Data Quality Evaluation of the Niger 2017 Demographic and Health Survey

The Demographic and Health Surveys Program

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Overall Conclusion: Based on this expert evaluation of data quality[1], The DHS Program deems that the EDS Niger 2017 data do not meet quality standards, and therefore cannot be validated. On the basis of the problems identified by this data quality analysis, we recommend that this survey not be published.

Key data quality findings

1. **Improbable durations for women's interviews**: One in 10 interviews of women with 4 or more births took less than 15 minutes, which is less than the mean time for women with no children, and almost 4 in 10 took less than half an hour. In contrast, in 2012, the mean interview time was almost 53 minutes and only 11% of interviews took less than 30 minutes. Similar results are seen comparing to the recent CAPI survey in Benin. This suggests that perhaps some interviews or parts of interviews were made up without actually talking with the respondents. Further, the duration of individual women's interviews decreased in the latter two months of field work, which is unusual since these interviews were in rural areas and rural women have had more births.
2. **Substantial heaping of women's age** suggest that interview data with women may have been made up; however, the age distributions do not reveal omission of women respondents.
3. **Fewer births in the most recent period**: Distributions of children's births by calendar year and years since birth show many fewer births in the latest periods. The number of births is highest six years prior to the survey, probably due both to omission of births in the most recent period and displacement of births, especially in the rural areas. Comparing the rural with the urban patterns, the former appears to be due more to omission and the latter to displacement of births. There does not seem to be a relatively higher omission of dead children in the rural areas.
4. **Decline in fertility for all cohorts in the recent period not possible**: Cohort-period fertility rates indicate that there has been a decline in fertility for all age cohorts in the most recent five-year period. Most of the age cohorts for earlier periods indicate rising fertility in rural areas. The rise in fertility in the 5-9 period is at least partly due to displacement of births, consistent with the figures in the birthdate distributions. Urban areas show a consistent decline in fertility, while rural areas show an increase to the period 5-9 years prior to the survey and then a decline. The substantial decline in fertility of the latest period could also be due to omission of births. The decrease in the latest period and increase in the preceding

[1] The 2017 Niger dataset had already excluded data from two teams that were earlier determined to be of very low quality. Therefore, the data quality evaluation presented here is likely less critical than the full reality had the data from those two teams been included.

period is consistent with the omission/displacement conclusion drawn from the rural birth distribution.

5. **The proximate determinants model yields a deficit of a 0.8 births**: the proximate determinants model has an implied total fertility rate of 6.8 births per 1000 women compared to an actual rate of 6.0. There are therefore 0.8 births per woman that are not accounted for by the proximate determinants of delaying marriage, postpartum amenorrhea and abstinence or contraceptive use. The difference could be due to poor reporting of current use of contraception and/or omission of births. For the model applied to the Niger 2012 DHS, the TFR is in line with the implied TFR and indicates no omission of recent births or poor reporting of contraception.
6. **Age at death for dead children not well reported**: For dead children, there is a large heap on 12 months indicating that age at death was not well reported. The distribution of children's deaths by time since death in years shows a decrease in the number of deaths in rural areas in the most recent five-year period with no apparent decrease for urban areas. The decrease in the number of deaths in rural areas is indicative of omission of recent dead children and perhaps some displacement of dead children's dates. However, the distribution of surviving children by age indicates an offsetting omission of living and dead children, so that infant and child mortality rates were much less affected than fertility rates.
7. **Anthropometry data suggest data may have been made up**: The distributions of anthropometry measures of height and weight have dips in numbers of children in height between 72 and 89 centimeters for urban areas and 76 and 88 centimeters for rural areas. The weight distribution shows an unexpected dip at 10 kg. for both areas. Since these measurements are taken directly from children using height boards and digital scales, such dips should not be expected and may be indicative of some made-up data.
8. **Vaccination data are questionable**: Coverage of vaccinations from several sources over time indicate that coverage has increased over time, but this is not seen in the results from the 2017 Niger DHS. It is improbable that vaccination rates have decreased so drastically in the five years between the last two DHS surveys. Another way at looking at vaccination coverage is to see whether children are receiving their vaccinations according to their age, for children less than 36 months. For children less than 36 months at the time of the survey, coverage appropriate for age is substantially lower from the 2017 survey compared with the 2012 survey in urban areas and in regions Agadez, Diffa, Dosso, Zinder and Niamey. While coverage appropriate for age is a little lower in 2017 than in 2012 for the whole of Niger, the difference is not nearly as great as that evident for children 12-23. Therefore other factors may be affecting the 2017 results for children 12-23 months, perhaps age displacement to/from the 12-23 month age range.
9. **Potential problems with interviewing fieldwork, listing or sample design**: There is a disagreement between the 2012 census distribution of the population and the weighted household distribution from the 2017 DHS indicating that there may have been a problem either in the sample design, the cluster dwelling listing, or the in the interviewing field work.

Detailed Findings:

1. **Improbable durations for women's interviews**

There were 16,542 women interviewed in 500 clusters by 20 teams. Field work lasted 67 days, beginning in October in Niamey and then the rest of the country mainly in November and December. On average, teams spent 2.6 days interviewing in a cluster, including time for travel between clusters and rest days. This very short in-cluster time leads one to investigate the duration of the interviews, which are presented in Table 2. The average duration in minutes spent interviewing households was 21 minutes, close to the median time of 18 minutes. A third of the households were interviewed in 15 minutes and 80 percent in half an hour.

Overall, it took an average of 33 minutes to interview women respondents, and almost one in four were interviewed in 15 minutes and slightly over half in 30 minutes. The mean duration of interviewing increases with the number of children ever born, which is expected, from 17 minutes for women with no births to 42 minutes for women with 4 or more births. However, one in ten interviews of women with 4 or more births took less than 15 minutes, which is less than the mean time for women with no children.

The duration of time to interview individual women decreased very substantially with calendar month, from 49 minutes in October to 27 minutes in December. In October, 12 percent were interviewed in less than 15 minutes and 33 percent in less than 30 minutes. In December, these percents were 30 and 62, respectively. This result is much unexpected as most of the interviews in October were in Niamey, presumably with women with fewer births. By December, most interviewing would have included rural women with greater number of births. It is possible, however, that more experience with using the tablets and with interviewing in general allowed for short durations of interview but I doubt by as much as is indicated.

Note that the interview durations are for those that started and ended in the same day, i.e. were not suspended and restarted the next day.

In comparison, in Niger in 2012, the mean women's interview duration was 53 minutes and only 11% of women's interviews were completed in less than 30 minutes (Table 2). Another comparison is the recent 2018 Benin survey, which was also a CAPI survey[2] (Table 3). In Benin the mean interview time was 39 minutes for the women's interview, and 39% of women were interviewed in less than 30 minutes. However, the mean interview time for women with 4+ children was 53 minutes with only 12% of these interviews lasting less than 30 minutes.

[2] While the only recent CAPI-based survey in West Africa available for comparison, the Benin comparison is not ideal, as literacy is very high in Benin compared with Niger.

Table 1. NIGER 2017. Duration of Household Interview and Women's Interview by Children Ever Born and Month of Interview

	Minutes			Percents	
	Mean	Median	Mode	< 15 min	< 30 min
Household interview	21	18	17	33.5	79.6
Women's interview					
All	33	28	14	23.3	52.7
Never given birth	17	13	7	53.3	86.4
Ever given birth	39	28	11	12.6	40.7
1-3 CEB	36	30	18	15.4	47.6
4+ CEB	42	37	27 & 28	10.4	37.1
Month 10 (only 6 days)	49	42	14 & 29	11.7	33.4
Month 11	37	32	33	18.2	45.6
Month 12	27	23	12	29.8	62.4

Note: Interviews started and ended the same day.

