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THE POPULATION DYNAMICS OF THE TEMBOMVURA PEOPLE OF ZAMBEZI VALLEY, NORTHERN ZIMBABWE: SOME METHODS OF COLLECTING AND ANALYSING BIRTH HISTORY DATA

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Abstract
Collecting quantitative demographic data from illiterate populations continues to be a major drawback in the study of demographic phenomena. The problems of illiteracy and lack of numeracy are more acute in Africa where the majority of the rural populations are not well educated. This article describes a method of collecting quantitative data using simple techniques of drawing and modelling. Using a small semi-nomadic population of the Tembomvura people of Zambezi Valley, northern Zimbabwe, the study concludes that it is possible to collect birth history data from illiterate populations. A combination of the traditional questionnaire approach and the 'participatory' methods proposed in this article provide a more reliable method for collecting birth history data. With large populations aiming for nationally representative samples, the method would be very time consuming and costly. The approach is more useful for studying small populations or small samples. The major strength is that it gives the respondents a chance to express their knowledge in simple numeric form.

DATA DEFICIENCIES CONTINUE to be a major drawback in the study of demographic levels and trends in Sub-Saharan Africa. The need for quantifiable data, usually in large sample sizes, has led to the use of the precoded quantitative questionnaire as the main method of collecting demographic data. However, most rural populations in Africa from whom demographic data are collected are illiterate and have little if any culture of numeracy. In Zimbabwe, 25% of women aged 15 years and above and 14% of men aged 15 years and over reported themselves as illiterate (those who have not completed Grade Three) in the 1992 census (CSO, 1995). These rates of illiteracy were believed to be underestimates since the respondents were not actually asked to prove their literacy. What can

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1 This study was part of a Ph.D. in Medical Demography done at the London School of Hygiene and Tropical Medicine under the supervision of Basia Zaba. Funding for fieldwork for this study was provided by Population Council, New York.
be done to make the demographic questionnaire more usable with illiterate populations?

One approach has been the development of indirect estimation techniques which rely on data collected from simple questions. For example, indirect estimation of adult mortality can be done from simple questions on the survival of mother or father (Blacker, 1977, p. 28) and fertility and childhood mortality can be estimated indirectly from data on children ever born and children dead (Brass, 1968, p. 68; 1971, p. 24; and UN, 1983, p. 53). These indirect approaches have to some extent alleviated data deficiencies but their major weakness is the retrospective nature of the estimates.

In spite of the simplicity of data required for indirect estimates, there may be need to adjust and/or impute the data because they are either inaccurate or coverage is incomplete. Such adjustments and imputations introduce their own errors (Meekers, 1991, p. 249).

CURRENT FERTILITY AND THE NEED FOR THE BIRTH HISTORY QUESTIONNAIRE

In studying current changes in fertility, the birth history questionnaire remains our major source of demographic data. In Sub-Saharan Africa, the recent interest in whether fertility has declined has highlighted the need for reliable sources of current fertility, since the debate focusses on recent changes in fertility which cannot be obtained from indirect estimates.

The birth history questionnaire has undergone some refinements ever since the World Fertility Survey (1978) but has retained most of its bad characteristics, which are an excessive length and a purely quantitative approach that is not user friendly when information is obtained from illiterate populations (see both 1988 and 1992 Zimbabwe Demographic and Health Surveys' birth histories). The challenge that faces demographers is how to make the birth history questionnaire more applicable to people with little or no numeracy. This study attempts to provide some suggestions to meet this challenge, using a case study of the Tembomvura people of Zambezi Valley, Zimbabwe.

DESCRIPTION AND OBJECTIVES OF THE STUDY

This article discusses a simple procedure to refine a birth history questionnaire in an attempt to make it more usable with illiterate populations. An attempt is made to shift away from the traditional coded questionnaire as the centre of the data gathering process by focussing on methods referred to either as 'microapproaches' (Caldwell, Hill and Hull, 1988, p. 43) or 'participatory' (Chambers, 1992, p. 15).
Using data from the Tembomvura people, the study examines and
discusses how period fertility data was collected through the use of a
combination of methods which involve group interviews, participatory
modelling and diagramming, dramatisation, and a demographic
questionnaire. Focussing on the small nomadic population where all the
population was functionally illiterate, the study aims to show how local
people can present their own concepts through the use of simple methods
like dramatisation, building models or drawing.

