The Analysis of Children Ever Born Data for Post-Reproductive Age Women

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Notestein Seminar
Office of Population Research, Princeton University
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Abstract

Children ever born data for post-reproductive age women, if accurately reported, provide information on historical fertility trends that is often not available from any other source. Accuracy of reporting cannot be assumed, but may be objectively evaluated when data are available for two or more censuses.

This talk will present a simple technique for 'time plotting' children ever born data to assess completeness of reporting and, if the assessment is satisfactory, display historical fertility trends. An advantage of the procedure is the possibility of historical estimates of parity progression ratios often available from no other source, e.g., for pre-World War II fertility decline in Japan.

The technique will be illustrated by application to a diverse set of developed and developing countries: Japan, Kenya, Thailand, Korea and the United States, all of which have children ever born data for at least two censuses. These examples show that children ever born data for post-reproductive age women is often more accurately reported than has been generally supposed.

Introduction

Children ever born data, collected in population censuses and large scale surveys, is one of the most important sources of information on human fertility, complementing birth registration data (in combination with population censuses) and birth histories from fertility surveys.

Children ever born data is available for many populations and time periods for which birth registration data does not (and will never) exit. Census data on children ever born, unlike survey data, is available (in censuses) for the entire population, so we can look at (a) arbitrarily small geographical regions, and,

therefore, (b) extremely fine-grained spatial detail, and (c) arbitrarily small other subgroups, e.g., small ethnic minorities.

Even where birth registration data is available, children ever born data has the advantage of providing fertility measures specific for many characteristics that birth registration data do not. The registration certificates from which birth registration data derive contain minimal or no information on social and economic characteristics, and even if such information is introduced, it is available only for the most recent years. By comparison, the population census is an extremely flexible instrument, providing the possibility of new classifications every five or ten years. The retrospective character of children ever born data means, moreover, that data collected in a single census provides information for the preceding half century or more.

Unlike birth registration data, children ever born data doesn=t pose a Adenominator problem@-- the source data gives both numerator and denominator. Children ever born data also gives fertility measures, notably parity progression ratios, that very few birth registration systems provide.

As a matter of particularistic historical fact, children ever born data is available for many populations and time periods for which neither registration (especially complete registration) nor birth history data are available. Birth registration data is either lacking altogether or seriously incomplete, for example, for the whole of south Asia, much of southeast Asia, and for China, and on these counts alone omits a large fraction of world population. Children ever born data is thus particularly important for historical investigations and selected area studies.

Most recently, children ever born data has acquired a new significance as a necessary input to the method of birth history reconstruction, which provides birth histories from census and large scale census data, making possible analyses of birth histories on a scale not previously possible.

For all these reasons, children ever born data is particularly important for social, economic, and historical studies. Even within demography, however, it has rarely been utilized to full potential. There are various reasons for this, but one of the most important has been the suspicion that reports of children ever born for older women are usually too defective to provide useful information. This paper provides a method of analysis for establishing the quality of children ever born data and applies it to numerous particular cases. It is established, beyond any reasonable doubt, that while children ever born data for older women is defective in many

cases, it is remarkably accurate in many other cases, whence that data must be assessed anew in each investigation.

The significance of *post-reproductive age* women is three fold. First and most importantly, it means that the numbers of children ever born represent completed fertility. Second, it raises the question of under reporting of children ever born, widely suspected to increase with age, and particularly beyond the ages of reproduction. Third, children ever born for post-reproductive age women cannot, by definition, increase with increasing age except by a process of mortality (or, for certain kinds of data, other) selection.

Children ever born data has been under utilized, however, and one reason is the widespread suspicionC conviction, evenC that reporting for older women is too poor to provide useful information. In the next 45 minutes or so I expect to convince you that this is not the case, and to do so by describing what is probably the simplest tool of demographic analysis you=ll ever encounter, something I call Atime-plotting@ children ever born data for post-reproductive age women.

Time Plotting Children Ever Born Data

The idea of time-plotting children ever born data is simply to identify the mean number of children ever born for a cohort of women that has completed reproduction with the time at which this cohort reaching it=s mean age at childbearing. Given a cohort of women aged $x > 50$ at time t for which the mean age at childbearing is m, we regard the mean children ever born for the cohort as an estimate of the period total fertility rate for the population at time $t - (x - m)$, as illustrated in the Lexis diagram in Figure 1.

The mean number of children ever born to women aged 50-54 at the 1910 US census, for example, was 4.37. These women were aged 52.5, on the average, and we may estimate the mean age at childbearing to be 30 years. The cohort reached age 30 (on the average) 22.5 years prior to the census data (52.5 - 30). The census was taken on 1910.25 (1 April 1910), whence the period total fertility rate (TFR) as of 1910.25 - 22.5 = 1887.75 was 4.37 children per woman. Showing fractional parts of years in this way is useful to illustrate the calculation. In practice, we would usually be content to say that the given figure is an estimate for the (calendar) year 1887.

Several observations may be made of this estimate. First and most obviously, if children ever born are under reported, it will be too low. Because this is always a

potential problem, we will not in general time plot children ever born data unless we can do so for two or more censuses and derive overlapping time series, which (as explained below) provides evidence of under reporting.

Second, because short term fluctuations in period fertility are heavily smoothed in cohort data, estimating period from cohort fertility may give seriously erroneous estimates for a particular year. If children ever born data are accurately reported, however, the long term trend indicated will be accurate. It may be thought of as what we would get from smoothing an annual time series of total fertility rates if such a series were available.

Third, differential mortality risks by number of children ever born will introduce errors. If higher fertility women experience higher fertility risks, for example, mean children ever born for the surviving women enumerated in a census will be lower than for the cohort as a whole. Overlapping trends from successive censuses provides evidence on this. It is in general a trivial error.

Similarly, migration into or out of the population may induce departures of complete cohort fertility from period fertility at the mean age of childbearing for the cohort. For errors on this account to be serious, both the level of migration and the differential fertility of migrants and non-migrants must be very high. This will very rarely be the case for national populations, and not usually the case for many subpopulations.

Finally, since we will not usually have a value for the mean age at childbearing for the cohorts in question, it is necessary to use an estimate. Fortunately, mean age at childbearing does not vary a great deal, either over time or across populations. Fertility decline tends (other things being equal) to lower mean age at childbearing (because numbers of higher order births decline, and these births occur at older ages), but fertility decline is usually accompanied by rising age at marriage, which tends (other things being equal) to raise mean age at childbearing. The net result is that mean age at childbearing doesn=t change very much with fertility decline. In the absence of more specific information, mean age at childbearing is conveniently taken to be 30 years.

Interpretation of Time Plots

The first step in assessing the quality of children ever born data for post-reproductive age women is to time plot it for two or more censuses and scrutinize the resulting plot for consistency. Figure 2 shows three possible results of this in

schematic form (the south-west quadrant merely labels the scales).

The first case represented is that in which (a) fertility has been constant and that (b) children ever born is completely reported. In this case the two time plots will be straight lines of the same height. This same picture would be observed if children ever born is under reported to the same degree at all represented age groups at both censuses. Since under reporting of children ever born, where present, is expected to increase with increasing age, however, we do not generally expect to find this. Empirical data showing this pattern is thus fairly strongly suggestive of both constant fertility and reasonably complete reporting of children ever born.

The second case represented is that in which (a) fertility has been constant (as in the first case), but (b) reporting of children ever born deteriorates with increasing age of woman. In this case the time plots from both censuses go down as we move to the left, i.e., as we move to older women, giving the appearance of increasing fertility. The appearance of the individual time plots is belied, however, when we compare them. Because completeness of reporting of children ever born declines with increasing age, the level indicated at any given time for the more recent census lies below the level indicated by the earlier census. The discrepancy between the intra-census variation and the inter-cental variation instantly indicates under reporting.

Note that there is no assumption that the highest values shown (the far right of each series, corresponding to the youngest age group) are correct. Children ever born to the youngest post-reproductive age women may be substantially under reported. We do however obtain a quantitative indication of the relative level of under reporting for older age groups.

The third case represented is on in which (a) fertility was increasing during the period in question and (b) children ever born data are accurately reported. The inferences here is that fertility was indeed increasing, that reporting of children ever born was reasonably complete, and that biases due to mortality or migration are not sufficiently large to obscure the picture.

It will be observed that these inferences are not absolute. It is possible, for example, that the pattern represented in the third case results from a combination of (a) increasing under reporting of children ever born with increasing age of woman and (b) an overall improvement in completeness of reporting of children ever born between the two censuses just sufficient to remove the discrepancy that would otherwise be observed. The first condition would yield the pattern shown in the

northeast quadrant of Figure 2, but the second would lift the second series just sufficiently to bring the two time plots into coincidence. While this is logically possible, it will in general be implausible. The case calls for ADuncan=s Law@ (enunciated to the author as a graduate student at the University of Michigan during 1967-68 by Otis Dudley Duncan): *nature is not antagonistic to our efforts to understand her, merely indifferent.*

That=s all there is to the method, aside from some elaborations we=ll mention in closing. We proceed now to look at a series of applications.

Japan Censuses of 1950, 1960, and 1970

The 1970 census of Japan provides mean numbers of children ever born to all women by quinquennial age groups to age 80-84. Taking these women to be 82.5 years old exactly and assuming them to have had all their children at exact age 25 dates the fertility of the cohort 57.5 years prior to the 1970 census, the reference data of which was October 1. Mean children ever born to these women (4.568 children per woman) is thus plotted at time 1970.75 - 57.5 = 1913.3. It is generally worth taking account of tenths of a year, but not of any higher precision.

It is not necessary to repeat this calculation for the other age groups, for we know that the 75-79 age group will be plotted five years forward of the 80-84 age group, and so on. We may of course work forward from a younger age group, but since the youngest usable age group varies from one application to another, it is preferable to work from the oldest age group. Irregular age groups, grouping by ten year groups after age 50, for example, may of course require repeated dating calculations.

(The general procedure for converting census dates into decimal times is to add the number of days in all months preceding the census month to the number which is the census day and divide by the number of days in the year. Carrying the result to three places after the decimal allows recovery of the date from the decimal form and is therefore recommended as general practice.)

Figure 3 time plots mean children ever born for the 1950, 1960 and 1970 censuses of Japan. Look at the plot. What are we looking at? What do we see? What does it mean? What sort of pattern would be observed if reporting deteriorated with increasing age?

Figure 4 shows the same time plot of children ever born data, but this time

together with period total fertility rates from 1960 forward. Note how well the two series, based on radically different data source, join together.

Figures 5-8 show a series of estimates and comparisons based on work I did for the review paper *Fertility Decline in East Asia* (**Science 266**, 2 December 1994: 1518-1523). The first shows all available post-war values of annual total fertility rates. The very high levels at the beginning of the series in the late 1940s together with the paucity of data for earlier years have lead more than one researcher to suppose that Japan=s fertility decline was a postwar phenomena.

Figure 6 show the same TFRs as Figure 5, but supplemented by scattered estimates for earlier years available in *Historical Statistics of Japan* (Japan Statistical Association, Tokyo, 1987, vol. 1, page 272). While there is some indication of fertility decline beginning during the 1920s, the points are too sparse for a confident conclusion. A simple interpolation technique based on the census age distributions, described in note 18 of the **Science** paper, fills in values for missing years and gives the picture shown in Figure 7. At this point it becomes very clear that the high TFR values in the late 1940s were a post-war aberration, that fertility decline had begun *circa* 1930 and had been proceeding for nearly two decades before the post-war registration data shown in Figure 5 begin.

