses	98	48
Mother's characteristics		
Mother's age at childbirth		
<20	170	103
20-29	126	80
30-39	132	90
40-49	133	88
Mother's marital status		
Not currently in union	135	87
Currently in union	133	69
Mother's education		
No education	152	97
Primary	94	63
Secondary or higher	60	36
Mother's use of contraceptives		
Not currently using	141	90
Currently using	89	63
Household characteristics		
Residence		
Urban	91	62
Rural	160	102
Household's wealth status		
Highest	183	119
Higher	164	94
Middle	136	81
Second	92	69
Lowest	64	54
Safe drinking water³		
Yes	115	77
No	168	109

(Table 2- end)

Type of toilet facility⁴		
Improved toilet facility	123	69
Traditional pit latrine	167	107
No facility/bush/other	154	103
Possession of bednet		
No	131	77
Yes, at least one	139	88

¹ Only births in the past five years

² Only last birth in the past five years

³ Safe drinking water include piped/tap water, tube well/borehole, protected well, protected spring, rain water, and bottle water.

⁴ Improved toilet facility includes flush toilets and improved pit latrines

Prenatal care and assistance during delivery by a health professional have had a positive effect on mortality decline. However, possession of a bednet shows only small differences in under-five mortality in both surveys.

Table 3 shows the result of multivariate analysis (unadjusted and adjusted hazard ratios) for each of the variables as well as the p-value. The dependent variables for mortality analyses are under-five mortality during the five-year period prior to the surveys. Not all children born during the period have been exposed to the risk of death for the whole time since some may have been born later in the period. Therefore, the Weibull hazard regression (a multivariate life-table procedure) was used to adjust for the incomplete exposure to mortality. The covariates of interest regarding children and mothers, health and health care, as well as households are those discussed in the preceding section. Hazard ratios (HR) are exponentiated coefficients and are the percentages of increase or decrease in the risks of dying entailed by the specific category of variable when compared to the reference category for that variable.

In the unadjusted model, for children's characteristics, the model reveals that being a child from a multiple birth (HR=4.07), with a birth interval less than 24 months (HR=1.58), and having a size at birth smaller than average (HR=1.58) significantly increases the risk of mortality. For health and health care indicators, not receiving antenatal care provided by a health professional is significantly associated with a higher risk of mortality (HR=1.66). For mother's characteristics, mother's aged 20-29 at childbirth (HR=0.73), had primary education (HR=0.59) or secondary education or higher (HR=0.39) significantly decreases the risk of mortality. Mother's current use of contraception is associated with lower probability of their children dying before the age of five (HR=0.71). Mother's marital status does not affect child mortality. Among household characteristics; urban residence, higher household wealth status, improved drinking water, and improved toilet facility both positively and significantly affect child survival status. Household possession of a bednet is not significantly associated with under-five mortality.

Table 3 Effects of selected factors associated with under-five mortality among children who were born in the five-year period preceding the surveys, by selected characteristics, Senegal 2005 and 2010-11

Background characteristic	Under-five mortality			
	Unadjusted		Adjusted	
	Hazard ratio	P-value	Hazard ratio	P-value
Child's characteristics				
Child's sex				
Boy	1.00	—	1.00	—
Girl	0.80	0.021	0.80	0.019
Multiple birth				
Single	1.00	—	1.00	—
Multiple	4.07	0.000	3.24	0.000
Prior birth interval				
First born	1.00	—	1.00	—
<24 months	1.58	0.001	1.31	0.088
24-35 months	0.93	0.583	0.78	0.124
36+ months	0.92	0.536	0.75	0.081
Child's size at birth¹				
Average or larger	1.00	—	1.00	—
Smaller than average	1.58	0.000	1.47	0.000
Antenatal care and delivery				
Delivery by health care professional¹				
Yes	1.00	—	1.00	—
No	1.14	0.152	0.83	0.087
Mother received prenatal form health professional² for last birth in preceding 5 years				
Yes	1.00	—	1.00	—
No	1.66	0.000	1.41	0.001
Mother's characteristics				
Mother's age at childbirth				
<20	1.00	—	1.00	—
20-29	0.73	0.009	0.84	0.214
30-39	0.95	0.708	1.12	0.480
40-49	1.26	0.286	1.67	0.033
Mother's marital status				
Not currently in union	1.00	—	1.00	—
Currently in union	1.28	0.225	1.14	0.535
Mother's education				
No education	1.00	—	1.00	—
Primary	0.59	0.000	0.72	0.036
Secondary or higher	0.39	0.001	0.51	0.037
Mother's use of contraceptives				
Not currently using	1.00	—	1.00	—
Currently using	0.71	0.031	0.83	0.271
Household characteristics				
Residence				
Urban	1.00	—	1.00	—
Rural	1.69	0.000	1.27	0.098
Household's wealth status				
Highest	1.00	—	1.00	—
Higher	1.57	0.081	1.40	0.206
Middle	1.59	0.058	1.08	0.751
Second	1.70	0.024	1.02	0.948
Lowest	2.27	0.000	1.33	0.282
Safe drinking water³				
Yes	1.00	—	1.00	—
No	1.45	0.000	1.32	0.005
Type of toilet facility⁴				
Improved toilet facility	1.00	—	1.00	—
Traditional pit latrine	1.43	0.001	1.16	0.254
No facility/bush/other	1.40	0.003	1.02	0.897
Possession of bednets				
No	1.00	—	1.00	—
Yes at least one	1.17	0.280	1.05	0.753

¹ Only births in the past five years

² Only last birth in the past five years

³ Safe drinking water include piped/tap water, tube well/borehole, protected well, protected spring, rain water, and bottle water.

