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Teenage Pregnancy and Motherhood in Developing Countries: A Life Table Analysis

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Abstract

This study examines teenage pregnancy and motherhood in developing countries using life table analysis. The ultimate objective is to obtain a measure of impact of teenage pregnancy and motherhood unaffected by compositional factors that may be used to assess the achievements of SDG. The method of life table analysis was applied to the data on teenage pregnancy and motherhood from Demographic and Health Surveys (DHS) in some selected developing countries. The results of the analysis show that in almost all the developing countries studied, a teenager aged 15 years, who experiences the observed schedule of age-specific rates of teenage pregnancy and motherhood would expect to live less than 5 (4.8) years before becoming pregnant or mother, among others. The implications of this are early marriage, adverse adolescent reproductive health, school dropout with the attendant low status of women. Therefore, more efforts are required for the implementation of gender equality and empowerment of women and girls (goal 5) of SDG.

Keywords: Teenage pregnancy/motherhood, adolescent reproductive health, life table, expectation of life, gender equality.

Introduction

Teenage pregnancy and motherhood is a major socio-economic and health problem facing teenage girls and young women in the whole world, but mostly especially in developing countries. This is because of its association with high risk of morbidity and mortality for the young mothers and their children, school drop-out and low status of women for the young mothers [10]. Teenage pregnancy refers to pregnancy among teenage girls, usually within the ages of 13-19, [23].

According to UNFPA [22] and Neal et al. [15] approximately 16 million girls aged 15 -19 years and 2.5 million girls under 16 years give birth each year in developing regions. WHO [24] observed that the leading cause of death among girls aged 15-19 years globally are complications during pregnancy and childbirth, while about 3.9 million girls aged 15-19 years perform unsafe abortions every year [3].

According to Tsoaledi [21], teenage pregnancy in South Africa is growing rapidly among school-going pupils and leads to school drop-out as the teenage mothers have to leave school to care for their babies. Some of the factors identified as being responsible for are lack of communication between parents and their children, lack of parental guidance and role models in the village, peer-group influence and ignorance of the use of modern contraceptives. Mkwananzi and Odimegwu [17] applied theory of social disorganisation to the Demographic Health Surveys (DHS) from eleven countries in investigating teenage pregnancy. Females aged 15-19 were modelled using multilevel logistic regression to explore teenage pregnancy in West, East and Southern Africa. Teenage pregnancy was found to be associated with community levels of poverty and unemployment while it was not associated with the head of the household's age. In their follow up work, Odimegwu and Mkwananzi [19] assessed the contextual factors associated with teenage pregnancy in sub-Saharan Africa; they observed that teenage pregnancy decreased in East Africa, plateau in West Africa and increased slightly in Southern Africa between 1992 and 2011. The applied multilevel logistic regression to DHS data by modelling females aged 15-19 to establish the independent influence of social disadvantage on teenage pregnancy in West, East and Southern Africa with the aid of the MLwiN programme. Their findings highlighted the necessity of creating regional-specific interventions and prevention campaigns to address multilevel factors such as

family disruption as well as the need for governments to address issues of unemployment, poverty and inequality.

In Nigeria, Teenage pregnancy and motherhood has been widely studied. These include [1, 2, 6, 16]. In their study of the prevalence of adolescent pregnancy in Ganye Local Government Area, Adamawa State [16], showed that about 51% of the subjects had adolescent pregnancy. Out of this about 42% are Muslims while about 9% are Christians. Avong and Bassey [1] examined the trend of Teenage childbearing in Nigeria between 1990 and 2008 and observed that the percentage of teenagers who had started childbearing was high and decreased only by 6% points between 1990 and 2008. It was found that the percentages in rural Nigeria are two times those of their counterparts in urban areas and slightly increased between the intervals they studied. The percentage of teenagers who had started childbearing ranged from 16% to 54% in the Northern region of the country and from 5% to 14% in the Southern region. Using the descriptive and logistic regression to analysis a sample of 7,819 female teenagers who were pregnant or had had a child in the last five years preceding the 2013 NDHS, Kupoluyi, et al [6] observed that the incidence of teenage pregnancy and childbearing reduced as educational levels, wealth status, and age at first sex increased. Chizor el tal (2017) observed that low socio-economic status, cultural factors, peer pressure, lack of adequate sex education were the major causes of teenage pregnancy in Alimosho and Ikorodu Local Government Area, Lagos, Nigeria.