Figure 8 shows, finally, the annual TFR series shown in Figure 7 overlaid with time plotted mean children born data from the censuses of 1950-1970 (Japan ceased to collect children ever born data with the 1980 census). The values plotted are not observed mean children ever born values, but values adjusted on the basis of differences between the values observed for cohorts at the three censuses (the adjustment procedure is described in note 19 of the **Science** paper). As the largest of the adjustment factors is 1.067, however, the picture differs but little from what would be observed if unadjusted values had been plotted.

Figure 8 illustrates the proposition that the time series derived from mean children ever born data may regarded as a smoothed annual series. Observe that as regards level, the two series are nearly identical. The retrospective trend for 1920-1950 derived from the 1950 and subsequent censuses gives essentially as good a picture of fertility decline as the historical estimates.

Kenya Censuses of 1962, 1969, and 1979

Japan is a special case in more ways than one, and a good result in Japan doesn't say much about what might happen elsewhere, so let's look at a radically

different example, Kenya. Without knowing anything very much about the country, one guesses that the CEB data for older women will be problematic.

Look first at the 1962 data shown in Figure 9 It jumps around a good deal, but the trend is clearly up. Eyeballing a straight line fit would show fertility rising from something like five children in 1920 to perhaps 5.6 in 1940. This is a rate of increase of 0.3 children per woman per decade, enough to lift fertility by 1.5 children per woman over the 50 year time period shown.

If we can believe it, that is. But it is by no means clear that we should believe it. With no more evidence than this, it is at least as plausible that the apparent increase in fertility is in fact a decline in completeness of reporting children ever born with increasing age of women after age 50. Many teachers of basic demographic methods would rebuke you sharply for supposing that this figure shows anything about changing levels of fertility in Kenya during the first half of the 20th century.

Which, incidentally, is a period for which *no other national level data whatsoever* is available. If we can say something about levels of fertility from this data, in other words, it is very well worth while doing so.

Think about the bad data argument. Suppose it is true. If it is true, what will the plot of the 1969 data look like when we put it up? That's a real, not merely a rhetorical question. What will we see? (Think for at least 60 seconds before looking at Figure 10.) The idea is that reporting deteriorates as women age, so that looking at the same cohort at a latter time (as of the 1969 census instead of the 1962 census) will give a *lower* mean children ever born. We know this is an error, if it happens, because mean children ever born *can't* change during post-reproductive ages. (Unless of course it refers to something screwy like children ever born in the current marriage-- as some of the Australian data is, but never mind that now, it's a rare case.) This means the 1969 plot should be lower than the 1962 plot, right? Think about it. Because of the way we plot, any two points lying on the same vertical line correspond to the same cohort.

It's simpler to think about, of course, if the censuses are a multiple of five years apart (think again with the 1969-1979 comparison, coming up).

What do we see, in fact? Figure 10 the time-plot of the 1969 census points (shorter because the last quinquennial group is only 60-64, more's the pity). Well? What do we see? The points for the 1969 census are higherC not lower, as they

should be if reporting deteriorates with increasing age of woman. Does this mean that reporting is improving with increasing age of woman? Surely not. What does it mean?

What do you think 1979 will show? All three censuses are time plotted in Figure 11. What's the conclusion now? The difference is not so pronounced between 1969 and 1979 as it is between 1962 and 1969, but it is in the same directionC inconsistent with what would be observed if completeness of reporting declines with increasing age of woman.

Should we conclude that fertility was indeed rising during the period in question? Why or why not? If it wasn't rising, why do we see the pattern we see? What kind of errors in the data would create this pattern despite constant (declining?) fertility? How should the discrepancies between the three time plots be interpreted?

The first conclusion is that fertility really was increasing in Kenya during four decades from 1920 to 1960. (As Bill Brass observed on seeing these results, given the extremely high levels that had been reached by the 1960s, it certainly is no surprise that fertility hadn=t been *declining*). All evidence points to this: the >within census= comparisons represented by each individual time plot, the >between census= comparisons of successive time plots, and comparisons of mean children born for the same age group at successive censuses. While it is logically possible to explain all this away, the assumptions that must be made about compensating errors are far more implausible than that fertility really was rising.

The second conclusion is that overall completeness of reporting of children ever born data rose from one census to the next, a lot between 1962 and 1969, a little between 1969 and 1979. A subsidiary, and surprising conclusion, is that there is no evidence of differential under reporting by age, at least for women over age 40-50. It is of course possible that there are significant age differentials at younger ages.

The magnitude of the improvement in reporting between censuses may be estimated very simply by seeing what sort of upward adjustment is required to bring the 1962 time plot up to the level of the 1969 time plot, and the 1969 time plot up to the level of the 1979 time plot. Figure 12 shows the result of adding 0.7 children per woman to the 1962 values and 0.1 children per woman to the 1969 values. The general raggedness of the series remains, of course; probably it is due to differential age heaping on ages ending in 0 and 5. The three resulting time plots show very

good overall consistency, however, and something very close to linear increase in mean children ever born from about 5.5 children per woman in 1920 to over 7.0 children per woman in the early 1960s.

Figure 13 concludes the analysis of the Kenyan data by fitting a straight line to all the points in figure 12. The fitted line rises at a rate of 0.04 children per woman per year, or 0.4 children per woman per decade, and the fitted line rises from 5.75 in 1920 to 7.35 in 1960.

The example of Japan shows how much useful information may be gained by time plotting children ever born data when it is good. The example of Kenya shows how much may be learned even when it is not particularly good. Note, too, that for Kenya, the children ever born data has essentially *no competition* from any other source (at the national level, at any rate). We have learned something from the children ever born data that no other data could tell us.

Thailand Censuses of 1960, 1970, and 1980

Figure 14 shows time plots of children ever born data from the 1960 and 1970 censuses of Thailand. Note the indication of rising fertility and the nearly perfect agreement between the two series (though there is only one point of overlap). Figure 15 shows a straight line fine, indicating an increase of 0.022 children per woman per year over (roughly) the period 1920-1960, for an overall rise from 5.6 children per woman in 1920 to 6.5 children per woman in 1960 (a slight extrapolation beyond the observed points). While it is possible that the levels indicated are low, there is no indication of deteriorating completeness of reporting with increasing age of woman beyond age 45. And Thailand is the major country we have seen for which this is true.

Against this background, Figure 16, which adds 1980 data to the 1960 and 1970 data shown in Figure 15, may come as something of a shock. The 1980 points are spaced further apart because the published data collapses to 10 year age groups, but the detail lost does not significantly affect the picture. The 1980 data for post reproductive age women are roughly one child per woman below the levels indicated (consistently) by both the 1970 and the 1960 censuses, and since it cannot plausibly be suggested that children ever born were over reported in the earlier censuses, the only possible conclusion is that it was under reported in the 1980 census.

Clearly something went very wrong with the children ever born question in the 1980 census; we do as yet not know what. The example shows that we cannot

rely on census results in a given country being consistent from one census to the next. Often they are consistent, but on occasion there will be discontinuities, some readily accounted for, others of uncertain origin.

Korean (South) Censuses of 1970-1985

Korea took censuses every five years during this period, so we have a total of four censuses and more than usual overlap in time plots of the children ever born data. In Figure 17 we seeCat last!Cevidence of what many of us have learned to think is the essentially universal case: deteriorating completeness of reporting of children ever born with increasing age of woman. In every case, the time plot for the later census lies below the time plot for the earlier census.

We will not go into details here, but the comparison of the time plots gives an indication of the magnitude of under reporting and may be used to adjust the observed values. The results of one such adjustment are shown in Figure 18. The trend is unquestionably closer to the truth and the unadjusted values, but the level *circa* 1930 is suspiciously high. Pursing this analysis would require going to the various other sources of information on fertility levels available for pre-war Korea.

United States Censuses of 1910, 1940, 1950, 1960, 1970, and 1980

Figures 20-25 show time plots of US children ever born data extending to progressively earlier censuses. Not a great deal needs to be said here, given what has come before. The consistency of the plots for the censuses of 1940-1980 is little short of extraordinary. There is no indication of any increase in under reporting of children ever born even for the oldest age groups, which are very old women indeed.

This does not of course mean that the levels indicated are correct(the point has been made before, but bears repeating). If they are low, however, they are all low by about the same amount. That is what the consistency of the time plots tells us, not that the level is necessarily correct, but that under reporting does not increase with increasing age.

There is a clear indication of discrepancy between the time plot for the 1910 data and the later plots (data for the intervening censuses are not available, else they would be shown; I at any rate was unable to find them). There is no absolute inconsistency, since the plots do not overlap, but the left end of the plots for the later censuses appears very obviously lower than it should be in relation to the right end

of the 1910 plot. It is possible that there was an atypically sharp drop in fertility during the 1890s. An interesting follow up here is to compare the levels indicated with those given in the US cohort fertility tables of Heuser, an exercise similar to that described above for Japan. This is left (as textbooks say) as an exercise for the reader.

The time plot for 1980 is lamentably short because the published data truncate at 65+, rather than 85 plus (1960 and 1970 censuses) or 75+ (1910 and 1940 censuses). One might wonder whether the US Census Bureau finally became persuaded (erroneously) by conventional wisdom that data for older women aren=t worth looking at. The 1950 published data, which truncate even earlier (60+) belie this. The history of truncation points makes no sense whatever and leads one to suspect that such tabulation plan decisions are as much random as the result of informed decision.

Conclusion

Generalizations about errors in children ever born data for post reproductive age women are pernicious. Sometimes the data is amazingly good. Sometimes it is as poor as we have been taught to expect. The only way to know the situation in any particular case is to study the data and see what it has to say. The first conclusion is that we ought to do so.

We can=t do so, however, if census offices refuse to show us the data by truncating children ever born tables at young ages. A great deal of potentially valuable information is lost when, as in Malaysia 1947, or India 1981, the data tables end with a 50+ open ended age group. Perhaps this was a terrible waste. Perhaps the data wouldn=t have been any good any way. We=ll never know. Given the enormous cost of the census enumeration, it doesn=t make much sense to throw data away at the stage of publication by making tables a few lines shorter. The evidence given here suggests that no tabulation should end with an open ended age group below 75+ and that 85+ is preferable.

A final important conclusion is that we can learn things about fertility transition with children ever born data that we can't learn any other way, even with complete vital registration data.