Table 2. NIGER 2012. Duration of household interview and women's interview by children ever born and month of the interview ONLY FOR CASES WITH ONE VISIT

	Duration of interview in minutes:		Duration of interview in minutes: PERCENTS		
	Mean	Number of cases	<15 minutes	< 30 minutes	Total
Women's interview	52.8	10,661	0.8	10.9	10,661
Children ever born					
Never given birth	37.9	1,623	3.5	37.5	1,623
Ever given birth	55.4	9,038	0.4	6.1	9,038
1-3 CEB	54.1	3,358	0.6	7.4	3,358
4+ CEB	56.2	5,680	0.2	5.3	5,680
Month of interview					
Month 2	68.4	845	0.6	5.4	845
Month 3	61.6	2,091	0.7	5.2	2,091
Month 4	51.8	3,077	0.7	9.8	3,077
Month 5	46.9	3,283	1.0	13.3	3,283
Month 6	45.7	1,365	1.3	19.4	1,365

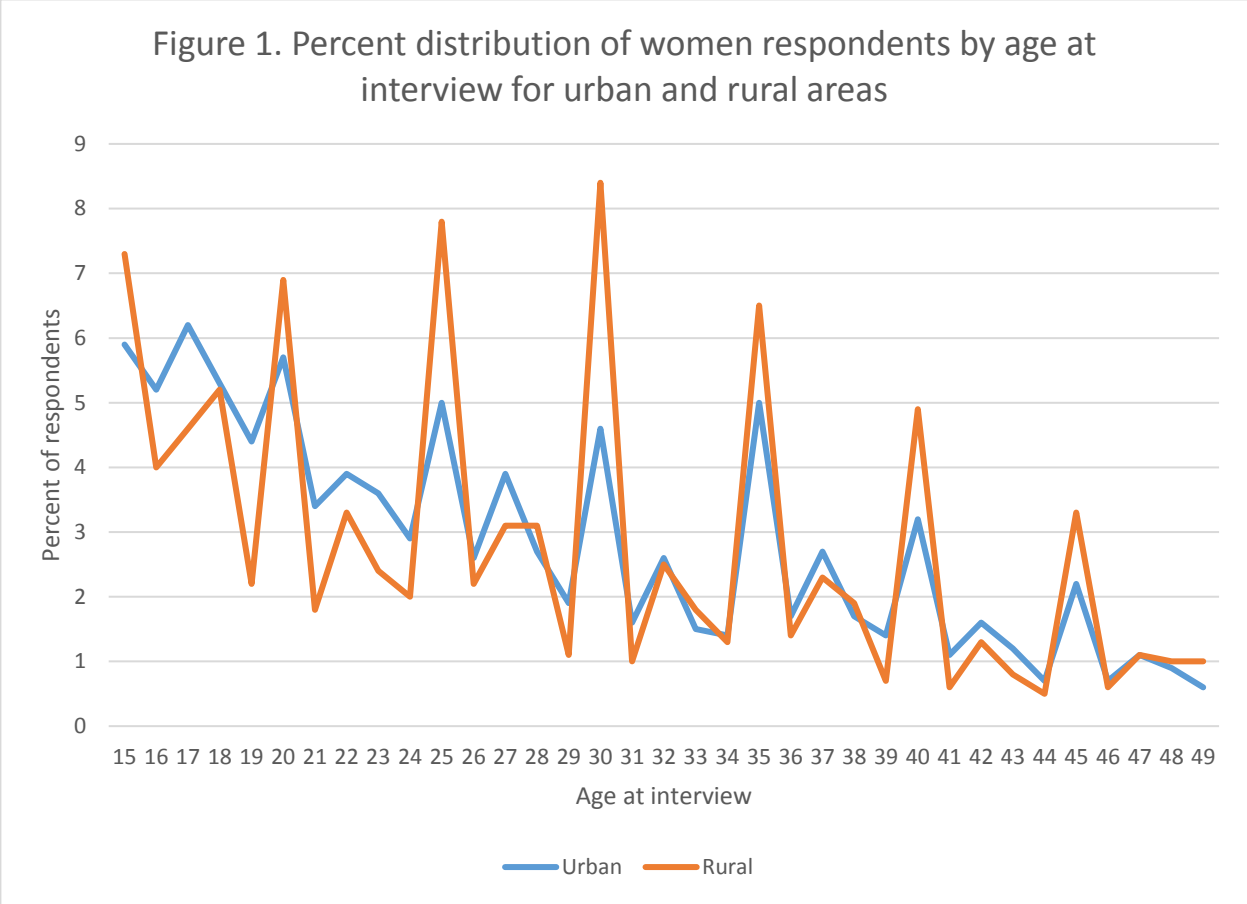
Table 3. Benin 2018. Duration of household interview and women's interview by children ever born and month of the interview ONLY FOR CASES WITH ONE VISIT

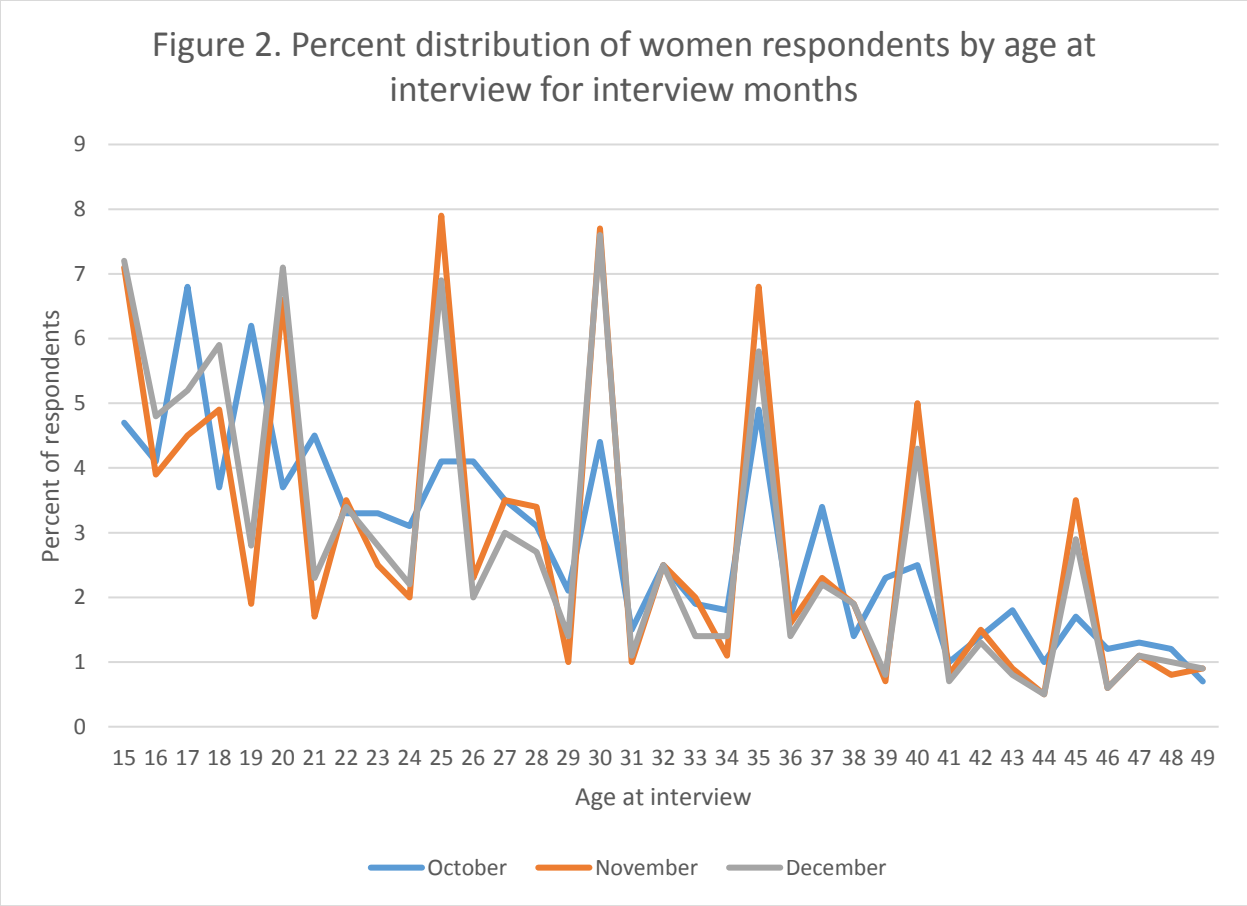
	Duration of interview in minutes:		Duration of interview in minutes: PERCENTS		
	Mean	Number of cases	<15 minutes	< 30 minutes	Total
Household interview	28.5	11,610	18.6	61.1	11,610
Women's interview	39.4	10,736	13.0	39.0	10,736
Children ever born					
Never given birth	20.6	3,412	38.5	82.6	3,412
Ever given birth	48.1	7,325	1.1	18.7	7,325
1-3 CEB	44.2	3,888	1.7	24.9	3,888
4+ CEB	52.6	3,437	0.5	11.6	3,437