From the foregoing, almost all the analysis of teenage pregnancy and motherhood except that by [6, 17, 19] are based on percentages and cross tabulations. The effect of this is that estimates of the true level of teenage pregnancy and motherhood may be influenced by compositional factors. Therefore, the ultimate objective of this study is to obtain estimates of the level of teenage pregnancy and motherhood which may be free from the influence of compositional factors using life table analysis.

Methodology

The data for this study is a secondary data derived from the DHS macro program publications [10, 11, 12, 13] for the various years in Nigeria (2013, 2008, 2003, 1999) and some selected countries [4, 5, 7, 8, 9, 14] of the World (including Ghana 2014, Liberia 2013, Sierra Leone 2013, Kenya 2014 and South Africa 2016 Egypt 2014, Cambodia 2013 and Bangladesh 2014). The data collected is on proportion ($_n M_x$) of women who became pregnant or mother at age x, ($x = 15, 16, \ldots 19$) (hereinafter referred to as teenage pregnancy and motherhood). The data is a central rate and as such, does not express the exact probability of a teenager becoming pregnant or motherhood within an age interval.

The method of analysis adopted in this study is the method of life table of analysis. The method was used to describe the life history of a group of teenagers aged 15 years, as their numbers are depleted by force of pregnancy and motherhood from the central rates.

If a teenager aged x- years experiences a given schedule of age-specific rate of teenage pregnancy/motherhood, $_n m_x$, then the life table probability that a teenager aged x years becomes pregnant / mother before attaining age x + n years ($_n q_x$) is given by

$$_n q_x = \frac{2n(_n m_x)}{2 + n(_n m_x)}$$

(1)

Thus, given the total number of teenagers not pregnant or mother at the exact age x years (l_x), the total number of teenagers attaining exact age x + n years (l_{x+n}) not pregnant or mother is given as

$$l_{x+n} = l_x \left(1 - _n q_x \right)$$

(2)

Hence, the total person-years lived without becoming pregnant/mother between exact ages x and x+ n is given as

$$_n L_x = \frac{n}{2}(l_x + l_{x+n})$$

(3)

The total person-years lived without becoming pregnant/mother beyond age x is

$$T_x = \sum_{i=x}^{\infty} {}_n L_i$$

(4)

And the average number of years ($_n e_x$) a teenager aged x-years expects to live before becoming pregnant/mother (expectation of life at age x, $_n e_x$) is given by

$$_n e_x = \frac{T_x}{l_x}$$

(5)

When n = 1, then

$$e_x = \frac{T_x}{l_x}$$

(6)

In this study, the levels and trend of teenage pregnancy and motherhood are discussed using expectation of life at age x ($_n e_x$).

In describing the life table functions above, it was assumed that

(i) only the female teenagers are involved
(ii) the population consists of a cohort of 10,000 teenagers aged 15 years (i.e. a radix of
$$l_{15} = 10000)$$
(iii) all teenagers aged 15 years are assumed to have survived throughout the age interval 15 – 19 and pregnancy/motherhood are the only source of decrement.
(iv) the cohort is closed to migration (in or out)
(v) teenage pregnancy/motherhood is uniformly distributed within the age interval
x – x+n

(vi) teenage pregnancy/motherhood is according to a pre-determined schedule of age – specific teenage pregnancy/motherhood rates
(vii) the age –specific rates of teenage pregnancy/motherhood do not change over time.

Results and Discussion

In this Section, the methods outlined in Section 2 were applied to the data on teenage pregnancy and motherhood in developing countries. Section 3.1 examines the level of teenage pregnancy and motherhood in developing countries; in Section 3.2 the trend of teenage pregnancy and motherhood in developing countries, while Section 3.3 is on the discussion and the concluding remarks.

Levels of teenage pregnancy/motherhood in some selected developing countries of the world.

The percentage distribution of teenagers reported to be pregnant or mothers by age are shown in Table 1 for some selected developing countries of the world. As Table 1 shows, the age-specific percentage of teenagers reported as either pregnant or mother increased from 5.1% at age 15 to 41.3% at age 19 in Nigeria. Similar pattern (of increase from age 15 to 19) are observed in Ghana, Liberia, Sierra Leone, Egypt, Cambodia, Bangladesh, Kenya and South Africa. In comparison at age 15, the percentage appears to be higher in Nigeria, Sierra Leone and Bangladesh (where it is more than 5%) than in Ghana, Egypt and Cambodia (where it is less than 2%) and in Liberia, Kenya and South Africa (where it is more than 3% but less than 4%). And at age 19, the percentage of teenagers reported as either pregnant or mother appears much higher in Liberia, Sierra Leone and Bangladesh (with more than 50%) and lower in Egypt, South Africa, Cambodia, Ghana and Kenya (where it is less than 40%).