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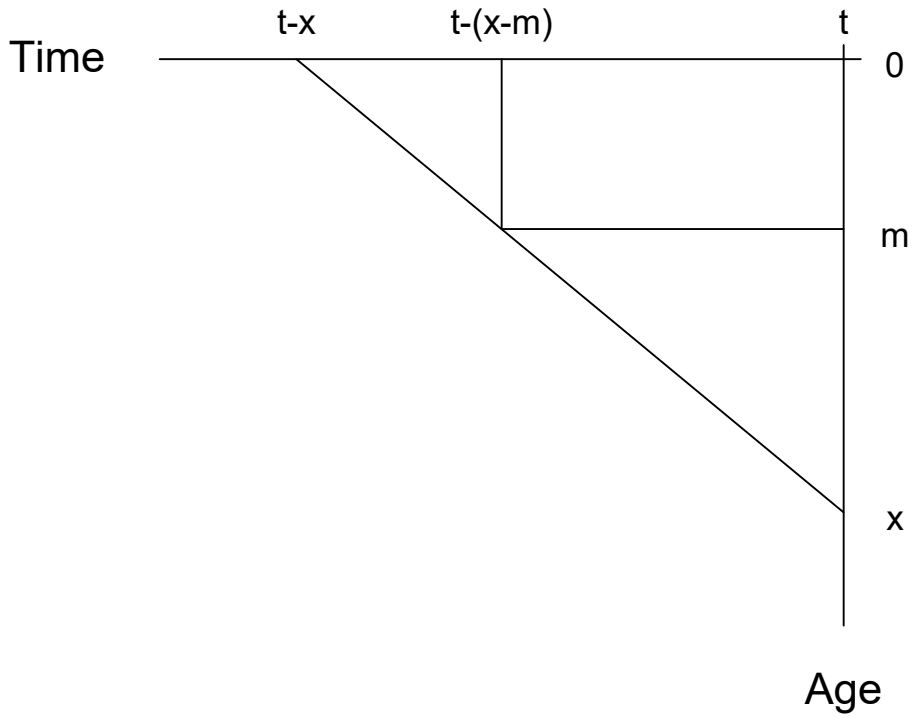

Figure 1
Dating Mean Children Ever Born (CEB) Values

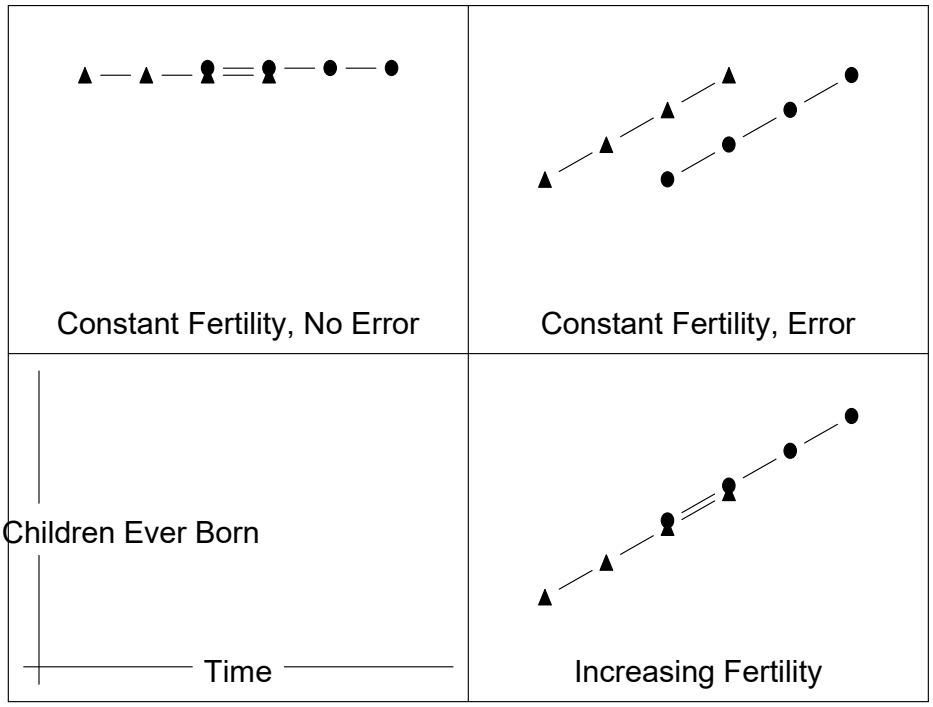

Figure 2
Diagnosing Reporting Error

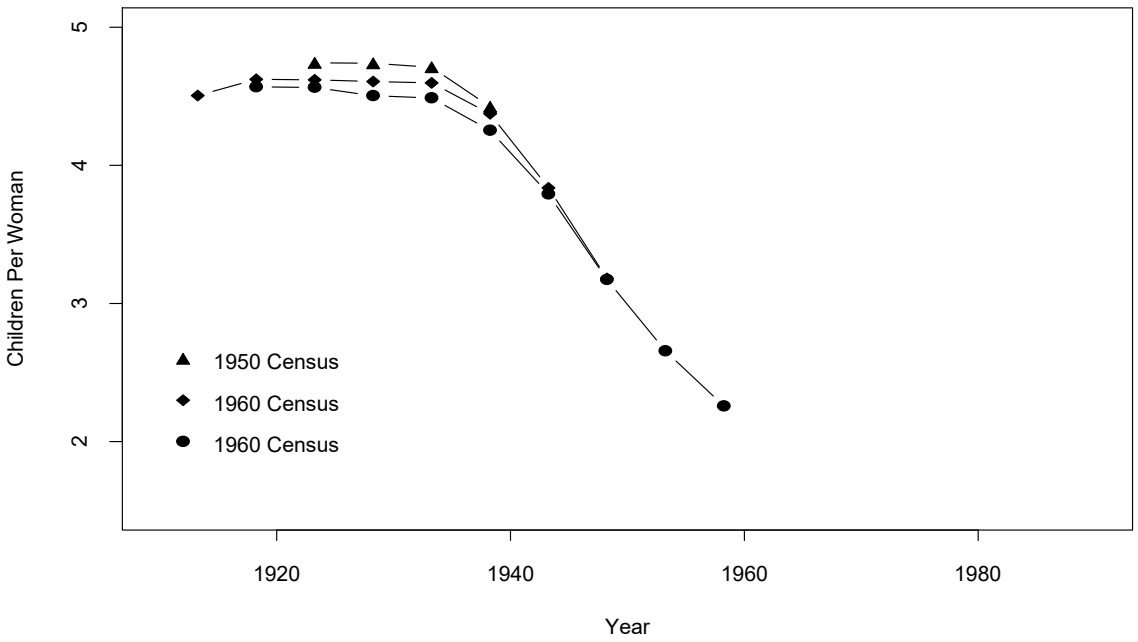

Figure 3
Time Plot of Mean Children Ever Born
Japan, 1950, 1960 and 1970 Censuses
Initial Age Group 40-44 Years

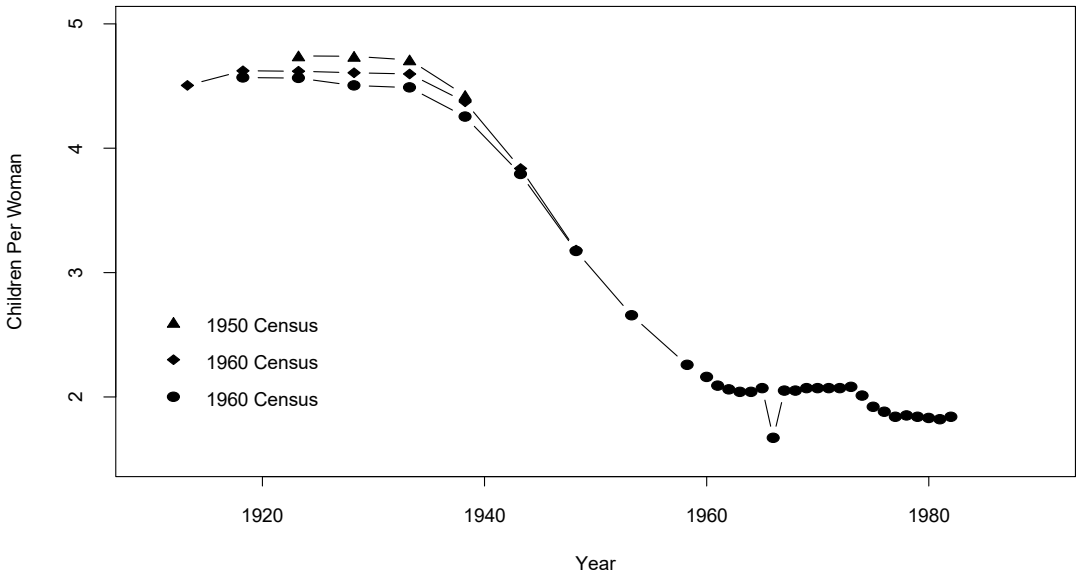

Figure 4
Time Plot of Mean Children Ever Born
Japan, 1950, 1960 and 1970 Censuses
Initial Age Group 40-44 Years
With Recent Time Series of Period PPR TFRs