⁴ Improved toilet facility includes flush toilets and improved pit latrines

To determine how much change in mortality between surveys is due to changes in the covariates seen in table 3, the analysis computed the products of covariate differences between 2005 and 2010-11 with covariate coefficients (with p-values less than 0.05) from the multivariate analysis. These products are then summed and this sum is exponentiated to get the change in mortality due to changing health conditions between surveys. The results are shown in Table 4. Reference categories with coefficients equal to one are not included; they are not presented in the coefficient column. Also non-significant results are omitted from the coefficient columns.

Characteristics	Proportion		Change in proportion 2010/11-	Coefficient		P value	U5M by change in 2005 -
	2005	2010-11		U5M 2010-	U5M		
Boy	0.515	0.514	0.000				
Girl	0.485	0.486	0.001	-0.227960	0.019		-0.000114
Singleton birth	0.966	0.960	-0.006				
Multiple birth	0.034	0.041	0.006	1.176192	0.000		0.007292
Proportion of birth with birth interval: First born	0.219	0.228	0.009				
Proportion of birth with birth interval <24 months	0.151	0.138	-0.013	0.272825	0.088		
Proportion of birth with birth interval 24-35 months	0.300	0.295	-0.005	-0.247403	0.124		
Proportion of birth with birth interval >35 months	0.331	0.339	0.008	-0.286277	0.081		
Size at birth average or larger	0.702	0.705	0.004				
Size at birth smaller than average	0.298	0.295	-0.004	0.381876	0.000		-0.001451
Delivery by a health care professional	0.622	0.728	0.107				
Delivery not by a health care professional	0.379	0.272	-0.107	-0.181670	0.087		
Antenatal care by health professional during pregnancy	0.575	0.624	0.049				
No/not by health professional during pregnancy	0.425	0.376	-0.049	0.346079	0.001		-0.017096
Mother's age at child birth <20	0.183	0.171	-0.012				
Mother's age at child birth 20-29	0.499	0.520	0.021	-0.173470	0.214		
Mother's age at child birth 30-39	0.281	0.275	-0.006	0.114458	0.480		
Mother's age at child birth 40-49	0.038	0.034	-0.003	0.510178	0.033		-0.001684
Mother not currently in union	0.045	0.058	0.012				
Mother currently in union	0.955	0.943	-0.012	0.134307	0.535		
Mother having no education	0.720	0.713	-0.006				
Mother having primary education	0.208	0.204	-0.004	-0.325477	0.036		0.001367
Mother having secondary education or higher	0.072	0.083	0.011	-0.665915	0.037		-0.007059
Mother not currently using contraceptive	0.883	0.857	-0.026				
Mother currently using contraceptive	0.117	0.143	0.026	-0.187781	0.271		
Urban residence	0.365	0.383	0.018				
Rural residence	0.635	0.617	-0.018	0.242866	0.098		
Household wealth quintile highest	0.155	0.161	0.007				
Household wealth quintile higher	0.181	0.195	0.013	0.334506	0.206		
Household wealth quintile middle	0.213	0.194	-0.019	0.079836	0.751		
Household wealth quintile second	0.222	0.220	-0.002	0.016801	0.948		
Household wealth quintile lowest	0.230	0.231	0.000	0.286691	0.282		
Household with improved sources of drinking water	0.630	0.736	0.106				
Household without improved sources of drinking water	0.370	0.265	-0.106	0.274934	0.005		-0.029088
Household with improved toilet facility	0.397	0.539	0.142				
Household with traditional pit latrine	0.318	0.247	-0.071	0.145596	0.254		
Household without facility/bush/other	0.285	0.214	-0.071	0.019583	0.897		
Household without a bednet	0.561	0.200	-0.361				
Household with bednet	0.439	0.800	0.361	0.046211	0.753		
Constant				-4.915462			
				sum			-0.047832
				exp(sum)	rel. risk		0.9533

Note: Non-significant variables are not presented and non-significant categories are blank.

An increase in the proportion of girls and mothers with secondary education or higher; a declining proportion of children with smaller than average birth size, of mothers who did not receive antenatal care from a qualified provider, of mothers age 40-49, and of households without improved sources of drinking water contributed to the decrease in under-five mortality in Senegal between 2005 and 2010-11. This decline in under-five mortality is offset by an increase in the proportion of multiple births and a decrease in primary education of mothers. Together, these characteristics account for about 5 percent (1 - 0.9533) of the percent of the decline in under-five mortality between 2005 and 2010-11. During the same period the decline is about 40 percent (from 121 per 1,000 live births to 72 per 1,000 live

births). Thus the model explains only 13 percent of the overall decline in under-five mortality during the period.

4. Conclusions

Under-five mortality in Senegal declined substantially from 2005 to 2010-11. There have been certain health improvements from 2005 to 2010-11. Even though our model explained only about 30 percent of the under-five mortality decline, other progress in health and healthcare that were included in the model may also contribute to the reduction in under-five mortality even though their effects were not statistically significant in our analysis. This progress includes a decline in short birth interval, an increase in delivery by a qualified healthcare provider, and better access to improved sanitation facilities.

Other socioeconomic and health conditions may also explain some of the remaining overall declines but were not included in the analysis due to lack of data (e.g. changes in mortality due to violence and accidents) or inappropriate timing of data (e.g. fever, diarrhea, and ARI treatment, which are measured for the two-week period preceding the survey). Of course some of the unexplained decline may still be due to sampling variability and changes in data quality.

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