The study also discusses and shows how the period data was adjusted
and analysed to give estimates of current fertility, that indicated some
recent changes which had affected the population.

The study provides some alternative methods of demographic data
collection, relying on techniques already present in many rural populations,
which include drawing, the use of local materials like seeds to build
models, dramatisation and focus groups. The study does not totally do
away with the birth history questionnaire, but attempts to make it more
usable by taking account of the context within which data is collected,
focussing on the creation of rapport and allowing local people to express
their knowledge in their own way. The birth history questionnaire becomes
part of a cumulative process of information gathering rather than something
imposed on the population.

**BRIEF BACKGROUND OF THE STUDY POPULATION**

This study is based on a small semi-nomadic population of the Tembomvura
people. Commonly known in Zimbabwe as the Dema (a name which they
deplore) the Tembomvura reside in Chapoto Ward on the Western side of
the Mwan zamutanda River close to the border of Mozambique, Zambia
and Zimbabwe.

The Tembomvura community has a total population of 780 people
and of these 235 are in the reproductive ages 15 to 49 years. Their livelihood
is based on a combination of clandestine hunting in Chewore and Dande
game reserves, selling their labour to the neighbouring Chikunda people,
minimum agriculture, gathering the tubers *Disocorea bulbifera* (manyanya),
*Tacca leontapotoides* (bepe), and *Boscia angustofolia* (mupama) as well
as fishing and honey extraction. According to their oral history they were
hunters and gatherers until 1974, when they were first resettled by the
Rhodesian government.

In 1978, the Tembomvura people, together with their neighbours the
Chikunda, were moved from Chapoto Ward and resettled in a security

\[2\text{This figure is based on a census done by the researcher during the period of research in}
\text{July 1992.}\]
Figure 1
CHAPOTO WARD AND ITS PROXIMITY TO CHEWORE AND DANDE GAME RESERVES

ZAMBIA
Zambezi River
STUDY AREA
CHEWORE SAFARI AREA
MUKUNGU RIVER
ANGWA
MUSHUMBULI POOLS
TIRIRA
ZAMBEZI ESCARPMENT
GURUVE
HARARE

ROAD
TARMAC ROAD
RIVER
APPROX SCALE 1cm = 12km
village in Mashumbi Pools. Many Tembomvura people escaped from the village and went back to their original home in Karemwa within Chewore game reserve until 1980. From then onwards, more effort was made to resettle the Tembomvura and to encourage them to engage in agriculture. These resettlement efforts have been met with resistence by the Tembomvura, who regard agriculture as inferior to hunting and try their best to continue with a nomadic lifestyle.

In the 1990s current efforts at sustainable utilisation of wildlife resources through the activities of CAMPFIRE (Communal Areas Management Programmes for Indigenous Resources) led to the introduction of control by mostly the Chikundu people (a neighbouring agricultural community residing in Chapoto Ward) which prevented the Tembomvura from hunting in the game reserve. Gathering for tubers and honey in the game reserves was also controlled and became defined as 'loitering in the game reserve with intent to commit a crime'.

The socio-political dynamics of the CAMPFIRE programme at village level have led to the exclusion of Tembomvura people, and this has created ill-feeling between the Tembomvura, wildlife officials and the local safari operators (Marindo-Ranganai and Zaba, 1995). In addition the Tembomvura were experiencing a drought which was at its height in 1992 when the survey was done. With their traditional life under threat due to the hunting ban and gathering being policed, they began to express fears that their community was facing demographic extinction due to fewer babies being born and mortality being very high because of food shortages.

DATA SOURCES AND METHODOLOGY

Data for the study is based on a demographic, socio-cultural and health survey which was carried out among the Tembomvura from July 1992 to November 1992.³ The data gathering process used was hierarchical, whereby a combination of qualitative methods using participatory models and diagrams, group interviews and a demographic questionnaire were all combined to provide detailed information on current fertility. The data gathering approach is shown in Figure 2 below.