2. Substantial heaping of women's age

Figure 1 shows the distribution of respondents by single years of age for urban and rural areas. It is evident that there is substantial digit preference (heaping) in the declaration of age in both urban and rural areas but in the rural areas heaping is severe. Indeed, in the urban areas 32% of respondents have age ending in 0 or 5, compared with 45% in the rural areas.

Since about 20% is expected if the age distribution were smooth, there is an excess concentration of 12% in urban areas and 25% in rural areas on preferred digits. Examining the age distribution by month of interview (Figure 2), excess concentration is 6% in October, 25% in November and 22% in December. Aside from substantial heaping, the age distributions do not reveal omission of women respondents.





3. Fewer births in the most recent period

A likely cause of errors in fertility rates and in infant and child mortality rates is the omission and displacement of the birthdates of young children. Figures 3 and 4 show the distribution of births to respondents by the calendar year of birth and by the number of years prior to the interview, respectively, in urban and rural areas. Rural and urban areas are show on separate vertical axes, given that most births are in the rural area. The national pattern is similar to that of the rural area.

Both figures show much lower numbers of births in the latest periods. It is clear from Figure 4 that the number of births is highest 6 years prior to the survey, probably due to both omission of births in the most recent period and displacement of births, especially in the rural areas. It is normal to find digit preference on values ending in 0 and 5 and such is the case in Figure 4 for births that occurred 10, 15, 20 and 25 years prior to the survey. However, 6 is not usually a preferred digit for age in years so that omission and/or displacement are the likely reasons that the number of births is highest on that value. Comparing the rural with the urban patterns, the former appears to be due more to omission and the latter to displacement of births. Figure 5 compares the distribution of births for all and for surviving children by time since birth for rural areas. The shape of the distributions are very similar and there does not seem to be a relatively higher omission of dead children in the rural areas. Given that many more questions are asked

and measurements taken for children who are alive at the time of the survey, this result is not surprising.

Figure 3. Distribution of Live Births by Calendar Year

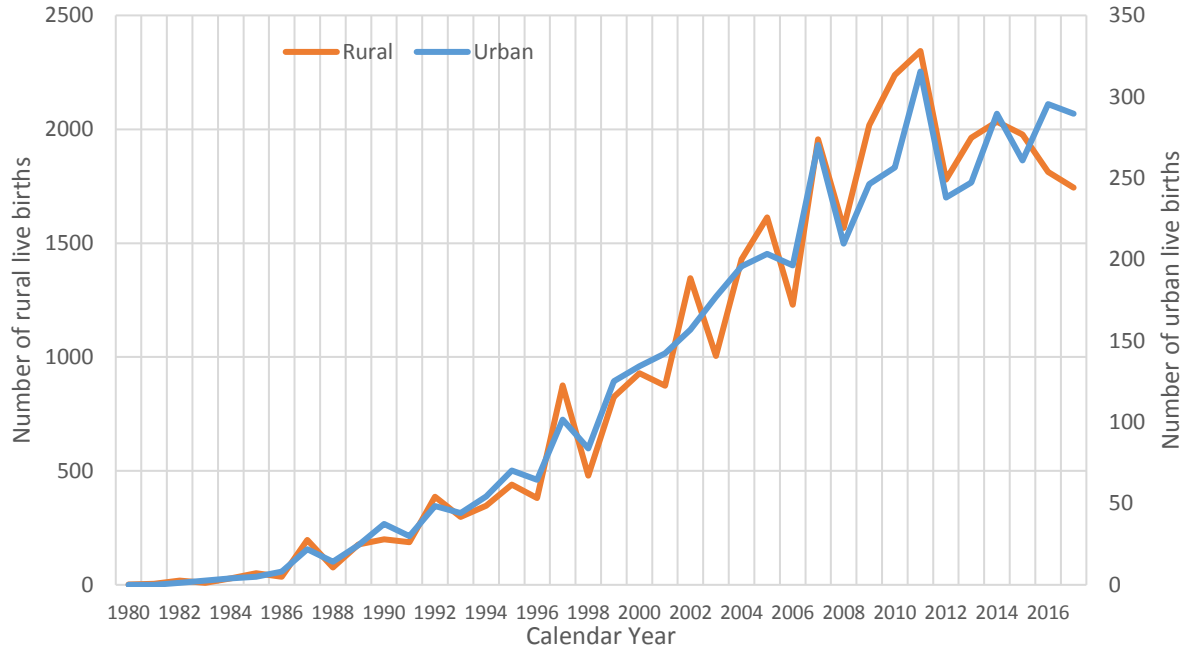
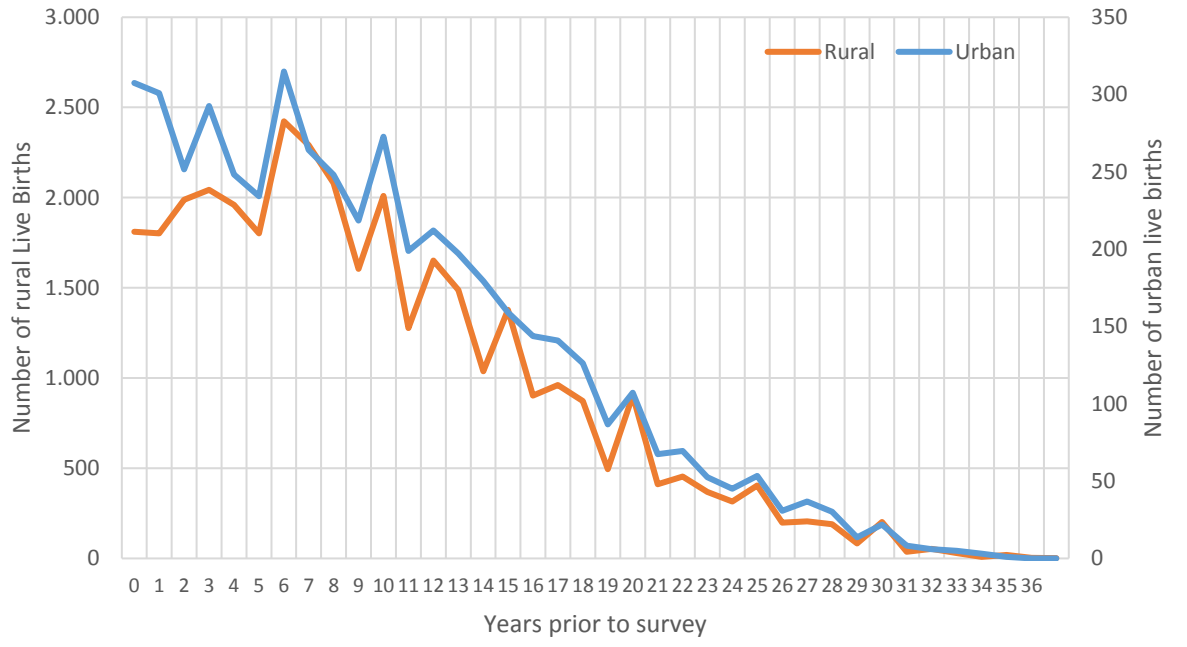