Table 1: Percentage distribution of teenagers who were reported to be pregnant or mothers by age in Nigeria and some selected countries of the world.

Age	Country/year								
	Nigeria	Ghana	Liberia	Sierra Leone	Egypt	Cambodia	Bangladesh	Kenya	South Africa
	2013	2014	2013	2013	2014	2014	2014	2014	2016
15	5.1	1.9	3.8	5.6	1.3	0.6	9.2	3.2	3.8
16	13.4	7	18.7	10.2	3.2	3.8	16.2	8	7.3
17	22.6	11	34.3	27.7	7.9	7.9	31.1	15	14.8
18	37.2	19.7	52	42.9	16.3	18.4	41.4	25.9	22.6
19	41.3	36.1	59.9	59.8	27.4	31.3	57.8	39.9	27.8

The life-table analysis of teenage pregnancy and motherhood in Developing Countries of the world.

The details of the computation of the life table functions described in Section 2 are given in Appendix A, while the average number of years a teenager aged x-years, subject to the observed schedules of age-specific rates in Table 1, expects to live before becoming pregnant/mother (expectation of life at age x, e_x) are given in Table 2 for the study populations. As Table 2 shows, at age 15 the value of e_x is more than four years but less than five years in all the countries. This indicates that at age 15 years, a teenager in these countries expects to live less than five years before becoming pregnant or mother.

Table 2: Levels of expectation of life at age x, (e_x) among teenagers in some selected. Developing countries of the world.

Age (x)	Country/Year								
		Ghana	Liberia	Sierra Leone	Egypt	Cambodia	Bangladesh	Kenya	South Africa
		2013	2014	2013	2013	2014	2014	2014	2016
15	4.80	4.89	4.74	4.79	4.93	4.92	4.75	4.87	4.88
16	3.83	3.90	3.75	3.81	3.93	3.93	3.78	3.88	3.89
17	2.87	2.93	2.82	2.84	2.94	2.94	2.84	2.91	2.92
18	1.93	1.95	1.90	1.91	1.96	1.96	1.91	1.94	1.95
19	0.98	0.98	0.97	0.97	0.99	0.98	0.97	0.98	0.99

At age 19 the value of e_x is less than one year in all the countries. This indicates that at age 19 years, a teenager in these countries expects to live less than one year before becoming pregnant or mother.

Trend in expectation of life at age x (e_x)

Trend in expectation of life at age *x* is discussed using Nigeria as it appears to reflect the experience of developing countries. The average number of years a teenager aged x-years, subject to the schedules of age-specific rates observed in Nigeria from NDHS between 1999 and 2013 expects to live before becoming pregnant/mother

(expectation of life at age x, e_x) are given in Table 3. As Table 3 shows, at age 15 and almost all ages, the value of e_x remained stable (4.8 years at age 15 and 0.98 at age 19 years) over the years (i.e. from 1999 to 2013).

Table 3: Trends in expectation of life at age x, (e_x) among teenagers in Nigeria

Age	1999	2003	2008	2013
15	4.80	4.78	4.80	4.80
16	3.84	3.81	3.83	3.83
17	2.88	2.86	2.87	2.87
18	1.94	1.93	1.93	1.93
19	0.98	0.98	0.98	0.98

From the foregoing, it is clear that the reported percentages are not good for discussing levels and trend of teenage pregnancy and motherhood. The wide variation observed in the percentages among the different countries vanished when the life table function (e_x) was introduced. Furthermore, the status of teenage pregnancy and motherhood appears to be the same in all the developing countries when controlled for compositional factors. Thus, a teenager aged 15 years exposed to the schedules of age-specific rates observed in the study populations expects live less than five years, on the average, before becoming pregnant or mother. The implication of this is that most of the child bearings among girls in developing countries start before age 20 years when they are supposed to be in school. This may be counterproductive in the SDG Goal (3) to reduce maternal mortality to less than 70 deaths per 100,000 live births. Maternal health illnesses still remained the most leading causes of death in girls aged 15-19 years in 2015 across the world [24], especially in developing countries such as Nigeria.