BRIEF DISCUSSION OF DATA GATHERING METHODS

Participatory modelling and diagramming

Participatory models and diagrams are methods of gathering data from local populations by using models and diagrams. By using materials like

³ Data collection took five months from the beginning of July to the end of November 1992. All demographic data was collected in a cumulative process and since data was entered in the field, cross-checking and recalling was also done during this period. The first fertility interviews took one month but cross-checking and re-interviews continued until the end of the study.
Figure 2
QUANTITATIVE AND QUALITATIVE METHODS USED IN DATA COLLECTION

Quantitative Data Collection

- Household Questionnaire on births in the household. All heads of households interviewed. Also information on births in the last year.

- Women's individual questionnaire. All women aged 15 and above were interviewed.

- Completing birth history questionnaire. Only women who had a birth in the last 10 years were interviewed on date of birth, season of birth, etc.

Qualitative Data Collection

- Details of people's views on their fertility, changes in marriage patterns, number of births, changes in population size. Groups of men and women interviewed.

- Participatory modelling and diagramming of children ever born, dramatisation using other children around.

- Calendar of local events, collection of information on seasons, birth practices. Only women were involved in groups.

- Plausible estimate of fertility: how do the demographic estimates relate to the qualitative information?
leaves, mud and stones, local people are assisted in making models of their environment as they see it. To facilitate the spirit of participation, researchers are encouraged to let the local people ‘hold the stick’ in drawing their diagrams and to give the locals a chance to express their knowledge. The process of handing over part of the research to locals is a necessary step towards participation (Marindo-Ranganai, 1994).

In this study, participatory modelling was used to create a local map of people’s dwellings and to model the whole population using seeds arranging them according to their relative ages. Seeds were placed on the ground indicating how many people were in which age group. In addition women used the seeds of Ziziphus mauritania (masawu) and Tamarindus indica (musika) to model their fertility histories. Each woman with the help of a spouse or her older children or friends arranged the fruits on the ground with the Ziziphus mauritania representing female children and the Tamarindus indica indicating male children. Through this modelling process, the woman created her own birth history based on local materials. Dead children were represented by stones.

Once a woman had made a model of her own fertility, she was asked to indicate the relative ages of the children.

In some cases, women were given coloured powders to make some paint, which they used to draw their children and produce a birth history. Using different colours they indicated first the different sexes, then the relative ages of the children. Paper diagrams were less popular than models although ground diagrams were popular with some of the women. Diagramming was found to be useful for the estimation of relative ages because it was easier to show age differences than on models.

Although the participatory nature of the methods have been questioned (Rifkin, 1994, p. 22), they did give women a chance to express their knowledge in numerical form.

During the course of the survey, groups of children usually followed the researcher around as she talked to the women. Some of these children were used to dramatise the fertility histories of the women, standing in front of a particular woman while she pointed out and arranged them according to their ages and sexes as if they were her children. Dead children were represented by stones because most of the living children did not want to dramatise the part of a dead child.

To cross-check the birth history models created mostly by women, focus group discussions were held with fathers and they were asked information about their children, the children’s names and ages. Some of the models were shown to the men and they were asked to comment or contribute to the women’s presentations.

A demographic questionnaire was used at the final stage of the study after the participatory modelling and diagramming as well as group
interviews. A birth history questionnaire was completed for each woman and details of each birth, place of birth, date of birth, season of birth and if the child died, details of death place, cause and age were all collected. Because rapport had been created and almost all women were known, it was possible to cross-check the birth history by diagramming data and group information.

The combination of the methods was found to be extremely useful in the collection of birth history information. The major criticism provided in the post-mortem group discussion was that there was too much repetition — that the participatory models, the group interviews and the demographic questionnaire all asked the same questions. It was then explained to the respondents that the idea was to cross-check the information and the respondents suggested that perhaps the researcher should learn a bit of trust.

The smallness of the population made the application of the methods easier and by the end of the study all the women were known personally by the researcher. The demographic questionnaire was completed as part of a cumulative process and within some form of cultural context. Analysis of the birth history data is discussed in the next section.