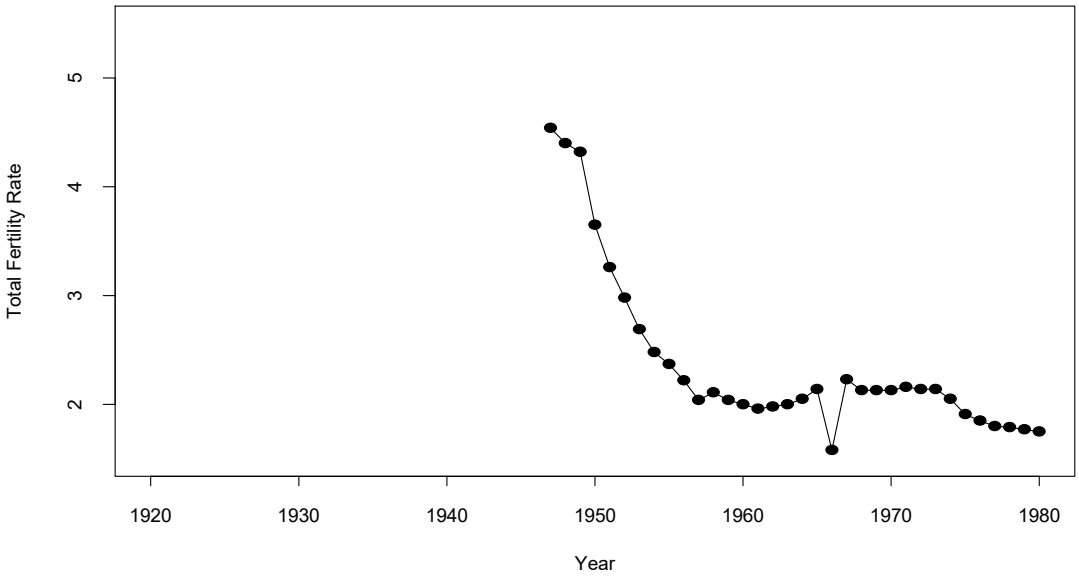

Figure 5
Japan=s Post-War Fertility Decline

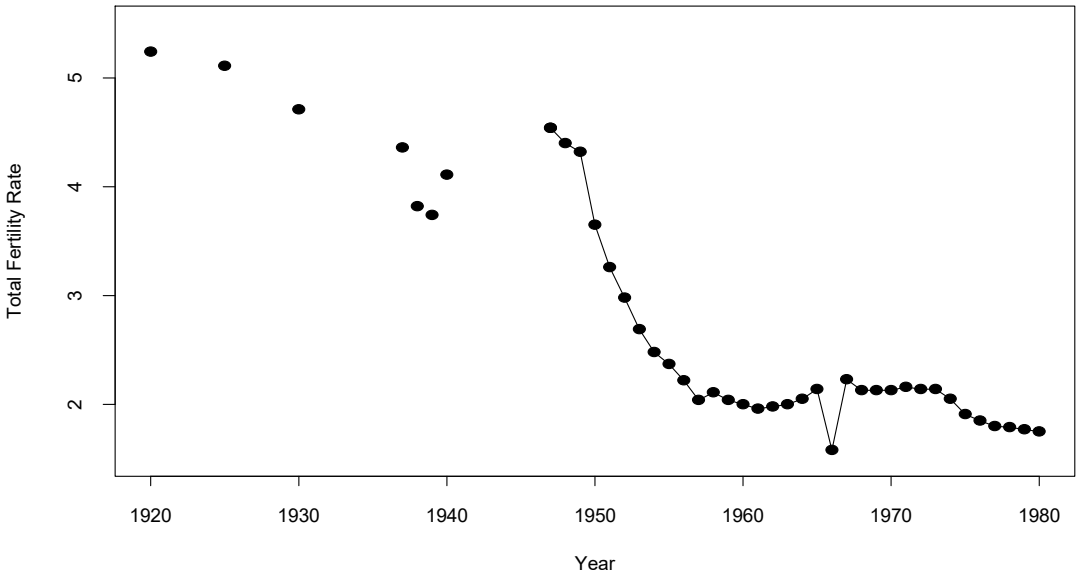

Figure 6
Japan=s Fertility Decline, Available Data

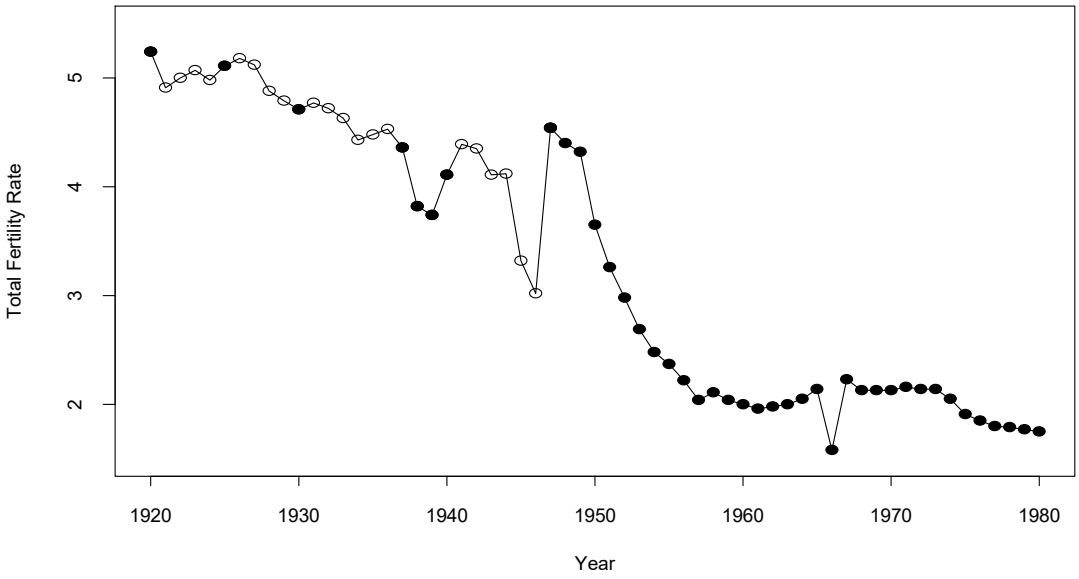

Figure 7
Japan=s Fertility Decline, Interpolated Series
Based on Age Distribution

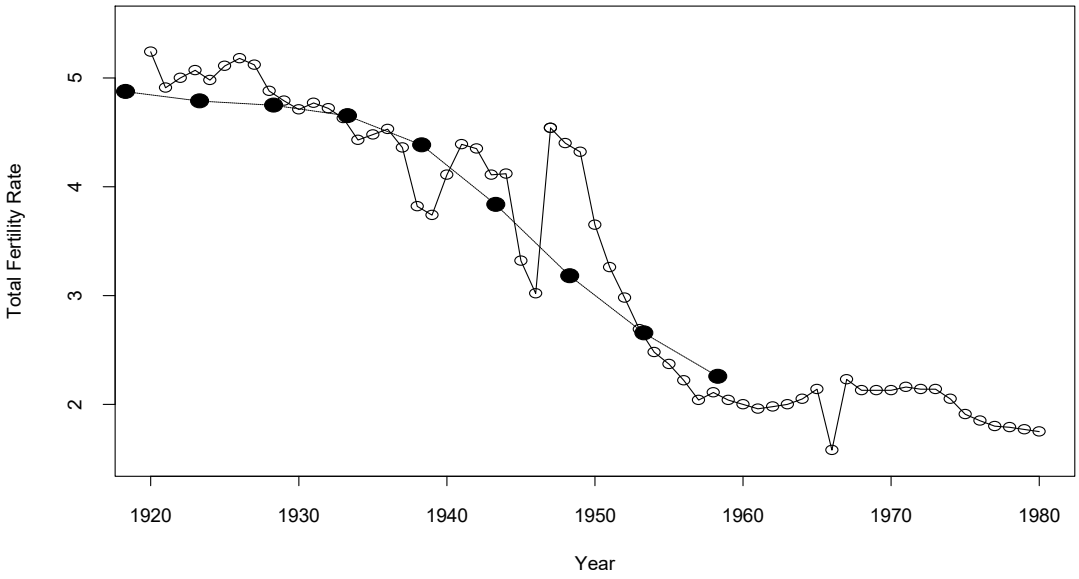

Figure 8
Japan=s Fertility Decline with Time-Plotted
Mean Children Ever Born Data

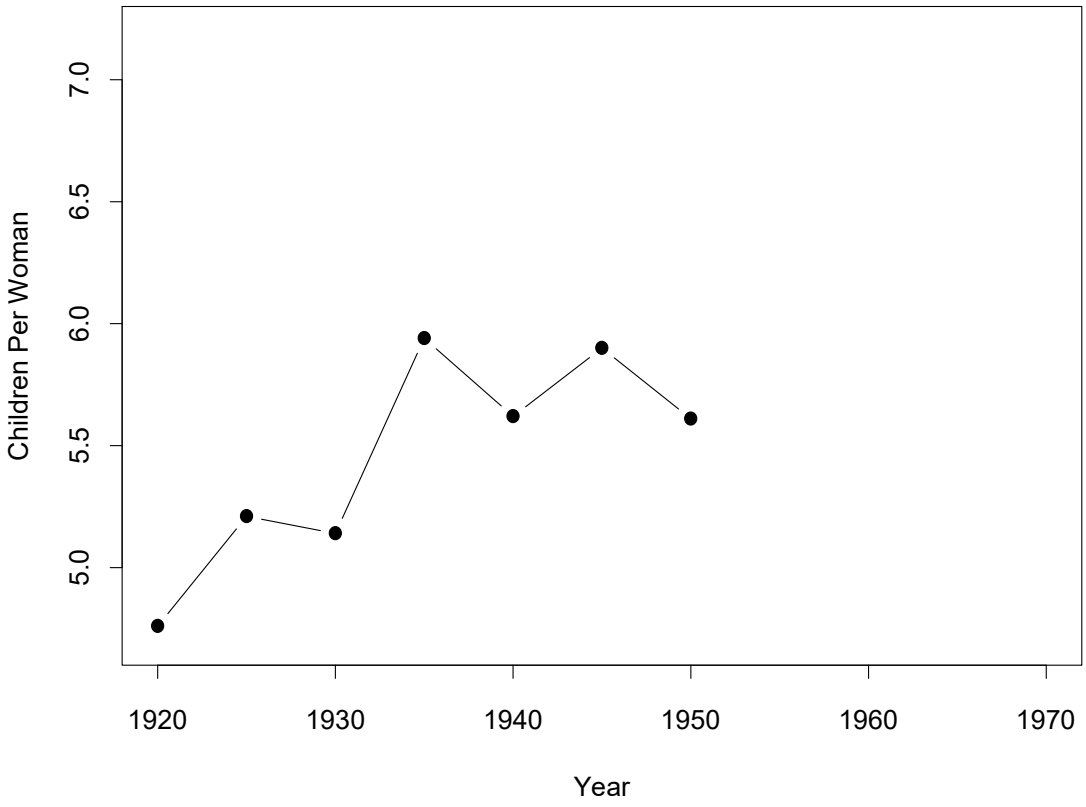

Figure 9
Time-Plot of Mean Children Ever Born
Kenya Census of 1962
Initial Age Group 40-44 Years

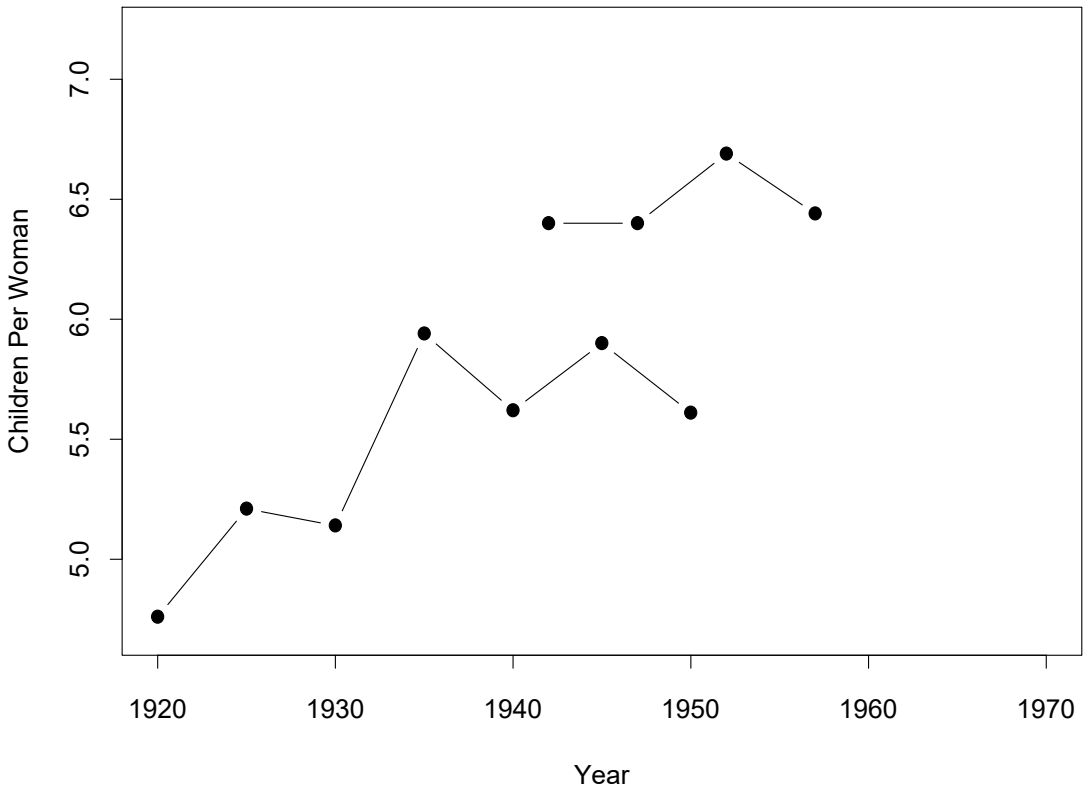

Figure 10
Time Plot of Mean Children Ever Born
Kenya, Censuses of 1962 and 1969
Initial Age Group 40-44 Years