Figure 4. Distribution of Live Births by Years Prior to Survey



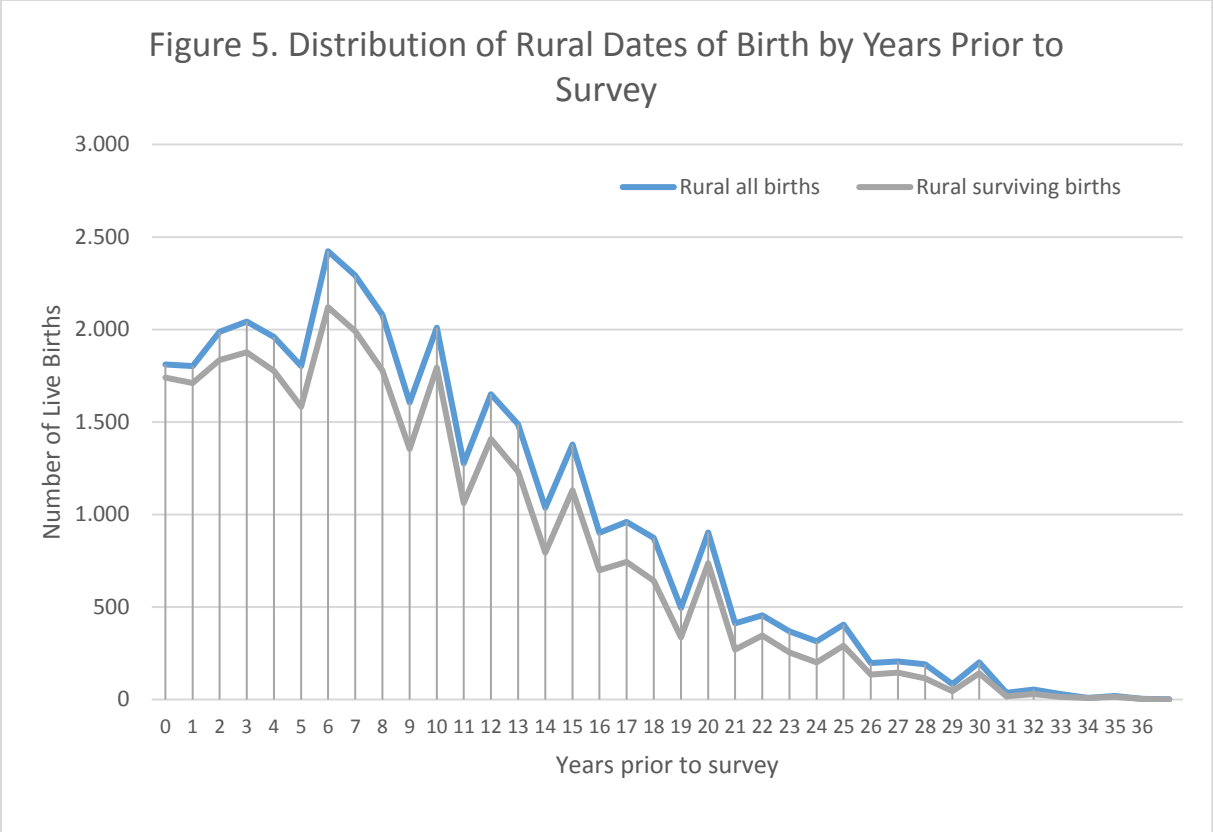


Figure 5. Distribution of Rural Dates of Birth by Years Prior to Survey
3.000
2.500
2.000
1.500
1.000
500
0
Number of Live Births
Rural all births
Rural surviving births
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Years prior to survey

4. Decline in fertility for all cohorts in the recent period not possible

Cohort-period fertility rates (CPFR) are a good way of checking the veracity of trends in fertility. Fertility rates are calculated by the age of respondents at the time of interview and by time period of birth. The rates are shown in the top panel of Table 4. CPFR can be compared along a diagonal from left to right, which indicates rates at similar ages in time periods prior to the survey (highlighted in blue for one diagonal). It is clear from this comparison that the rates are lower in the latest period. In the second panel the rates are cumulated across periods for each age cohort to give parity (P), and in the third panel the rates are cumulated for each period across the time periods to give period fertility (F). The ratios of the P to F values are given in the fourth panel. If there were no change in fertility over time, the P/F ratio would be 1.0. A value higher than 1 indicates a decline in fertility over time and a value lower than 1 indicates a rise in fertility. Looking at the P/F ratios in the latest period, it is evident that there has been a decline in fertility for all age cohorts. Most of the age cohorts for the preceding period (5-9) have values lower than 1 indicating a rise in fertility in that period. Earlier periods also indicate rising fertility. We believe that rise in fertility in the 5-9 period is at least partly due to displacement of births, consistent with the figures in the birthdate distributions. The substantial decline in fertility of the latest period could also be due to omission of births.

Table 4. Cohort-period fertility rates, total

Fertility rates by cohort and period, total

Age at survey	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39
15-19	0.060	0.003	0.000	0.000	0.000	0.000	0.000	0.000
20-24	0.247	0.114	0.004	0.000	0.000	0.000	0.000	0.000
25-29	0.279	0.270	0.101	0.007	0.000	0.000	0.000	0.000
30-34	0.262	0.341	0.275	0.107	0.005	0.000	0.000	0.000
35-39	0.224	0.332	0.326	0.234	0.078	0.004	0.000	0.000
40-44	0.149	0.284	0.323	0.283	0.216	0.079	0.005	0.000
45-49	0.069	0.213	0.286	0.285	0.268	0.205	0.087	0.006
Total	6.450	7.789	6.571	4.575	2.842	1.437	0.457	0.032

Parity (P) by cohort and period, total

Age at survey	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39
15-19	0.318	0.017	0.000	0.000	0.000	0.000	0.000	0.000
20-24	1.826	0.591	0.019	0.000	0.000	0.000	0.000	0.000
25-29	3.286	1.891	0.539	0.034	0.000	0.000	0.000	0.000
30-34	4.944	3.636	1.933	0.560	0.027	0.000	0.000	0.000
35-39	5.990	4.869	3.211	1.579	0.409	0.018	0.000	0.000
40-44	6.691	5.948	4.526	2.913	1.499	0.417	0.023	0.000
45-49	7.096	6.749	5.685	4.256	2.832	1.490	0.466	0.032