DATA ANALYSIS

A detailed birth history for each of the women, with information on the number of births, the year of birth (based on a historical calendar) the season of birth, the current development stage of each child (for those under the age of one), the sex of each child and on dead children — the sex, age, year and season of death of each child and the cause of death as perceived by both parents was collected. In addition, from each household, information on whether a birth occurred in the last 12 months was collected and used for providing the fertility pattern of the Tembomvura (BLY).

The data was organised into a child file tabulated by year of birth and also by year of survey and year of death for the children who died. A woman’s file was also created where the births were tabulated by her age. These combination tables provided the basic data for fertility estimation. The data from qualitative and quantitative approaches from each woman were put into a database and the different files for each woman cross-checked for consistency. Because of the size of the population, data analysis and fertility estimates were not done using existing packages like SPSS but by designing spreadsheets for manipulation of the data.

RESULTS

Table 1 shows the period fertility data of births by calendar year. Bearing in mind that the births were collected only from women who are currently
in the reproductive ages (15–49), the births were adjusted for truncation effects. The adjustment is discussed below.

Table 1
BIRTHS BY CALENDAR YEAR ADJUSTED FOR WHOLE YEAR AND TRUNCATION EFFECTS, TEMBOMVURA SURVEY, 1992.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>BLY</th>
<th>92</th>
<th>91</th>
<th>90</th>
<th>89</th>
<th>88</th>
<th>87</th>
<th>86</th>
<th>85</th>
<th>84</th>
<th>83</th>
</tr>
</thead>
<tbody>
<tr>
<td>15–19</td>
<td>5</td>
<td>3</td>
<td>9</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20–24</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>14</td>
<td>8</td>
<td>12</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>25–29</td>
<td>9</td>
<td>8</td>
<td>3</td>
<td>9</td>
<td>11</td>
<td>10</td>
<td>16</td>
<td>9</td>
<td>7</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>30–34</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>13</td>
<td>12</td>
<td>9</td>
<td>13</td>
<td>10</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>35–39</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>9</td>
<td>8</td>
<td>10</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>40–44</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>45–49</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
<td>28</td>
<td>29</td>
<td>35</td>
<td>52</td>
<td>44</td>
<td>50</td>
<td>40</td>
<td>40</td>
<td>36</td>
<td>29</td>
</tr>
</tbody>
</table>

SOME MINOR ADJUSTMENTS TO THE BIRTH DATA

According to household reports, 33 children were born in the year before the survey. Using birth history reports, we estimate that \(28 + \frac{29}{4} = 35\) children were born in this time if we assume that \(\frac{1}{4}\) of all births in 1991 occurred in the last three months of the year. This indicates that under-reporting of births last year by the household head is in the order of 6% if the assumption of an even spread of births throughout the year is justified. The births history data collected by calendar year had to be adjusted because of the following reasons:

1. The births in 1992 represented only \(\frac{3}{4}\) of the births expected for the whole year because the survey was carried out in September. The 1992 births were adjusted to represent the whole year by multiplying by \(\frac{4}{3}\).

2. Birth history data was collected from women aged 15–49 in 1992. The birth history covered 1983–1992, which means that data was truncated as we go back in time since the women who were aged 40–49 years in 1983 would be over 50 in 1992 and these did not provide birth history information during the survey.

3. The existing births were based only on live women. Using information on female mortality, the births could be adjusted for maternal mortality.

CORRECTING FOR TRUNCATION

To correct for truncation in the birth history data, the only complete information on births available to us is through the births in the last year.
which suggests that \( \frac{1}{33} = 3\% \) of births occurred to mothers aged 45–49 in the year before the survey. This is rather high as most fertility models show that for a non-contracepting population, the ASFR for women aged 45–49 is between 1\% and 3\% of the total (Bongaarts and Porter, 1983, p. 48) and we expect about half of this as a fraction of the total births, due to the age structure of the mothers being weighted towards younger ages.