Conclusion

Levels and trend of teenage pregnancy and motherhood in developing countries has been discussed in this study. The aim is to determine an index that is unaffected by compositional factors which can be used to assess the achievements in the areas of improvement in status of women, reduction of maternal and child mortality. Data on the age-specific rates of teenage pregnancy and motherhood obtained from the DHS of some developing countries were analysed using life table analysis. The life table function used in discussing the levels and trend of teenage pregnancy and motherhood is the average number of years a teenager aged x year, who experienced the observed age-specific rates of teenage pregnancy and motherhood expects to live before becoming pregnant or mother (expectation of life at age x, e_x).

The results of the analysis show that the expectation of life at age 15 (e_{15}) is more than four but less than 5 years. That is a teenager aged 15 years, who experiences the observed age-specific rates of teenage pregnancy and motherhood, expects to live, on the average, more than four but less than 5 years before becoming pregnant or mother. Similarly, the expectation of life at age 19 years (e_{19}) is less than one year. That is a teenager aged 19 years, subject to the observed age-specific rates of teenage pregnancy and motherhood expects to live, on the average, less than one year before becoming pregnant or mother in all the developing countries studied. These results are very necessary in pursuing the targets of the 5th Goal of the SDG [26].

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APPENDICES

Appendix A: Life table of teenage pregnancy and motherhood in selected developing countries of the world

Age/ year							
Nigeria 2013	$_nM_x$	$_nq_x$	$_np_x$	l_x	$_nL_x$	T_x	e_x
15	0.0051	0.0051	0.99491	10000.00	9974.6	48046.3	4.80
16	0.0134	0.0133	0.98669	9949.13	9882.9	38071.7	3.83
17	0.0226	0.0223	0.97765	9816.70	9707.0	28188.8	2.87
18	0.0372	0.0365	0.96348	9597.32	9422.1	18481.8	1.93
19	0.0413	0.0405	0.95954	9246.82	9059.7	9059.7	0.98
20				8872.65			
Ghana 2014	$_nM_x$	$_nq_x$	$_np_x$	l_x	$_nL_x$	T_x	e_x
15	0.0019	0.0019	0.99810	10000.00	9990.5	48942.6	4.89
16	0.0070	0.0070	0.99302	9981.02	9946.2	38952.0	3.90
17	0.0110	0.0109	0.98906	9911.39	9857.2	29005.8	2.93
18	0.0197	0.0195	0.98049	9802.97	9707.3	19148.7	1.95

	$_nM_x$	$_nq_x$	$_np_x$	l_x	$_nL_x$	T_x	e_x
19	0.0361	0.0355	0.96454	9611.73	9441.3	9441.3	0.98
20				9270.90			
Liberia 2013	$_nM_x$	$_nq_x$	$_np_x$	l_x	$_nL_x$	T_x	e_x
15	0.0038	0.0038	0.99621	10000.00	9981.0	47380.0	4.74
16	0.0187	0.0185	0.98147	9962.07	9869.8	37399.0	3.75
17	0.0343	0.0337	0.96628	9777.51	9612.7	27529.2	2.82
18	0.052	0.0507	0.94932	9447.79	9208.4	17916.5	1.90
19	0.0599	0.0582	0.94184	8968.96	8708.1	8708.1	0.97
20				8447.34			
Sierra Leone 2013	$_nM_x$	$_nq_x$	$_np_x$	l_x	$_nL_x$	T_x	e_x
15	0.0056	0.0056	0.99442	10000.00	9972.1	47853.7	4.79
16	0.0102	0.0101	0.98985	9944.16	9893.7	37881.6	3.81
17	0.0277	0.0273	0.97268	9843.24	9708.8	27987.9	2.84
18	0.0429	0.0420	0.95800	9574.31	9373.3	18279.2	1.91
19	0.0598	0.0581	0.94194	9172.20	8905.9	8905.9	0.97
20				8639.62			
Egypt 2014	$_nM_x$	$_nq_x$	$_np_x$	l_x	$_nL_x$	T_x	e_x
15	0.0013	0.0013	0.99870	10000.00	9993.5	49263.2	4.93
16	0.0032	0.0032	0.99681	9987.01	9971.1	39269.7	3.93
17	0.0079	0.0079	0.99213	9955.10	9915.9	29298.6	2.94
18	0.0163	0.0162	0.98383	9876.77	9796.9	19382.7	1.96
19	0.0274	0.0270	0.97297	9717.08	9585.8	9585.8	0.99
20				9454.43			

Appendix A cont.