Cumulative fertility (F) by cohort and period, total

Age at survey	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39
15-19	0.301	0.017	0.000	0.000	0.000	0.000	0.000	0.000
20-24	1.536	0.589	0.019	0.000	0.000	0.000	0.000	0.000
25-29	2.930	1.941	0.524	0.034	0.000	0.000	0.000	0.000
30-34	4.239	3.644	1.898	0.567	0.027	0.000	0.000	0.000
35-39	5.360	5.302	3.529	1.737	0.418	0.018	0.000	0.000
40-44	6.103	6.724	5.142	3.151	1.500	0.412	0.023	0.000
45-49	6.450	7.789	6.571	4.575	2.842	1.437	0.457	0.032

P/F ratios by cohort and period, total

Age at survey	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39
15-19	1.057							
20-24	1.189	1.003						
25-29	1.121	0.974	1.028					
30-34	1.167	0.998	1.019	0.988				
35-39	1.118	0.918	0.910	0.909	0.980			
40-44	1.096	0.885	0.880	0.925	1.000	1.011		
45-49	1.100	0.867	0.865	0.930	0.996	1.037	1.019	

A similar cohort-period exercise has been performed for urban and rural areas. Table 5 and 6 show the P/F ratios for urban and rural areas, respectively. The P/F ratios in Table 5 for periods 0-4, 5-9 and part of 10-14 years prior to the survey are higher than 1.0 indicating a somewhat continuous decline in fertility in urban areas of Niger. In contrast, the P/F ratios for rural areas (Table 6) are only higher than 1.0 in the most recent period for all age cohorts and lower than one for the cohorts 25-29 and older in the 0-5 period, indicating a substantial rise in fertility in that period. The decrease in the latest period and increase in the preceding period is consistent with the omission/displacement conclusion drawn from the rural birth distribution shown in Figure 3.

Table 5. P/F ratios by cohort and period, urban								
Age at survey	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39
15-19	1.036							
20-24	1.182	1.036						
25-29	1.123	1.044	1.016					
30-34	1.186	1.094	1.015	0.987				
35-39	1.165	1.033	0.933	0.930	0.988			
40-44	1.125	1.000	0.916	0.958	1.078	1.007		
45-49	1.262	1.118	1.007	1.084	1.152	1.051	0.988	

Table 6. P/F ratios by cohort and period, rural areas								
Age at survey	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39
15-19	1.058							
20-24	1.189	1.000						
25-29	1.112	0.961	1.029					
30-34	1.151	0.978	1.016	0.987				
35-39	1.108	0.903	0.909	0.910	0.980			
40-44	1.087	0.868	0.875	0.920	0.988	1.012		
45-49	1.067	0.830	0.842	0.906	0.970	1.032	1.022	

The quality of fertility reporting can be examined by comparing cohort-period fertility rates for the same period of time but coming from the Niger 2017 DHS and the previous Niger 2012. If reporting is accurate then the two sets of rates should be the same within sampling error. Tables 6a shows the cohort-period rates for the periods ending in 2012 and 2007 based on the 2017 and 2012 surveys and the difference in the rates. Rates for cells with na are not applicable.

For the period ending in 2012, the positive values of the difference in rates (third column) indicate that either there was a displacement of births from the most recent period of the 2017 survey into the preceding period or that there was a displacement or omission of births for the most recent period in the 2012 survey. Going back a further five years for the period ending in 2007, the negative difference values indicate that there was a likely displacement for the 2012 survey into this period. However, comparing the rates from the 2017 survey for the periods ending in 2007 and 2012, a rise is noted in all but one cohort, indicating that displacement did occur in the 2017 survey.

Table 6a. Cohort-period fertility rates for five-year periods ending in 2012 and 2007, according to Niger 2017 and 2012 surveys

Age at end of period	Period ending in 2012			Period ending in 2007		
	2017 DHS	2012 DHS	Difference 2017-2012	2017 DHS	2012 DHS	Difference 2017-2012
15-19	0.114	0.084	0.030	0.101	0.101	0.000
20-24	0.270	0.286	-0.016	0.275	0.313	-0.038
25-29	0.341	0.323	0.018	0.326	0.375	-0.049
30-34	0.332	0.318	0.013	0.323	0.359	-0.036
35-39	0.284	0.263	0.022	0.286	0.331	-0.045
40-44	0.213	0.180	0.033	na	0.248	na
45-49	na	0.082	na	na	na	na

Table 6b. Cohort-period fertility rates for five-year periods ending in 2012 and 2007, according to Urban areas, Niger 2017 and 2012 surveys

Age at end of period	Period ending in 2012			Period ending in 2007		
	2017 DHS	2012 DHS	Difference 2017-2012	2017 DHS	2012 DHS	Difference 2017-2012
15-19	0.051	0.032	0.019	0.058	0.056	0.002
20-24	0.172	0.194	-0.022	0.203	0.211	-0.008
25-29	0.249	0.250	-0.001	0.268	0.267	0.000
30-34	0.251	0.249	0.002	0.257	0.252	0.005
35-39	0.190	0.211	-0.021	0.241	0.250	-0.009
40-44	0.137	0.125	0.012	na	0.168	na
45-49	na	0.049		na	na	na

Table 6c. Cohort-period fertility rates for five-year periods ending in 2012 and 2007, according to Rural areas, Niger 2017 and 2012 surveys

Age at end of period	Period ending in 2012			Period ending in 2007		
	2017 DHS	2012 DHS	Difference 2017-2012	2017 DHS	2012 DHS	Difference 2017-2012
15-19	0.130	0.099	0.031	0.110	0.113	-0.003
20-24	0.291	0.310	-0.019	0.288	0.335	-0.047
25-29	0.357	0.339	0.018	0.339	0.396	-0.057
30-34	0.349	0.332	0.017	0.336	0.382	-0.046
35-39	0.303	0.274	0.030	0.293	0.350	-0.057
40-44	0.225	0.193	0.032	na	0.265	na
45-49	na	0.089	na	na	na	na

Tables 6b and 6c are similar to table 6a for urban and rural areas, respectively. There is little evidence of displacement and omission for the urban areas but these problems are evident in the rural areas.

Summing up, displacement of births from the most recent five-year period to the preceding period appears to have occurred in both the 2012 and 2017 as well as omission of births in the most recent period of both surveys.

5. The proximate determinants model yields a deficit of a 0.8 births

The role of contraceptive prevalence in the level of fertility can be ascertained by applying the proximate determinants model, first derived by John Bongaarts. Table 7a and 7b give the results of applying this model by type of area and education.

Table 7a. Analysis of the Proximate Determinant of Fertility according to Bongaarts' model for Total and Urban and Rural Areas, Niger 2017

		Columns for Prox. Determinants							
	TFR	CM	CC	CI	CMxCC xCI	TF	TMF	TNF	Implied TFR
Type of residence									
Urban	4.65	0.69	0.82	0.60	0.33	13.96	6.79	8.32	5.10
Rural	6.28	0.91	0.93	0.55	0.47	13.42	6.87	7.35	7.16
TOTAL									
Total	5.98	0.87	0.92	0.55	0.44	13.53	6.87	7.48	6.77

The model takes three proximate determinants into account. CM is the reduction in total fecundity due to delaying marriage until after age 15, CC is the reduction due to use of contraception, and CI is the reduction due to postpartum infecundity (postpartum amenorrhea and postpartum abstinence). TF is estimated total fecundity, TMF is estimated total marital fertility and TNF is total natural fertility.

Postpartum infecundity accounts for 45% of the reduction of total fecundity of 13.5 births to the actual fertility level, and marriage after age 15 and use of contraception account for 6.5 and 4.5% of the reduction, respectively (Table 7b).