On the other hand, the proportion of all births to mothers aged 40–44 reported from BLY, also 3\% is probably too low as typically ASFR of women aged 40–44 account for between 5\% and 12\% of reported TFRs and this is reduced less when allowing for mother’s age structure in calculating the proportion of births contributed by these mothers, as the 40–44 age group is larger than the 45–49 age group.

It would be possible to estimate the proportion of births to women aged 40–44 from births history data from 1987 to 1992 but we would have first to allow for the missing births to 45–49 year olds, as well as reassigning the births tabulated by current age of mother to the age of the mother at birth of child.

**USING STABLE POPULATION MODELS**

It is preferable to use stable population models, especially since the numbers involved are very small. In a population growing at 3\% per annum with late child-bearing (i.e. no contraception) we would expect approximately 2\% of births occurring to women over 45 and 10\% to women over 40. We then adjust the births by a factor which lies between 2\% and 10\% for the 40–45 age group in 1992.

**ADJUSTING FOR MATERNAL MORTALITY**

The adjustment for truncation only corrects the reported total births due to not having interviewed women aged 50–59 who could have borne children in the 10 years prior to the survey. It does not adjust for births to mothers who may have died in the interval. Assuming an annual mortality rate in the 15–50 age group of 0.01 (which roughly corresponds to a 45:15 of 0.70, obtained for this population — Marindo-Ranganai, 1995, p. 196) we can conclude that births \( n \) years ago should be multiplied additionally by \((1.01)^n\), giving the total adjustment factors showing in the last row in Table 2.

Figure 3 shows the distribution of births by calendar year. The graphs indicate that the number of births increased steadily from 1983 to 1987. In 1988 there was a decline to just above the 1986 figure, but 1989 saw a recovery in the birth rate. After 1989, the births fell to lower levels than for any year since 1984. A three-year moving average smoothens the trend, but the sharp fall in the late 1980s is still visible.
Table 2
CALCULATION OF ADJUSTMENT FACTORS FOR TRUNCATION

<table>
<thead>
<tr>
<th>Years prior to survey</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last child-bearing age reported</td>
<td>49</td>
<td>48</td>
<td>47</td>
<td>46</td>
<td>45</td>
<td>44</td>
<td>43</td>
<td>42</td>
<td>41</td>
<td>40</td>
</tr>
<tr>
<td>Proportions of births lost (p)</td>
<td>0.004</td>
<td>0.008</td>
<td>0.012</td>
<td>0.016</td>
<td>0.020</td>
<td>0.036</td>
<td>0.052</td>
<td>0.068</td>
<td>0.084</td>
<td>0.100</td>
</tr>
<tr>
<td>Adjustment factor for truncation (\frac{1}{1-p})</td>
<td>1.004</td>
<td>1.008</td>
<td>1.012</td>
<td>1.016</td>
<td>1.020</td>
<td>1.037</td>
<td>1.055</td>
<td>1.073</td>
<td>1.092</td>
<td>1.111</td>
</tr>
<tr>
<td>Adjustment factor for maternal mortality</td>
<td>1.010</td>
<td>1.020</td>
<td>1.030</td>
<td>1.041</td>
<td>1.051</td>
<td>1.062</td>
<td>1.072</td>
<td>1.083</td>
<td>1.094</td>
<td>1.105</td>
</tr>
<tr>
<td>Total adjustment</td>
<td>1.014</td>
<td>1.028</td>
<td>1.042</td>
<td>1.058</td>
<td>1.072</td>
<td>1.101</td>
<td>1.131</td>
<td>1.162</td>
<td>1.195</td>
<td>1.228</td>
</tr>
</tbody>
</table>
Figure 3 (a)
BIRTHS BY CALENDAR YEAR ADJUSTED FOR WHOLE YEAR AND TRUNCATION EFFECTS

Figure 3 (b)
ADJUSTED BIRTHS WITH THREE-YEAR MOVING AVERAGES
SOME EXPLANATIONS OF THE LONG TERM PLAUSIBILITY OF RATES OF INCREASE

We can make some rough estimates of the rates of increase and decrease to check their long term plausibility. The slope calculated for the years 1983 to 1988 (which suggest an upward trend) indicates an increase of nine births over five years, an increase of 1.8 births per year. The mean births per year for this period is 46 so that an increase of 1.8 is equivalent to an annual increase of nearly 4%. This is a high rate of increase, but just about feasible for a rapidly growing population. For the period 1989–91, the three-year moving averages decline steadily at six births per year. The mean annual births for this period is 43 giving an annual rate of decline of 14%. This is a massive reduction, unlikely to be sustained for long periods, and in a community with little evidence of voluntary fertility control, probably represents an involuntary response to a crisis situation, such as documented by Dyson (1991) in the South Asia famine.