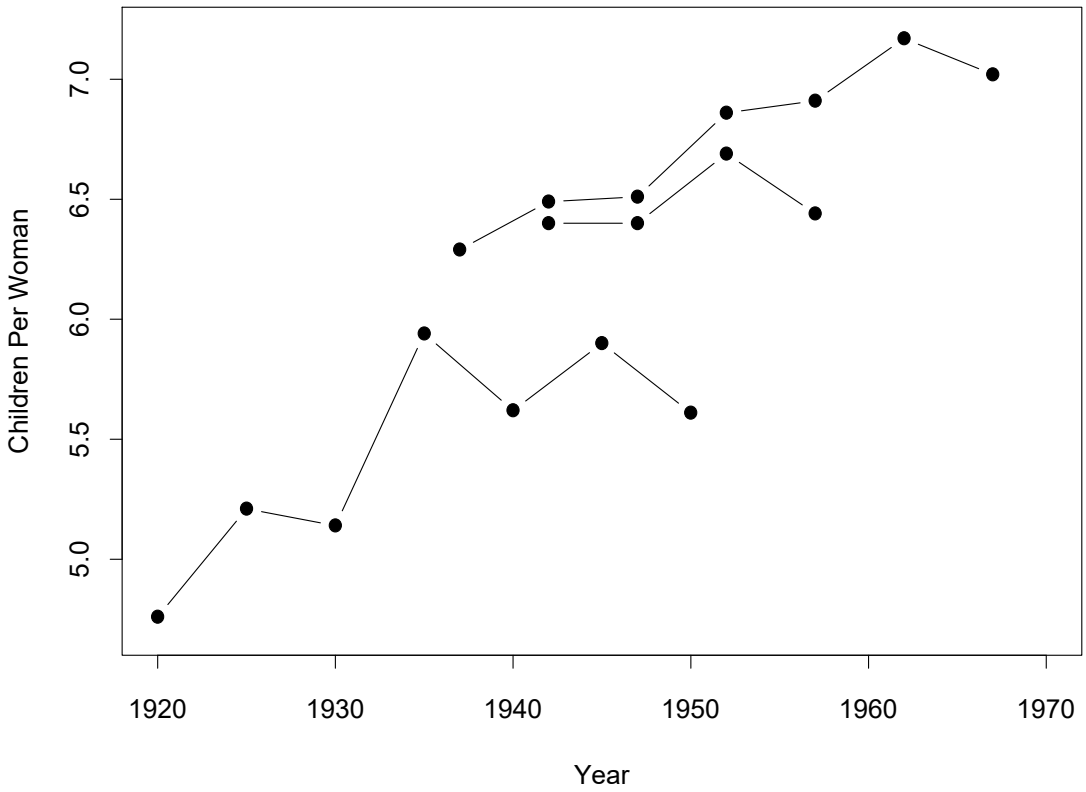

Figure 11
Time Plot of Mean Children Ever Born
Kenya Censuses of 1962, 1969 and 1979
Initial Age Group 40-44 Years

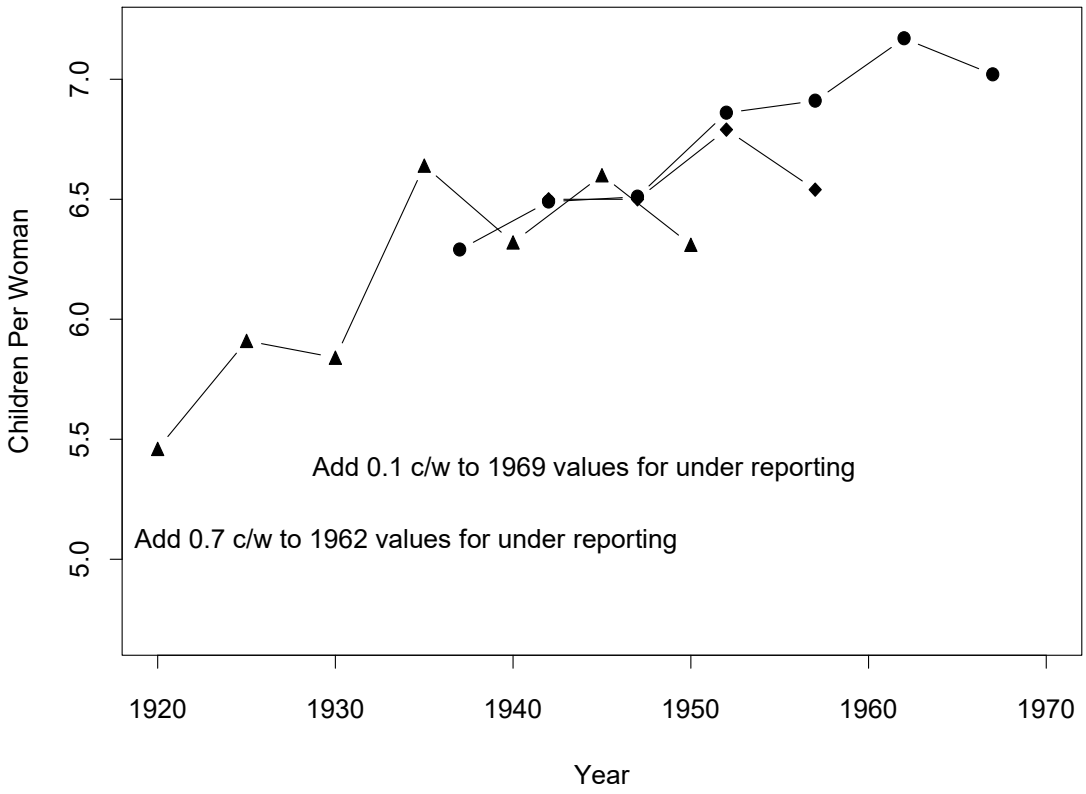

Figure 12
Time Plot of Mean Children Ever Born
Kenya Censuses of 1962, 1969 and 1979
Initial Age Group 40-44 Years
With Adjustment for Under Reporting

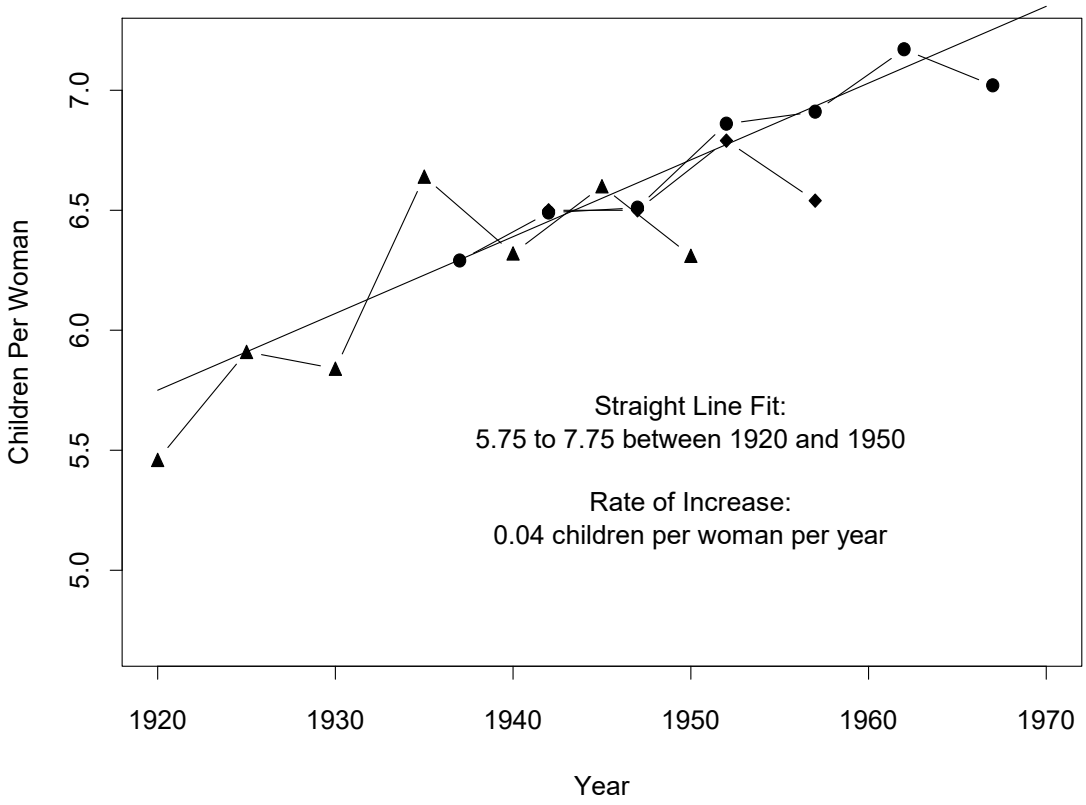

Figure 13
Time Plot of Mean Children Ever Born
Kenya Censuses of 1962, 1969 and 1979
Initial Age Group 40-44 Years
With Adjustment of 1962 Values and Fitted Straight Line

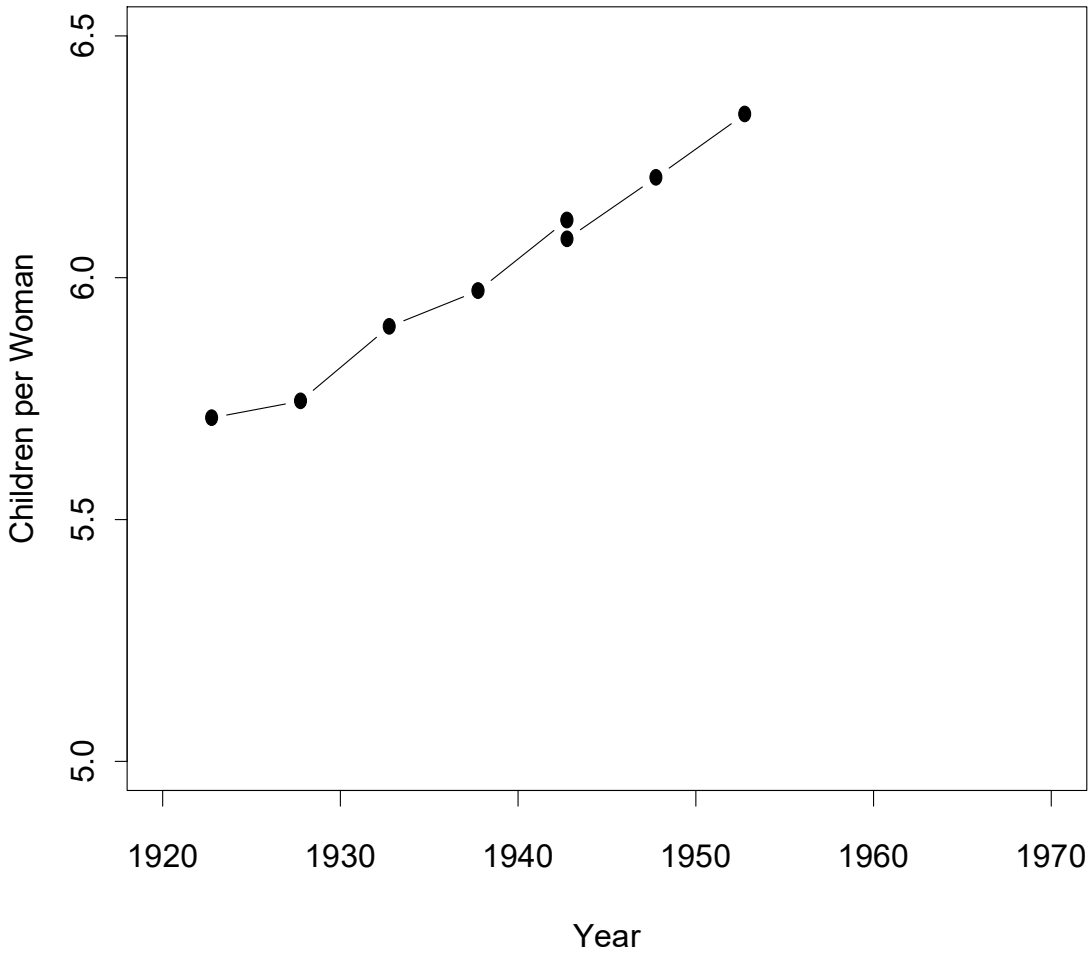

Figure 14
Time Plot of Mean Children Ever Born
Thailand Censuses of 1960 and 1970
Initial Age Group 45-49 Years