Table 7b. Percent of Estimated Total Fecundity according to Bongaarts' model for Total and Urban and Rural Areas, Niger 2017

	TFR	Percent of Total Fecundity: Delayed Marriage	Contraception	PP Infecundity	Total
Type of residence					
Urban	33.31	15.30	11.02	40.37	100.00
Rural	46.76	4.38	3.60	45.25	100.00
TOTAL					
Total	44.24	6.54	4.54	44.67	100.00

The model has an implied total fertility rate of 6.8 births per 1000 women which compares an actual rate of 6.0. There are therefore 0.8 births per woman that are not accounted for by the proximate determinants.

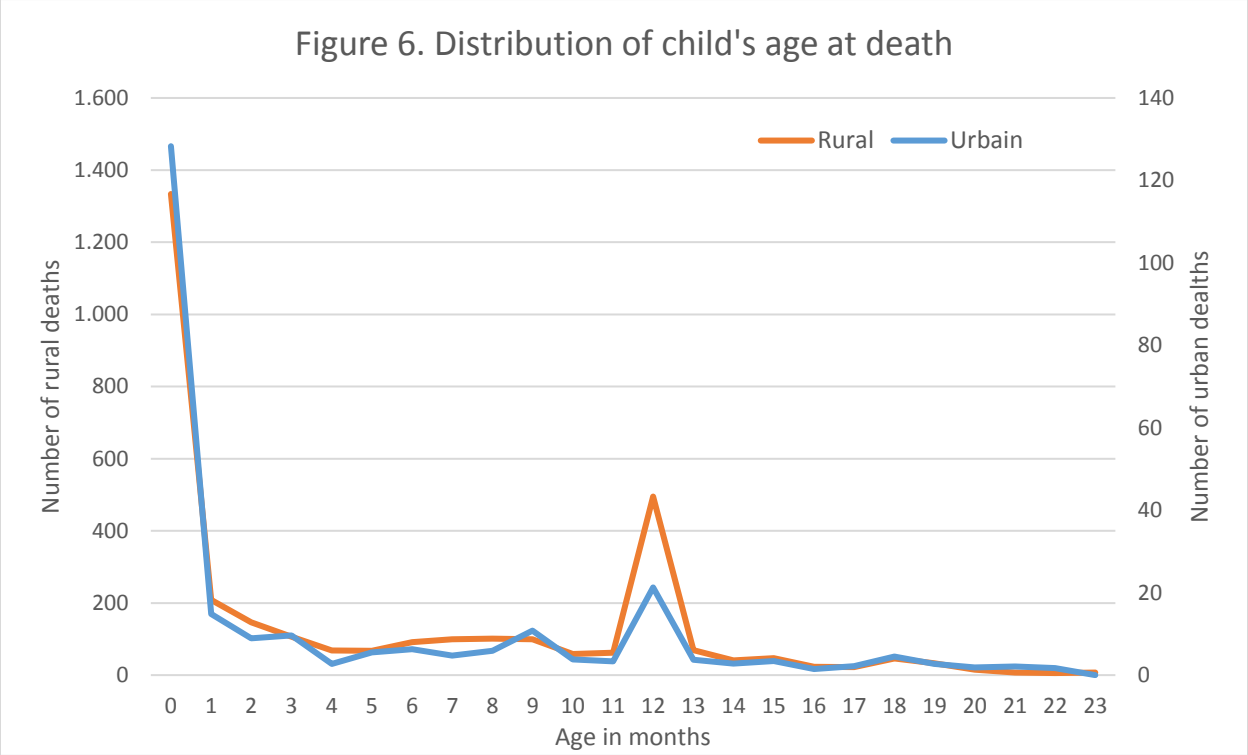
Table 7c is the same model applied to the Niger 2012 DHS. For the earlier survey, the TFR is in line with the implied TFR and indicates no omission of recent births. The value of CC is the same for both surveys, implying that there has not been a change in the effect of contraception between the two surveys.

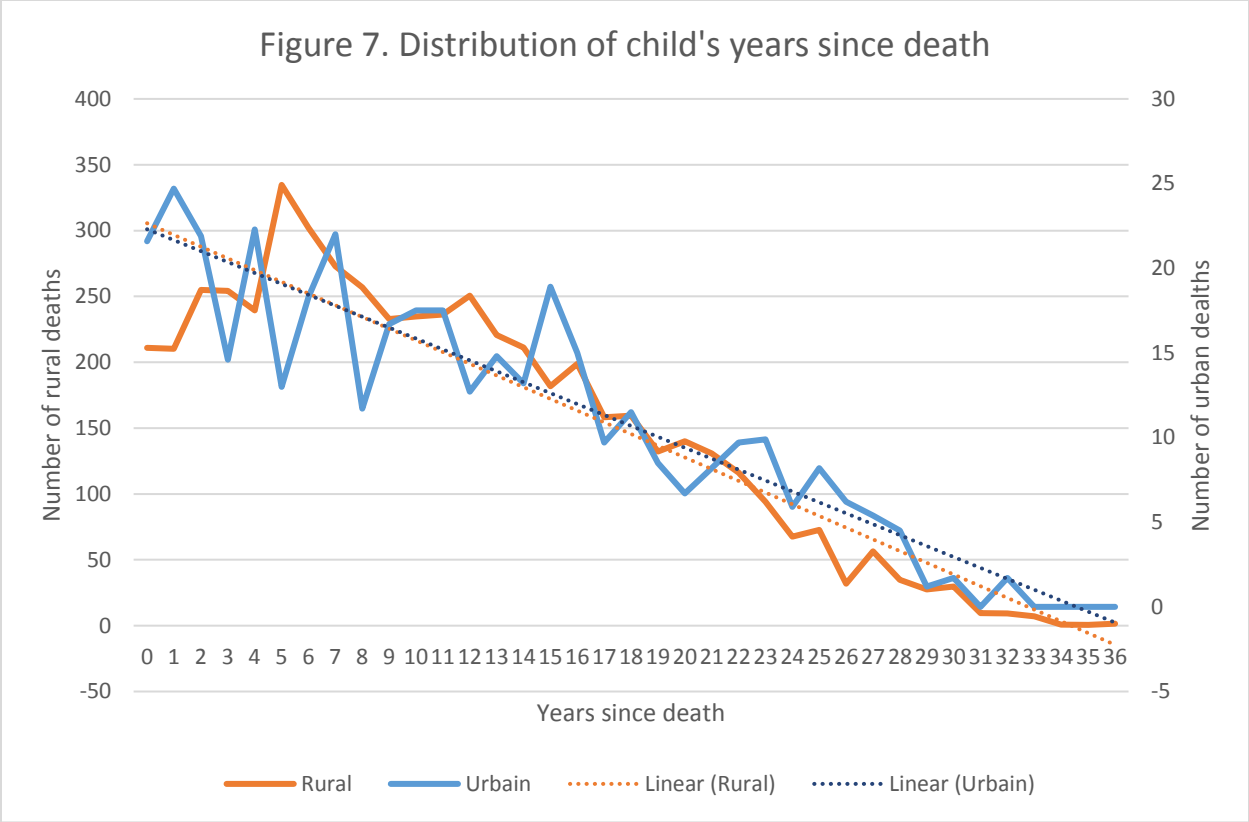
Table 7c. Analysis of the Proximate Determinant of Fertility according to Bongaarts' model by background characteristic Country: Niger 2012

		Columns for Prox. Determinants							
	TFR	CM	CC	CI	CMxCC xCI	TF	TMF	TNF	Implied TFR
Type of residence									
Urban	5.55	0.73	0.78	0.69	0.39	14.07	7.58	9.74	6.04
Rural	8.11	0.95	0.94	0.59	0.53	15.42	8.58	9.09	8.04
TOTAL									
Total	7.62	0.90	0.92	0.60	0.50	15.25	8.43	9.17	7.65

6. **Age at death for dead children not well reported**:
Figure 6 presents the distribution of dead children by age at death in months for the first 24 months of life. It is clear from this figure that there was a tremendous amount of heaping on age 12 months, more so for rural areas than for urban areas but little heaping on other ages. (The great number of deaths at less than one month—neonatal deaths—is to be expected.) The large heap on 12 months indicate that age at death was not well reported.