It is thought unlikely that the under-reporting of events alone would produce such a pattern of births, as the observed pattern would imply that reporting would be very incomplete in the most recent years, improve steadily going back over the last five years and then deteriorate slightly over the preceding five-year interval whereas experience in most fertility surveys is one of decreasing completeness going back over time. Also it is unlikely that misdating of events could be responsible: this would require that children aged 0–3 were consistently reported as 4–6. Since developmental milestones are easily noticed at these ages, and all but the dead children were seen personally by the researcher, this is not a likely explanation.

CALCULATING THE ASFR

In order to try to smooth some of the fluctuations which are due to small numbers and minor misdating of events, ASFR were calculated for periods 0–4 and 5–9 years before the survey. Assuming that the crisis that led to the dramatic reduction of births began somewhere between 1987 and 1989, the 1983–87 figures can be interpreted as pre-crisis rates and 1988–92 figures as crisis rates.

The rates were computed allowing for the age of mother at the time of birth in the standard five-year age groups to define numerators of the rates and the women years of exposure in the age group as denominators. The births and numbers at risk were back-dated over the five-year period (0–4) or (5–9) years to allow for the movement of the women within and between five-year age groups.
a) Calculation of the person years of exposure

The duration of exposure within each age group varies according to the exact age of the women. For example, a woman aged 20 years at the survey, will have spent four of the last five years in the 15–19 age group, and one year in the 20–24 age group, whereas a 16-year old would have spent two years in the age group 15–19 and three years under age 15.

Figure 4 shows an example of the calculation of person years of exposure in the period 0–4 years before the survey for women aged 15 to 25 showing the movement of a group of women from one age group going back into the past by one year, two years, three years.

**Figure 4**

**CALCULATION OF THE PERSON YEARS OF EXPOSURE IN THE PERIOD 0–4 YEARS BEFORE THE SURVEY**

<table>
<thead>
<tr>
<th>Single ages</th>
<th>Number of women at each age</th>
<th>Years before the survey</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>17</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>18</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>19</td>
<td>6</td>
<td>6</td>
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<tr>
<td>20</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>21</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>22</td>
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<td>9</td>
</tr>
<tr>
<td>23</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>24</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

For calculating births in the period 0–4 years before the survey, the procedure is essentially the same. The number of births are tabulated by the single year ages of the mother as recorded in 1992 and then stepped backwards to calculate the age of the mother and the number of births.
that the women had one year before the survey, two years before the survey etc. An example is shown in Figure 5.

**Figure 5**
**CALCULATION OF BIRTHS IN THE PERIOD 0–4 YEARS BEFORE THE SURVEY**

<table>
<thead>
<tr>
<th>Age of mother in single years</th>
<th>Births in the period 0–4 years before the survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>0 1 2 3 4</td>
</tr>
<tr>
<td>16</td>
<td>0 2 0 0 0</td>
</tr>
<tr>
<td>17</td>
<td>2 2 0 0 1</td>
</tr>
<tr>
<td>18</td>
<td>0 2 0 1 0</td>
</tr>
<tr>
<td>19</td>
<td>1 3 1 1 1</td>
</tr>
<tr>
<td>20</td>
<td>1 1 2 2 3</td>
</tr>
<tr>
<td>21</td>
<td>2 0 0 2 1</td>
</tr>
<tr>
<td>22</td>
<td>2 1 1 5 0</td>
</tr>
<tr>
<td>23</td>
<td>2 0 1 2 2</td>
</tr>
<tr>
<td>24</td>
<td>1 1 2 3 3</td>
</tr>
</tbody>
</table>

The results of the births divided by the person years of exposure for the period 0–4 years, 5–9 years and the last 12 months are shown in Table 3 below. Because of the shifting backwards of both births and ages of women, these births are tabulated by age of mother at the time of the survey.