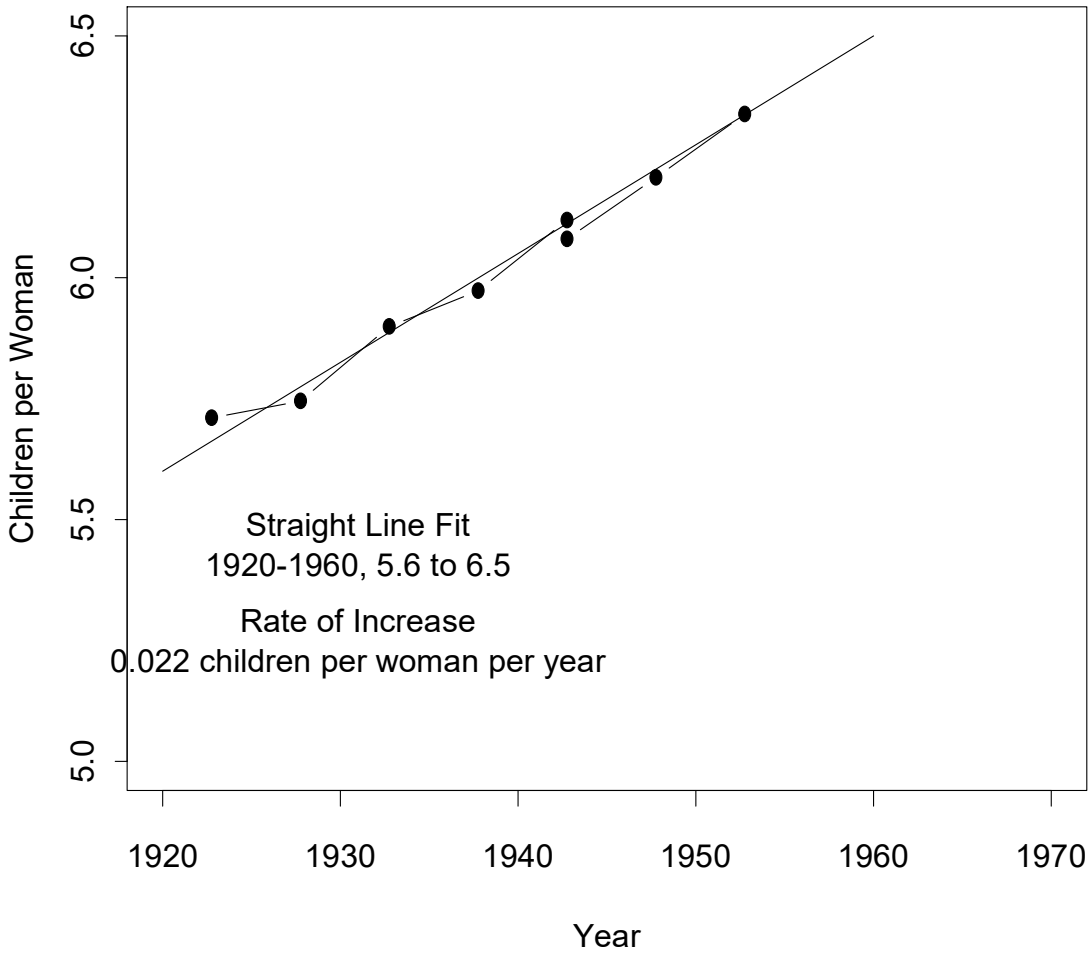

Figure 15
Time Plot of Mean Children Ever Born
Thailand Censuses of 1960 and 1970
Initial Age Group 45-49 Years
With Straight Line Fit

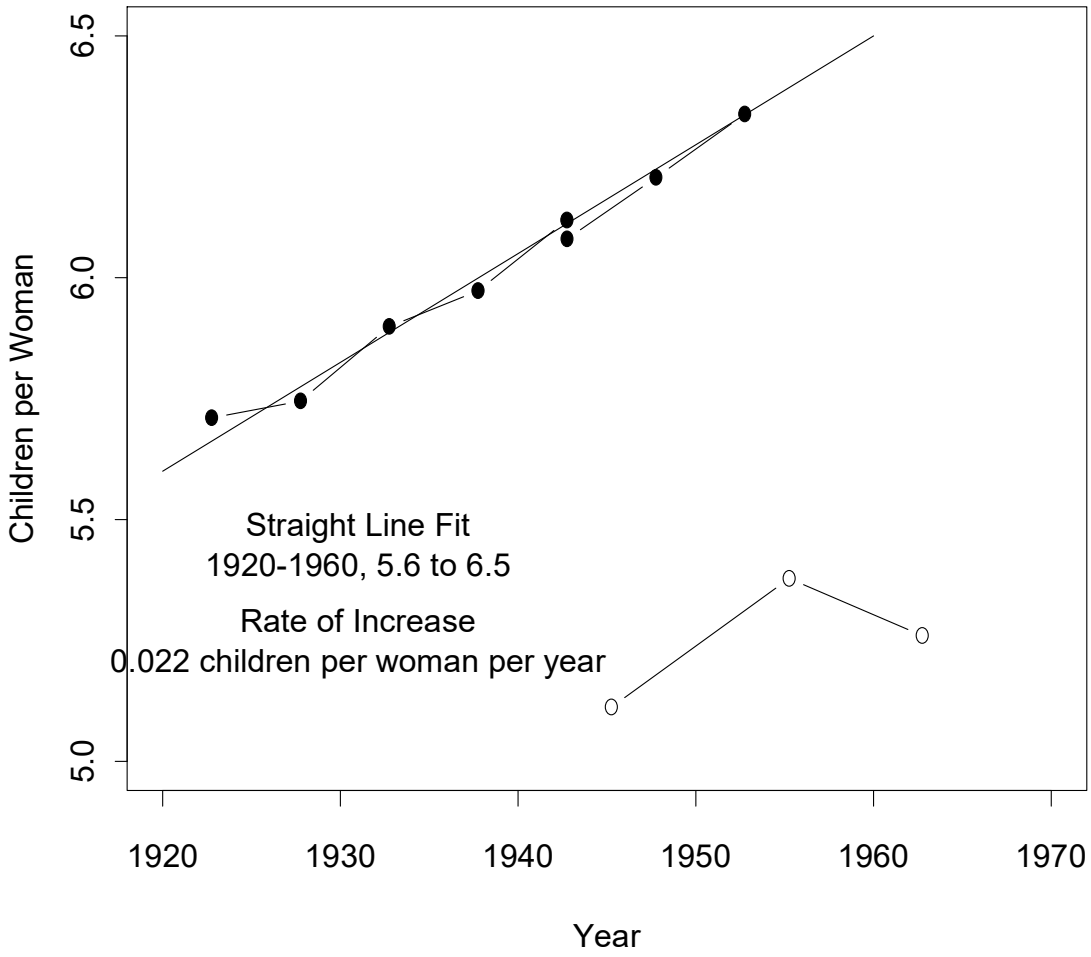

Figure 16
Time Plot of Mean Children Ever Born
Thailand Censuses of 1960, 1970 and 1980
Initial Age Group 45-49 Years
1980 Age Groups 45-49, 50-59 and 60-69 Years

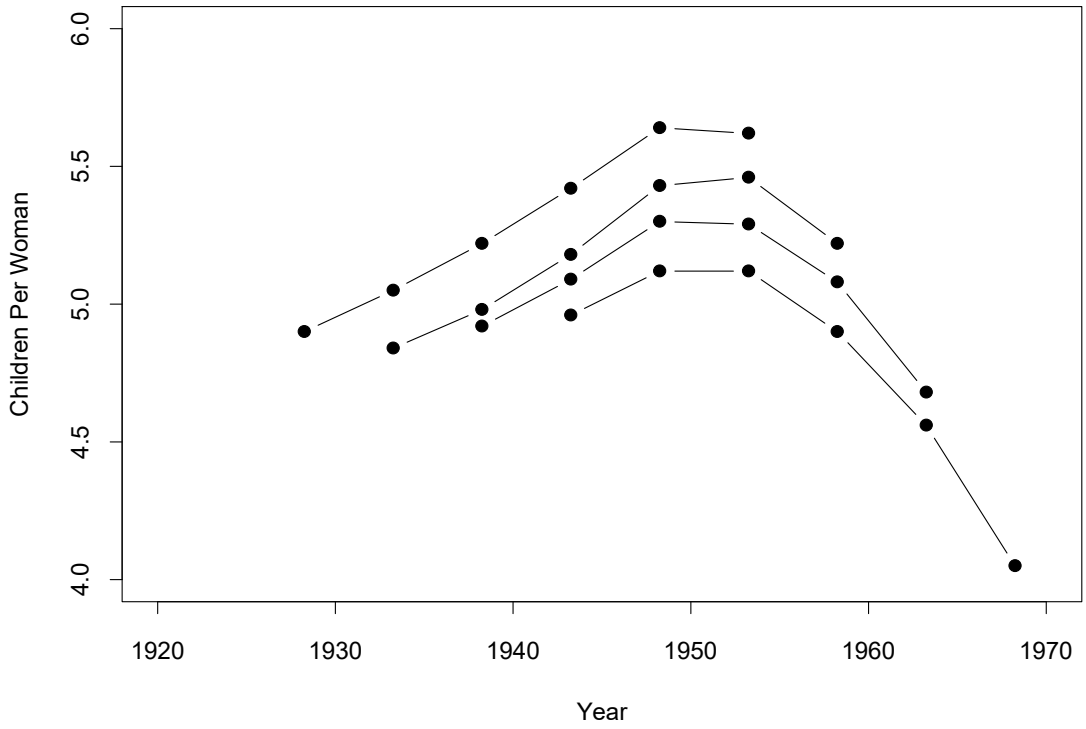

Figure 17
Time Plot of Mean Children Ever Born
Korea Censuses of 1970-85
Initial Age Group 45-49 Years