	$_nM_x$	$_nq_x$	$_np_x$	l_x	$_nL_x$	T_x	e_x
Cambodia 2014	$_nM_x$	$_nq_x$	$_np_x$	l_x	$_nL_x$	T_x	e_x
15	0.0006	0.0006	0.99940	10000.00	9997.0	49224.9	4.92
16	0.0038	0.0038	0.99621	9994.00	9975.0	39227.9	3.93
17	0.0079	0.0079	0.99213	9956.10	9916.9	29252.9	2.94
18	0.0184	0.0182	0.98177	9877.75	9787.7	19335.9	1.96
19	0.0313	0.0308	0.96918	9697.66	9548.2	9548.2	0.98
20				9398.80			
Bangladesh 2014	$_nM_x$	$_nq_x$	$_np_x$	l_x	$_nL_x$	T_x	e_x
15	0.0092	0.0092	0.99084	10000.00	9954.2	47454.5	4.75
16	0.0162	0.0161	0.98393	9908.42	9828.8	37500.3	3.78
17	0.0311	0.0306	0.96938	9749.19	9599.9	27671.5	2.84
18	0.0414	0.0406	0.95944	9450.64	9259.0	18071.6	1.91
19	0.0578	0.0562	0.94382	9067.32	8812.6	8812.6	0.97
20				8557.95			
Kenya 2014	$_nM_x$	$_nq_x$	$_np_x$	l_x	$_nL_x$	T_x	e_x
15	0.0032	0.0032	0.99681	10000.00	9984.0	48650.9	4.87

	nMx	nqx	npx	lx	nLx	Tx	ex
16	0.008	0.0080	0.99203	9968.05	9928.3	38666.9	3.88
17	0.015	0.0149	0.98511	9888.62	9815.0	28738.5	2.91
18	0.0259	0.0256	0.97443	9741.40	9616.9	18923.5	1.94
19	0.0399	0.0391	0.96088	9492.32	9306.7	9306.7	0.98
20				9120.99			
South Africa 2016	nMx	nqx	npx	lx	nLx	Tx	ex
15	0.0038	0.0038	0.99621	10000.00	9981.0	48755.2	4.88
16	0.0073	0.0073	0.99273	9962.07	9925.8	38774.2	3.89
17	0.0148	0.0147	0.98531	9889.61	9817.0	28848.4	2.92
18	0.0226	0.0223	0.97765	9744.32	9635.4	19031.4	1.95
19	0.0278	0.0274	0.97258	9526.56	9396.0	9396.0	0.99
20				9265.35			

Appendix B: Life table of teenage pregnancy and motherhood in Nigeria

Age/ year							
1999	nMx	nqx	npx	lx	nLx	Tx	ex
15	0.0108	0.0107	0.98926	10000.00	9946.3	47968.1	4.80
16	0.0094	0.0094	0.99064	9892.58	9846.3	38021.8	3.84
17	0.0264	0.0261	0.97394	9800.02	9672.3	28175.5	2.88
18	0.0305	0.0300	0.96996	9544.67	9401.3	18503.1	1.94
19	0.0343	0.0337	0.96628	9257.93	9101.8	9101.8	0.98
20				8945.74			
2003	nMx	nqx	npx	lx	nLx	Tx	ex
15	0.0075	0.0075	0.99253	10000.00	9962.6	47778.7	4.78
16	0.0139	0.0138	0.98620	9925.28	9856.8	37816.0	3.81
17	0.0311	0.0306	0.96938	9788.27	9638.4	27959.3	2.86
18	0.0342	0.0336	0.96637	9488.52	9329.0	18320.9	1.93
19	0.0395	0.0387	0.96127	9169.47	8991.9	8991.9	0.98
20				8814.29			
2008	nMx	nqx	npx	lx	nLx	Tx	ex
15	0.0063	0.0063	0.99372	10000.00	9968.6	48004.1	4.80
16	0.0130	0.0129	0.98708	9937.20	9873.0	38035.5	3.83
17	0.0242	0.0239	0.97609	9808.85	9691.6	28162.5	2.87
18	0.0357	0.0351	0.96493	9574.31	9406.4	18470.9	1.93
19	0.0384	0.0377	0.96232	9238.50	9064.5	9064.5	0.98
20				8890.43			
2013	nMx	nqx	npx	lx	nLx	Tx	ex
15	0.0051	0.0051	0.99491	10000.00	9974.6	48046.3	4.80
16	0.0134	0.0133	0.98669	9949.13	9882.9	38071.7	3.83
17	0.0226	0.0223	0.97765	9816.70	9707.0	28188.8	2.87
18	0.0372	0.0365	0.96348	9597.32	9422.1	18481.8	1.93
19	0.0413	0.0405	0.95954	9246.82	9059.7	9059.7	0.98
20				8872.65			