Figure 7 shows the distribution of children's deaths by time since death in years. There is substantial year to year variation with some indication of heaping, on 15 years prior to the survey for urban areas and 5 years before the survey for rural areas. While the linear trend lines (dashed lines) are very similar for urban and rural areas, the number of deaths in rural areas decreases in the most recent five-year period. There does not appear to be such a decrease for urban areas. The decrease in the number of deaths in rural areas is indicative of omission of recent dead children and perhaps some displacement of dead children's dates. However, comparing Figures 5 and 7 leads one to believe that there was offsetting omission of living and dead children, so that infant and child mortality rates were much less affected than by observing Figure 7 by itself.





7. Anthropometry data suggest data may have been made up

The estimation of nutritional status of children is measured through anthropometry. Four indicators produced, height for age, weight for age and weight for height, and BMI rely on the measurements of height, weight, and age at the time of the survey. If these individual measures are in error then the evaluation of the nutritional status will likewise be in error. For a population, selective omission of children will also bias the estimation of the population's status. Omission of children has already be seen for children under age five in rural areas. In this section, the reports of children's height, weight and age are examined to assess the accuracy of the estimation of the nutrition indicators.

Figures 8 and 9 show the distribution of children's heights in centimeters and weights in kilograms for urban and rural areas. While both are measured in finer increments that that graphed, the patterns reveal deviations from the expected normal curve shape. Beyond the quite spikey nature of the curves, there are dips in height between 72 and 89 centimeters for urban areas and 76 and 88 centimeters for rural areas. The weight distribution, with a less finely graphed axis, also shows an unexpected dip at 10 kg. Since these measurements are taken directly from children using height boards and digital scales, such dips should not be expected and may be indicative of some made-up data.

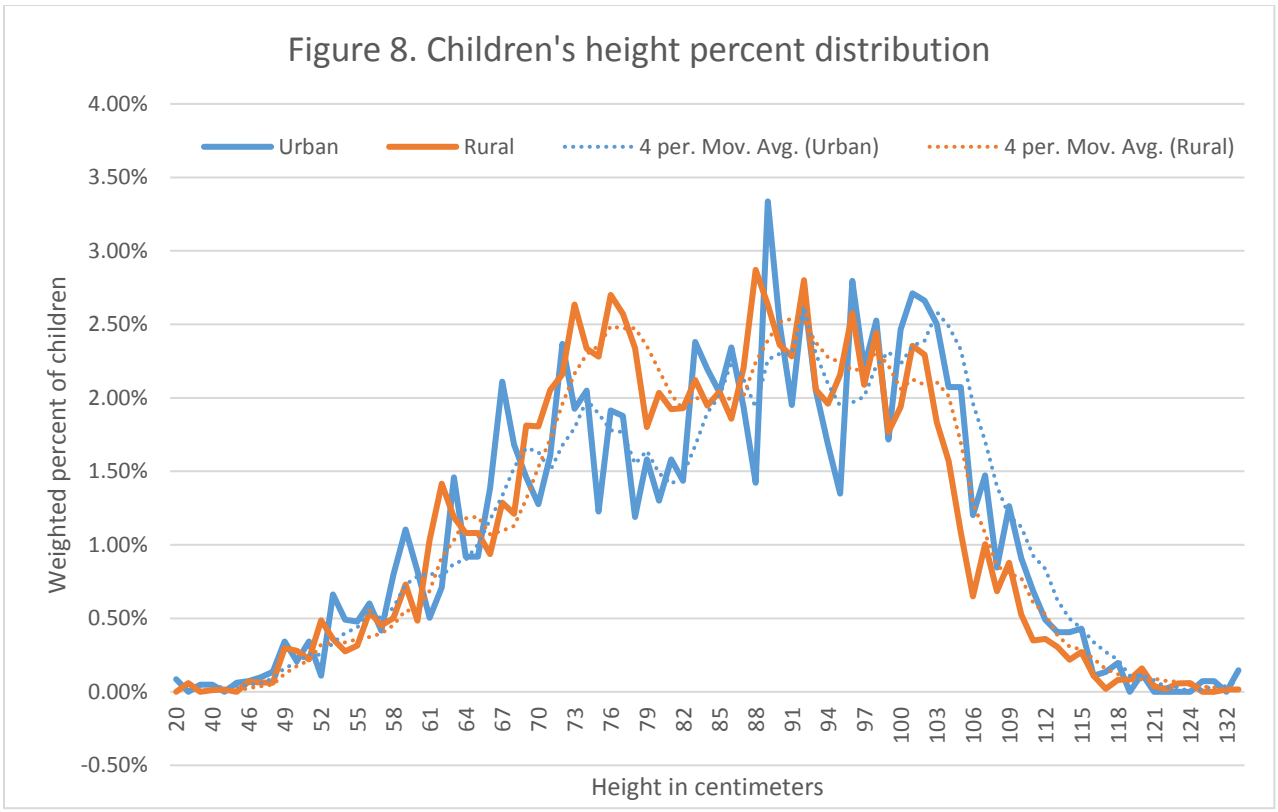


Figure 8. Children's height percent distribution
Urban
Rural
4 per. Mov. Avg. (Urban)
4 per. Mov. Avg. (Rural)
Weighted percent of children
4.00%
3.50%
3.00%
2.50%
2.00%
1.50%
1.00%
0.50%
0.00%
-0.50%
20 40 46 49 52 55 58 61 64 67 70 73 76 79 82 85 88 91 94 97 100 103 106 109 112 115 118 121 124 132
Height in centimeters