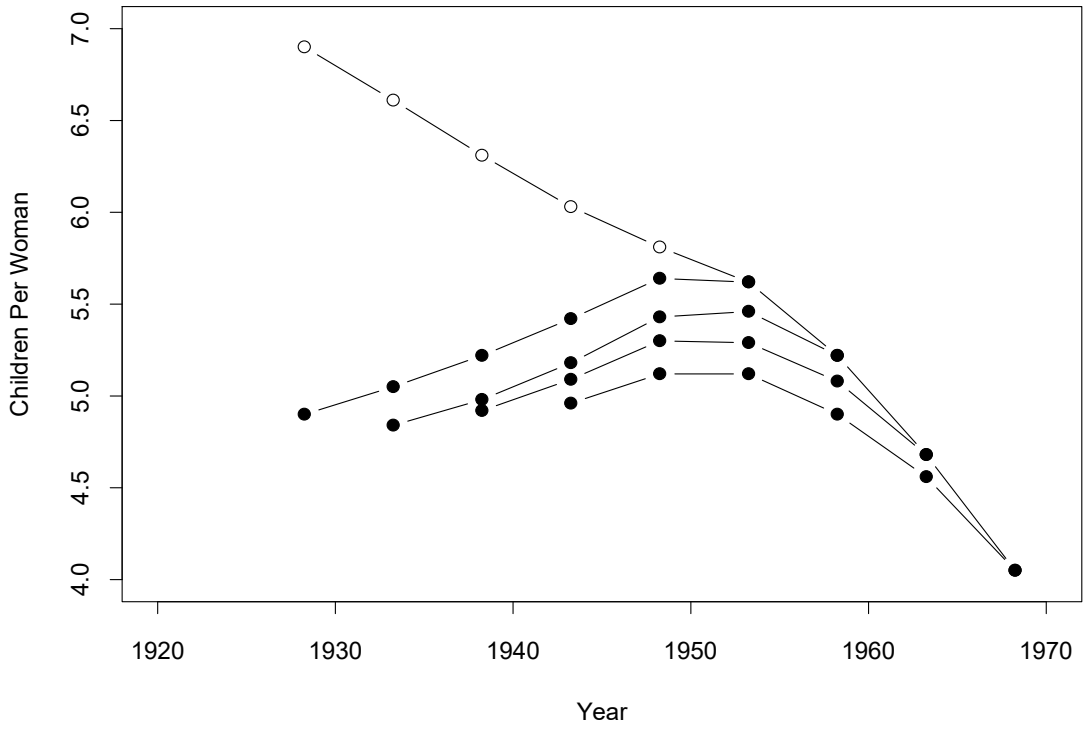

Figure 18
Time Plot of Mean Children Ever Born
Korean Censuses of 1970-85
Initial Age Group 45-49 Years
With 1st Adjustment for Under Reporting

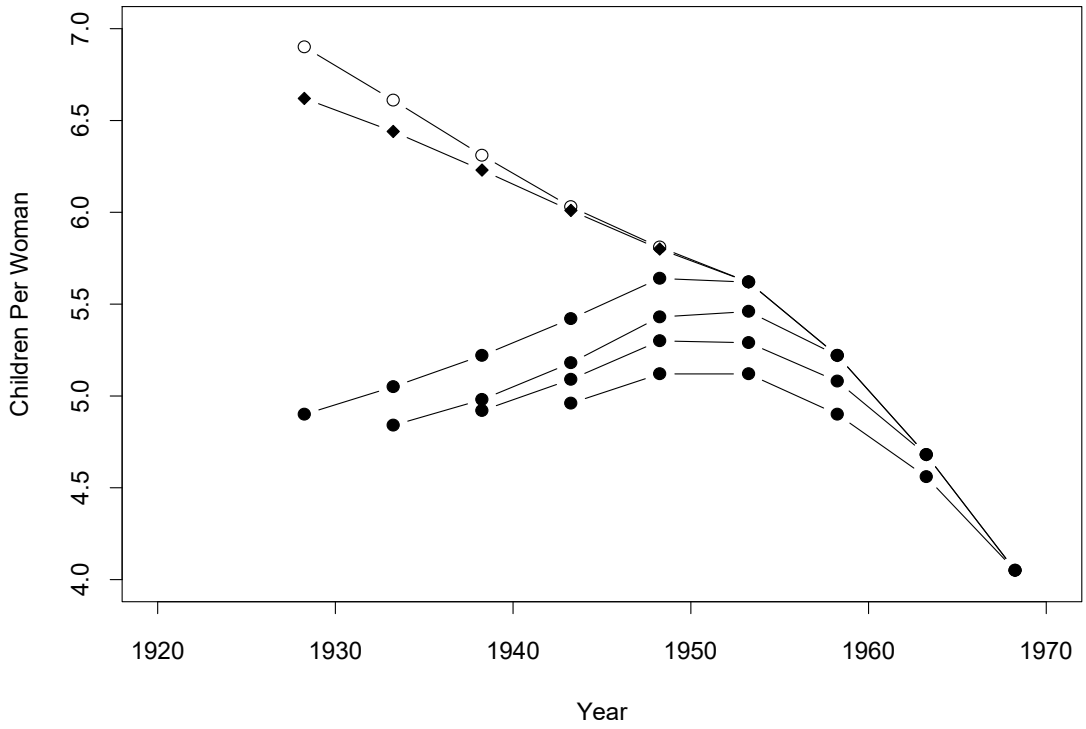

Figure 19
Time Plot of Mean Children Ever Born
Korean Censuses of 1970-85
Initial Age Group 45-49 Years
With 1st and 2nd Adjustments

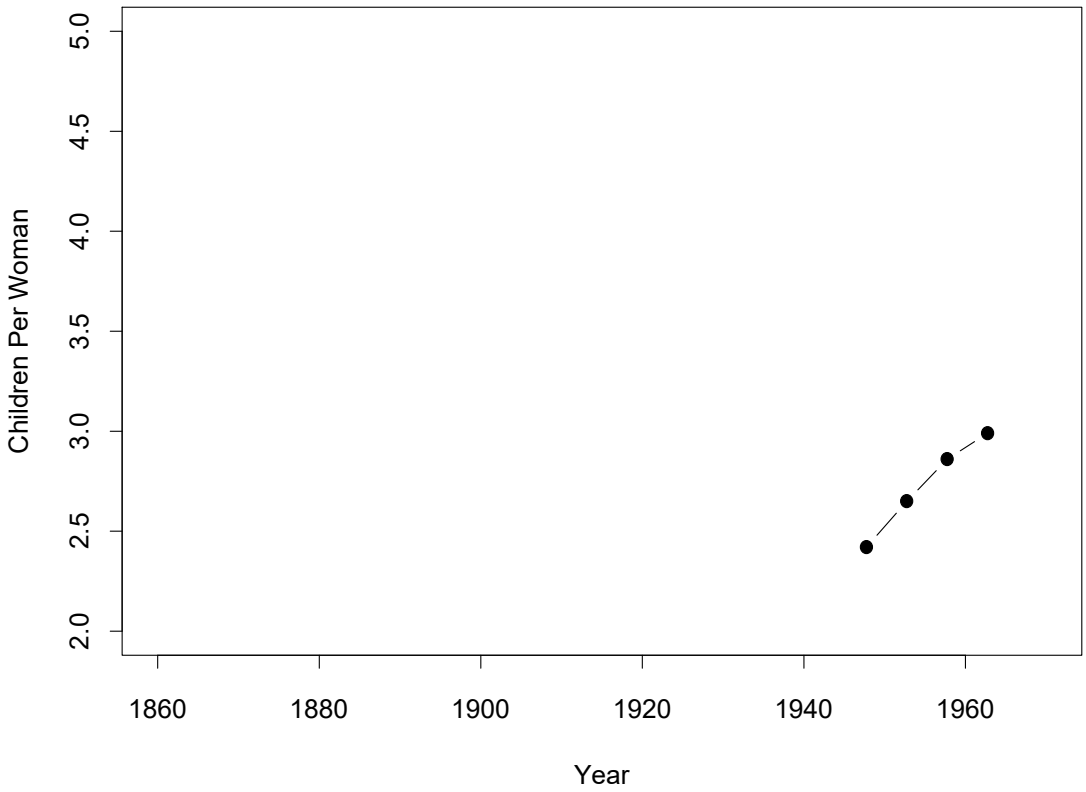

Figure 20
Time Plot of Mean Children Born
United States Census of 1980
Initial Age Group 45-49 Years

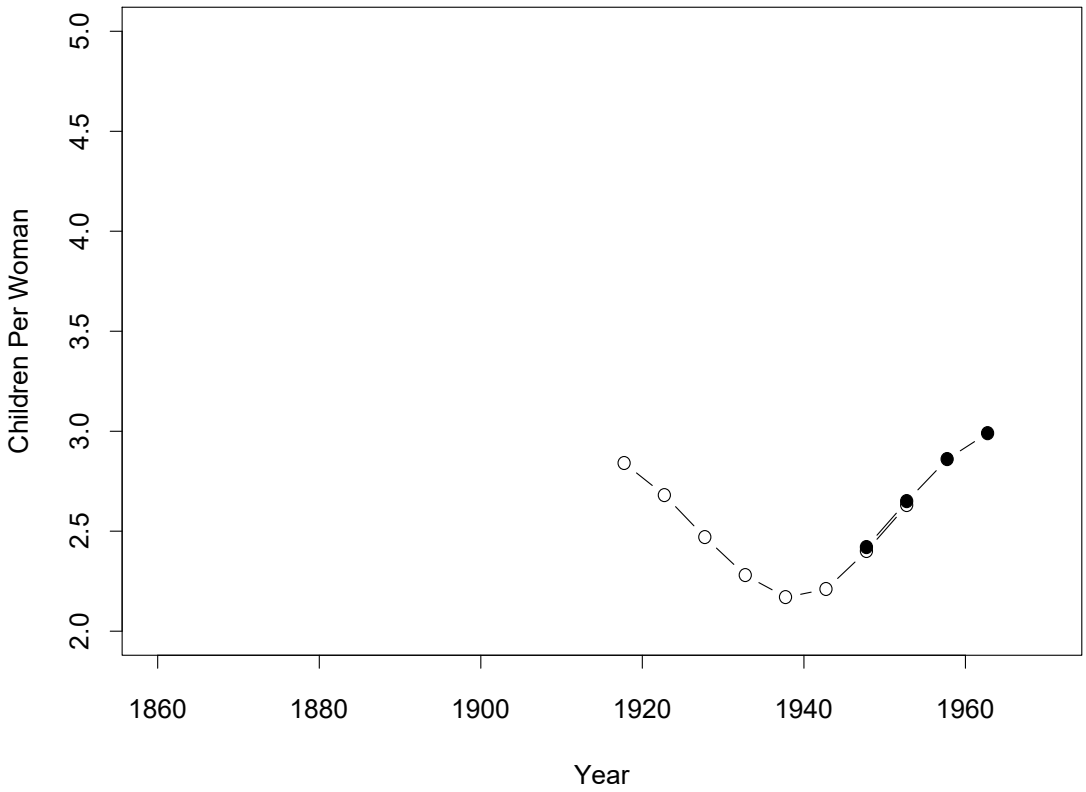

Figure 21
Time Plot of Mean Children Born
United States Censuses of 1970 and 1980
Initial Age Group 45-49 Years

