

Population Change in Rural Eastern Ethiopia Between 2007 to 2019: Findings from an Open Dynamic Cohort Demographic Surveillance

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Background

- There remain distinct differences in population growth and composition in rural areas compared to urban areas.
- In Eastern Ethiopia there is high fertility, children and youth make up a high proportion of the rural population
- Women in this region enter marriage early and thus have a long period of childbearing.
- We present data from a long-standing demographic surveillance system operating in the rural district of Kersa, to characterize how population patterns are developing in this region over the course of a decade
- Kersa HDSS began demographic and health surveillance from 12 Kebeles in Eastern Ethiopia in September of 2007

Methods

Study setting

- Kersa HDSS was established with the aim of providing community-based health information to health planners and policy makers and to inform evidence-based decision-making in this resource-limited setting.
- The HDSS consists of a representative selection of Kabeles (the smallest administrative unit in Ethiopia) with average population size of 5000 each.
- In 2015, in the same district, 12 additional Kebeles were added to increase the diversity of the HDSS, that doubled the size of the population under surveillance.

Study Population

- All permanent residents of the HDSS are captured in the cohort. Between 2007 and the end of 2019, 32,819 births and 7,980 deaths were registered.

Data Management

- Data for this analysis were extracted from the Structure Query Language (SQL) database in which HDSS data are maintained.
- Population size and age and sex composition were calculated using a person-time calculation for each year.
- Sex ratios, dependency ratios, median population age and geometric and exponential population growth rate were calculated.
- A linear regression is used to determine whether changes over time were significant.

Results

Baseline population

At the 2007 baseline census, the population of the Kersa HDSS was 50,830 people in 10,522 households with an average household size of 5.2 individuals. The population pyramidal was typical to that of many developing countries, with a wide base indicating a very young and rapidly growing population. The youth dependency ratio was 101.54 persons under the age of 15 for every 100 working-age persons and the elderly dependency ratio was 3.78 to 100, yielding an overall dependency ratio of 105.32 to 100 (Table 1).

Population change 2008 to 2019

The population of Kersa HDSS grew by about 1,552 people yearly through 2019: the population had 50,692 person-years in 2008 and increased to 136,373 in 2019. The population had double in 2015/16 (Table 2). The crude population increase (CPI) was 2.4% annually (95% CI: 0.55%, 4.47%), with lowest points in 2011 and 2019 and highest in 2013. The net population increase was lowest in 2011 (-0.6) and highest in 2013 (+1.98) (Figure 2) (Table 2). At the average rate of population growth, the population of Kersa HDSS will double by 2043, with a 25-years lap, and triple by 2060, (Figure 2).

Period	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Person-year	50,607	51,884	53,912	57,413	58,366	59,857	61,745	98,861	129,880	131,855	134,169	136,505	138,320
Birth	1,616	1,795	2,009	1,578	1,810	2,340	2,229	3,121	3,849	4,502	4,527	3,712	3,915
Birth rate	31.93	34.60	37.26	27.49	31.01	39.09	36.10	31.57	29.64	34.14	33.74	27.19	28.30
Death	567	487	561	657	561	506	526	823	845	746	814	887	807
Death rate	11.20	9.39	10.41	11.44	9.61	8.45	8.52	8.32	6.51	5.66	6.07	6.50	5.83
In-migration	223	213	280	341	420	711	944	1,641	1,996	2,631	2,816	2,048	1,656
In-migration rate	4.41	4.11	5.19	5.94	7.20	11.88	15.29	16.60	15.37	19.95	20.99	15.00	11.97
Outmigration	749	626	1,056	1,299	1,279	1,477	2,104	2,758	2,900	4,177	3,939	2,712	2,883
Outmigration rate	14.80	12.07	19.59	22.63	21.91	24.68	34.08	27.90	22.33	31.68	29.36	19.87	20.84
Crude pop. increase	2.07	2.52	2.69	1.60	2.14	3.06	2.76	2.32	2.31	2.85	2.77	2.07	2.25
Net-pop. increase	1.03	1.72	1.25	(0.06)	0.67	1.78	0.88	1.19	1.62	1.68	1.93	1.58	1.36

Table 2: Population characteristic of Kersa HDSS over 2008 to 2019

Life Expectancy

Life expectancy at birth has significantly increased from 56.1 in 2008 to 67.8 in 2019. The increase has been larger for women than men (Figure 3.a). As showed in figure 3.b, there is a clear difference in life expectancy across the life span between 2008 and 2019