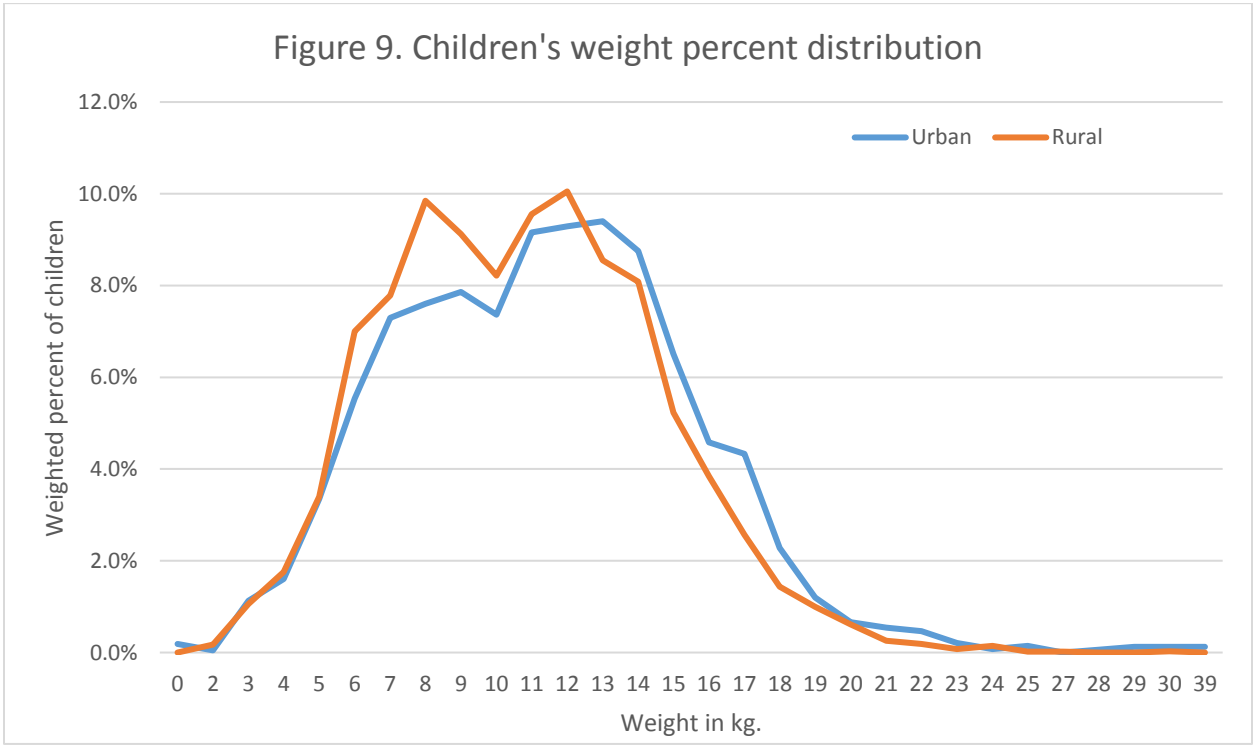


Figure 9. Children's weight percent distribution
Urban
Rural
Weighted percent of children
12.0%
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
0 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 27 28 29 30 39
Weight in kg.

Given that heights and weights should have continuous values, a preference for values of 0 and 5 as final digits may indicate false or made up reporting. Since 0 and 5 represent 20% of final digits, that percent of children should have those final digits. For weight measured in centigrams, the percentage reports with a 0 or 5 final digit is 21.1% in urban areas and 19.5% in rural areas, indicating no substantial digit preference. The same lack of substantial digit preference is found for height measured in millimeters, with urban areas having 23.6% and rural areas 19.3% of reports ending in 0 or 5. For children's age, usually preferred values are those that are a multiple of 6. In urban areas, 16.4 percent of children had an age in months that was a multiple of 6 as did 17.7% of rural children. The expected percent is 16.7 percent so that neither area indicates a preference for certain ages among the children with anthropometry data.

8. Vaccination data are questionable

The accuracy of vaccination reporting is difficult to evaluate based on a single survey. Indeed, even comparing between surveys at different points in time is problematic since there may be rapid changes in vaccination rates due to the start and ending of special campaigns, lack of supplies and funding, and changes in attitudes towards vaccination (increasing or decreasing wariness about side effects, etc.) Changes in the format of vaccination cards can lead to mistakes in recording.

Table 8 summarizes coverage of vaccinations from several sources over time. If the data from the 2012 Niger data are to be believed, then the dramatic decline seen in the 2017 Niger DHS is not plausible. However, it is also possible that the 2012 DHS, as well as the WHO estimate, may have overstated the coverage rates.

Table 8. Coverage of vaccinations, children 12-23 months

			DHS				
	WHO estimate 2017	ECV 2017	2017	2012	2006	1998	1992
All basic	na	38	30	52	30	18	17
BCG	93	91	74	84	64	47	40
DPT3	81	80	52	68	39	25	20
Polio3	82	82	42	75	55	24	20
Measles	78	76	55	69	47	35	28
Yellow fever	81	na	35	na	37	na	na
None	na	4	21	4	16	40	59

Note: WHO and UNICEF estimates of national immunization coverage, July 7, 2018, from https://data.unicef.org/wp-content/uploads/country_profiles/Niger/wuenic2017rev-ctry-reports/immunization_2018_ner.pdf

Another way at looking at vaccination coverage is to see whether children are receiving their vaccinations according to their age, for children less than 36 months. The results are presented

in Table 9. Coverage appropriate for age is substantially lower from the 2017 survey compared with the 2012 survey in urban areas and in regions Agadez, Diffa, Dosso, Zinder and Niamey. While coverage appropriate for age is a little lower in 2017 than in 2012 for the whole of Niger, the difference is not nearly as great as that evident for children 12-23. Therefore other factors may be affecting the 2017 results for children 12-23 months, perhaps age displacement to/from the 12-23 month age range.

Table 9: Percentage of children less than 36 months with basic vaccinations completed for age, Niger 2012 and 2017

	DHS 2017		DHS 2012	
	Percent Complete	N	Percent Complete	N
Region				
Agadez	36%	50	55%	40
Diffa	24%	84	44%	51
Dosso	40%	247	48%	319
Maradi	46%	407	35%	678
Tahoua	36%	381	35%	683
Tillabéri	47%	425	45%	359
Zinder	18%	399	35%	618
Niamey	62%	125	69%	151
Type of place of residence				
Urban	58%	308	65%	378
Rural	35%	1811	36%	2520
Total	38%	2118	40%	2898

9. **Potential problems with interviewing fieldwork, listing or sample design**:

Table 10 compares the Niger 2017 DHS with the Niger 2012 Census for distribution by type of residence and region for the population (household in the survey and total population in the census). It can be seen comparing columns 2 and 3 that there are large differences between the distributions by residence and for the Dosso and Niamey regions. By taking the ratio of the relative distributions between the survey and the census, an expansion factor can be calculated (column 4). Relative weights based on the expansion factor are given in column 5. Columns 6 and 7 give weighted and unweighted household members from the survey, from which an average relative sample weight is calculated in column 8. Column 9 compares the sample weight to the census-based weight by ratio. It can be seen that only for Niamey and Tillabéri are the ratios close to 1.0, indicating agreement. Particularly different are the weights for Agadez and for Differ and Zinder (combined). Since the greatest portion of the sampling weights come from the sampling fraction to compensate for unequal sampling (the rest is from response rates), column 9 indicates that there may have been a problem either in the sample design, the cluster dwelling listing, or the in the interviewing field work.

Table 10. Distribution of HH Pop by 2017 DHS and 2012 Census

Résidence	2017 DHS Total pop.	2017 DHS % pop of total	2012 Census % pop of total	Census/ survey (expansion)	Relative to total ratio (implicit weight)	2017 DHS Individual Interviews Weighted	2017 DHS Individual Interviews Unweighted	Average relative sample weight	Sample weight to census expansion ratio
Niamey urbain	3459	5.7%	8.5	401.47	0.665	795	1189	0.669	1.005
Autres villes	6034	9.9%	13.2	354.52	0.753	1317	2176	0.605	0.804
Ensemble urbain	9493	15.6%	21.7	371.63	0.719	2112	3365	0.628	0.873
Rural	51453	84.4%	78.3	247.74	1.078	9712	8459	1.148	1.065
Région									
Agadez	1749	2.9%	3.3%	307	0.871	361	1117	0.323	0.371
Dosso	6401	10.5%	13.2%	335	0.798	1372	1933	0.710	0.889
Maradi	11713	19.2%	19.8%	275	0.972	2124	1983	1.071	1.102
Tahoua	11321	18.6%	17.4%	250	1.069	2203	1759	1.252	1.172
Tillabéri	11191	18.4%	16.3%	236	1.130	2186	1938	1.128	0.998
Diffa et Zinder	14985	24.6%	21.8%	235	1.137	2753	1847	1.491	1.310
Niamey	3587	5.9%	8.5%	387	0.690	824	1247	0.661	0.958
Ensemble	60947	100.0 %	100.2 %	267	1.000	11824	11824	1.000	1.000