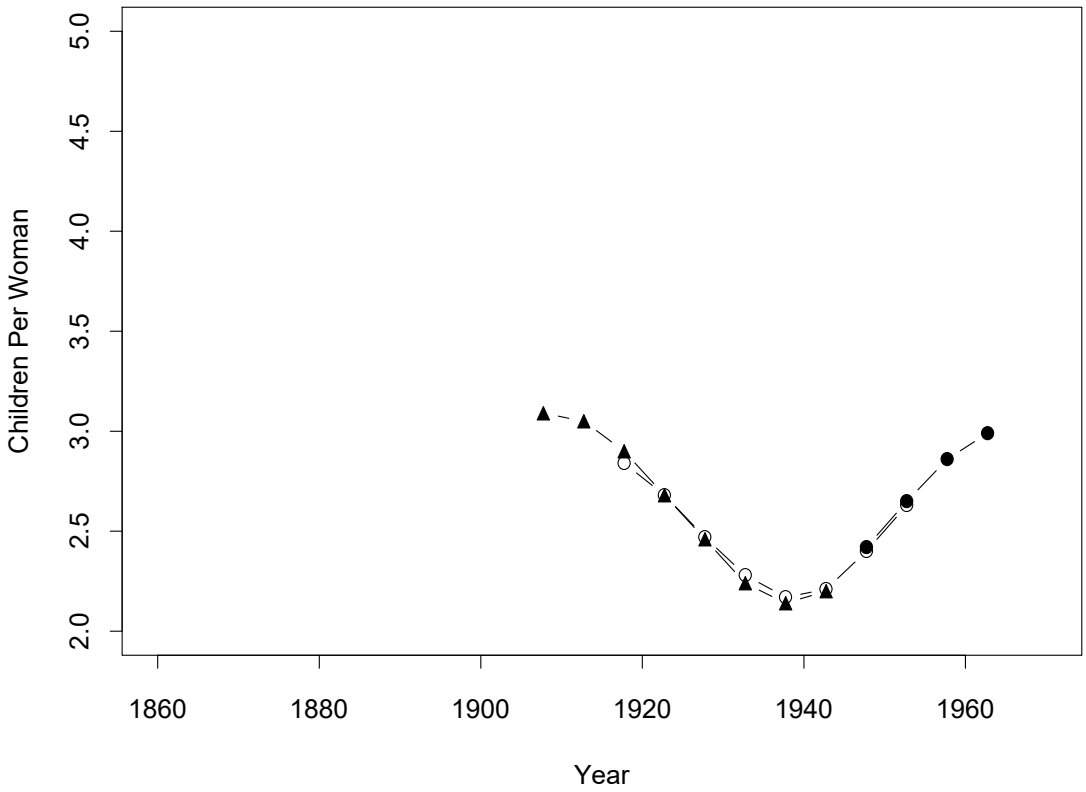

Figure 22
Time Plot of Mean Children Born
United States Censuses of 1960, 1970 and 1980
Initial Age Group 45-49 Years

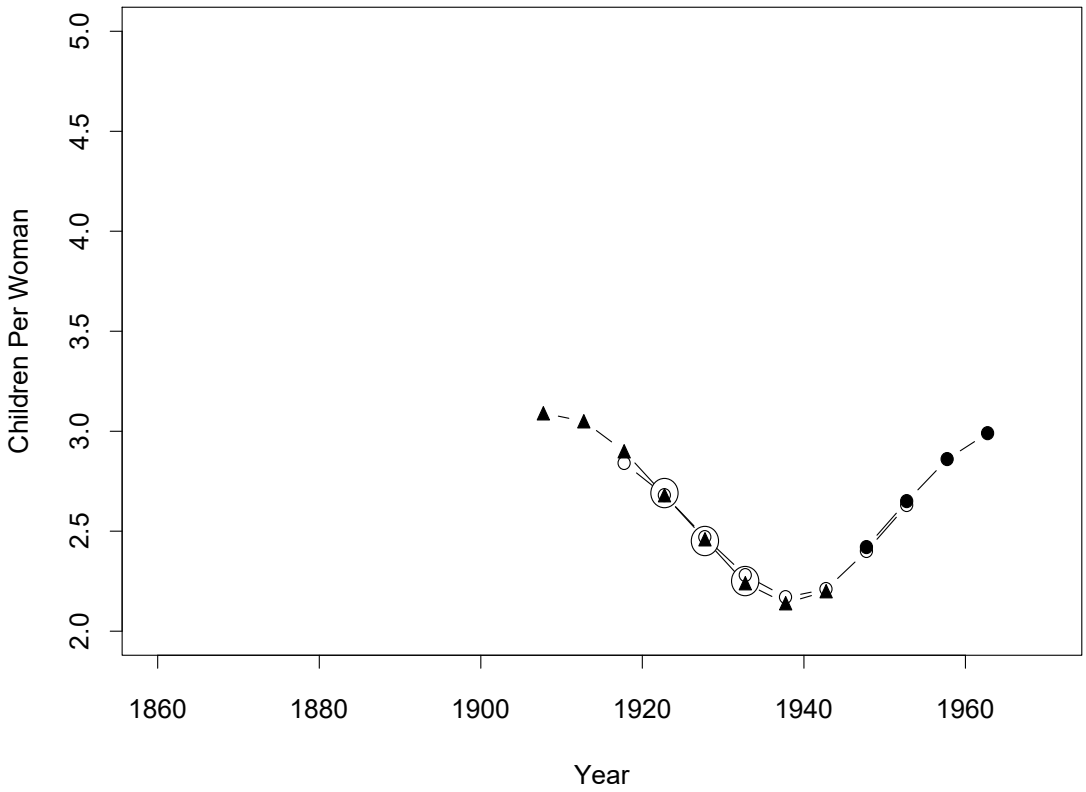

Figure 23
Time Plot of Mean Children Ever Born
United States Censuses of 1950-1980
Initial Age Group 45-49

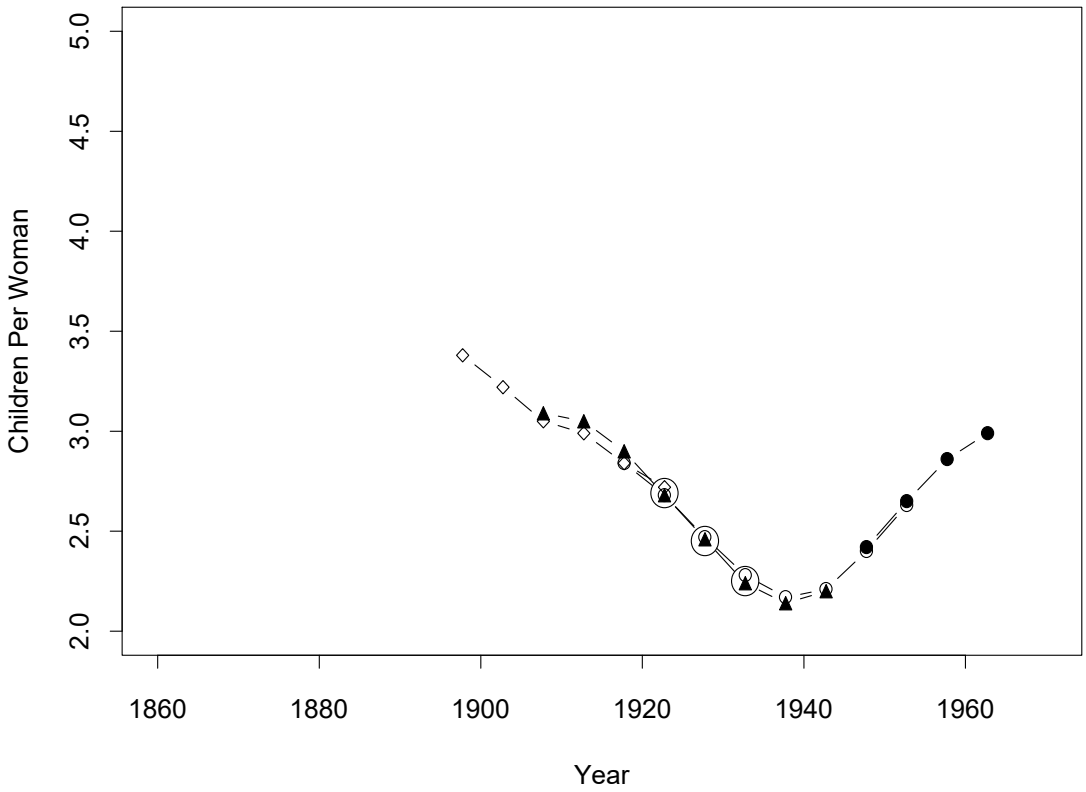

Figure 24
Time Plot of Mean Children Born
United States Censuses of 1940-1980
Initial Age Group 45-49 Years

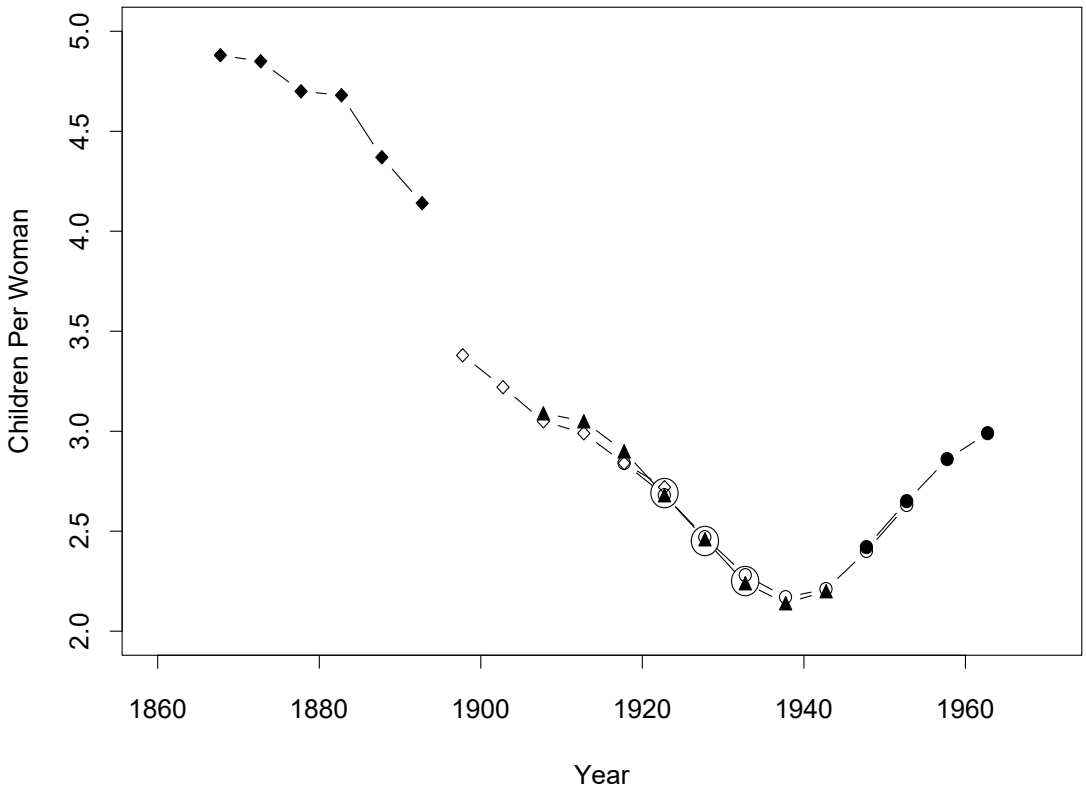

Figure 25
Time Plot of Mean Children Ever Born
United States Censuses of 1910 and 1940-1980
Initial Age Group 45-49 Years