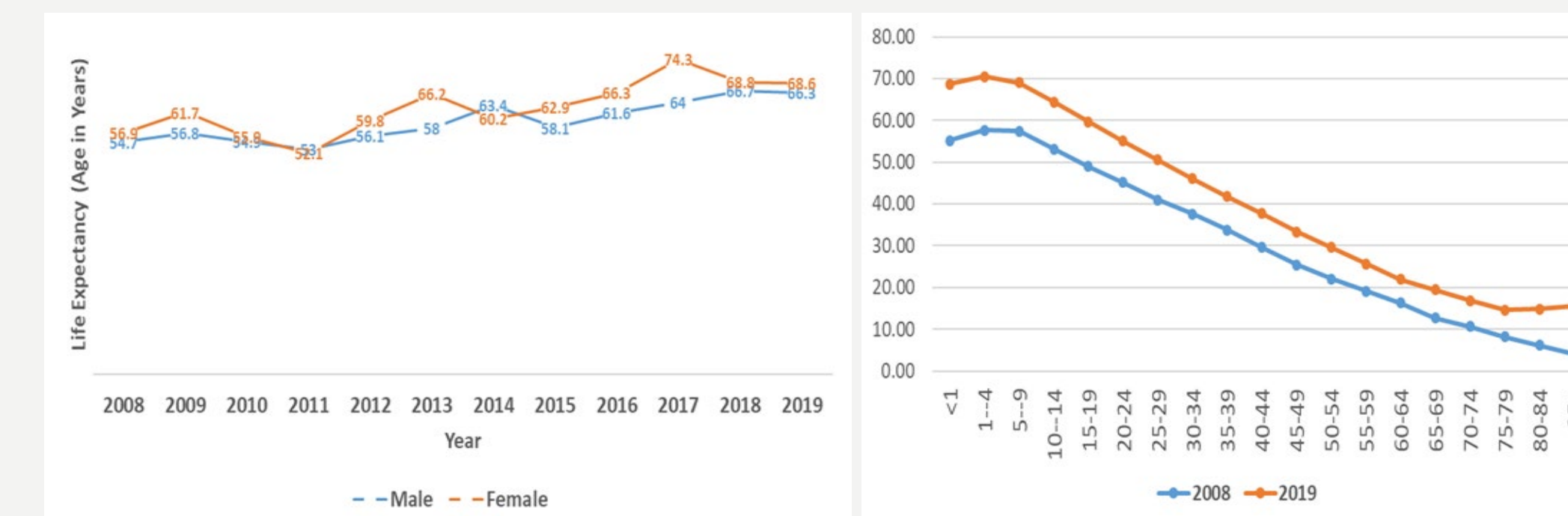


Figure 3: a. life expectancy of Kersa HDSS over years; b. expected year of survival by age

Age	Kersa 2007	Kersa 2008	Kersa 2020
Overall	101.52	101.35	104.50
0-14	107.39	106.97	107.91
15-24	92.82	97.23	119.77
25-54	97.67	95.80	93.74
55-64	107.25	105.22	87.46
65+	77.46	83.08	99.29

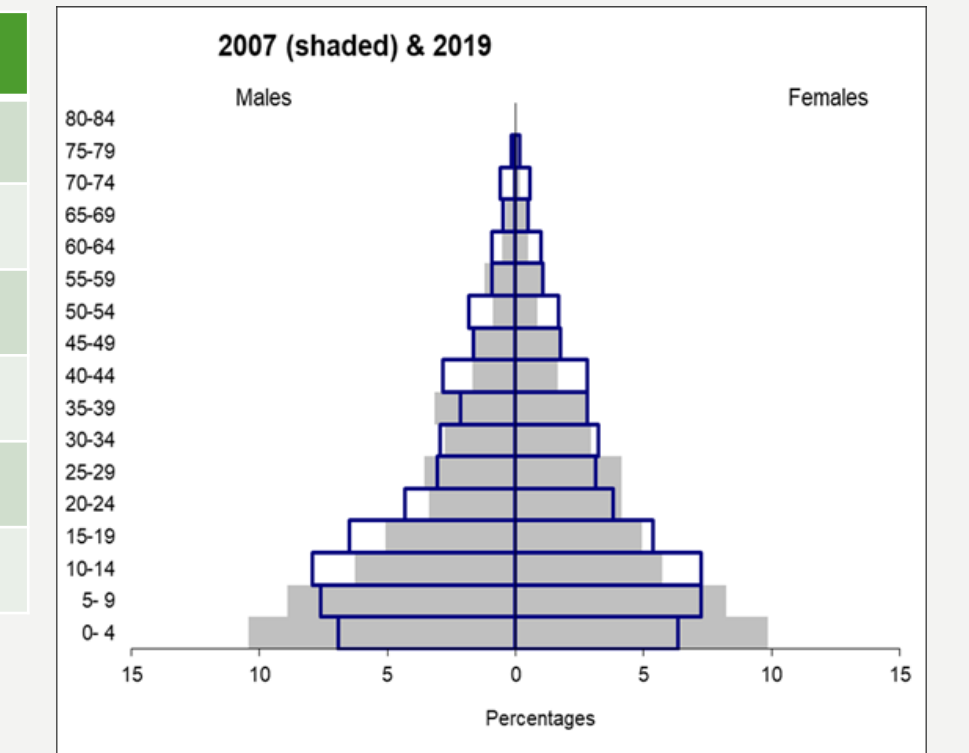


Table 1: Age specific sex ratio Kersa HDSS at baseline

Figure 1: Population pyramid

Conclusions

- At the baseline population of Kersa HDSS (2007) had a population size of 50,830 and average household size of 5.2.
- Between 2007 and 2019 the population grew by an average of 2.4%.
- The sex composition did not vary substantially during this time period, but the age composition of the population did.
- The proportion of youths in the population decreased by 6% by the end of 2019 from the baseline in 2007, while the productive and old population grew by 7% and 1% by the end of 2019 from the baseline in 2007, respectively. These numbers indicate that the Kersa population is at the early stage of demographic transition and has a young and rapidly growing population
- The life expectancy at the end of the 2019 gained additional 11.7 years as compared to 2008. However, the population is potentially slowly ageing.

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