Figure 6 shows the plots of the age specific rates by age. The adjustments made to the total births to allow for age truncation and maternal mortality are not incorporated into the age specific fertility rates calculated here, as the mortality correction would not affect the rates (numerator and denominator would be increased by the same amount).
### Table 3
**births by women years of exposure, tembomvura survey**

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Births in last 12 months</th>
<th>Births for 88-92</th>
<th>Women years of exposure</th>
<th>Births for 83-87</th>
<th>Women years of exposure</th>
<th>ASFR from BLY</th>
<th>ASFR for 88-92</th>
<th>ASFR for 83-87</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-19</td>
<td>0</td>
<td>1</td>
<td>203</td>
<td>30</td>
<td>137</td>
<td>0.109</td>
<td>0.167</td>
<td>0.219</td>
</tr>
<tr>
<td>20-24</td>
<td>6</td>
<td>36</td>
<td>137</td>
<td>52</td>
<td>177</td>
<td>0.182</td>
<td>0.263</td>
<td>0.294</td>
</tr>
<tr>
<td>25-29</td>
<td>9</td>
<td>47</td>
<td>177</td>
<td>54</td>
<td>157</td>
<td>0.281</td>
<td>0.266</td>
<td>0.344</td>
</tr>
<tr>
<td>30-34</td>
<td>7</td>
<td>33</td>
<td>157</td>
<td>35</td>
<td>140</td>
<td>0.212</td>
<td>0.210</td>
<td>0.250</td>
</tr>
<tr>
<td>35-39</td>
<td>4</td>
<td>23</td>
<td>140</td>
<td>17</td>
<td>107</td>
<td>0.148</td>
<td>0.164</td>
<td>0.159</td>
</tr>
<tr>
<td>40-44</td>
<td>1</td>
<td>13</td>
<td>107</td>
<td>1</td>
<td>59*</td>
<td>0.042</td>
<td>0.121</td>
<td>0.017</td>
</tr>
<tr>
<td>45-49</td>
<td>1</td>
<td>1*</td>
<td>59*</td>
<td>na*</td>
<td>na*</td>
<td>0.053</td>
<td>0.017*</td>
<td>na*</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>33</strong></td>
<td><strong>188</strong></td>
<td><strong>980</strong></td>
<td><strong>195</strong></td>
<td><strong>777</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Est of TFR

Mean age at child-bearing

Standard deviation

*Estimates affected by incomplete or missing data due to truncation.*
Figure 6
AGE SPECIFIC FERTILITY RATES BY AGE OF MOTHER AT BIRTH OF CHILD

In terms of level, the TFR estimates made from the births in the last year suggest that fertility was 5.1 children per woman whereas that from the births in the last five years suggest a TFR of 6.0. From the birth history information on births in the period 5-9 years, the TFR is around 6.4 births per woman. The TFR from BLY appears rather low and this suggests some under-reporting and/or reference period errors.

The TFR for both five years before the survey and 10 years before the survey are affected by truncation: the extent of truncation error is about 1% for the former and 6% for the latter estimates. Allowing for the truncation, the birth history data would give ASFR estimates of 6.1 and 6.8. These fertility rates are higher for purely nomadic populations (Howell, 1975, p. 18) but are comparable to estimates made for semi-nomadic populations using indirect procedures (Blurton-Jones et al., 1992).

It is possible that our birth history data may be under-reported, even when corrected for truncation error. However, the trend of falling fertility appears to be supported by other information obtained from the population. There is evidence from qualitative data that the population experienced a reduction in the number of births due to the drought and
food shortage. Furthermore, from qualitative information, there are indications that Tembomvura people used to have high fertility; colloquial evidence from the neighbouring Chikunda points to the fact that the Tembomvura women are very prolific and historically had a tendency to have large families. This suggests higher fertility in the past.

There is evidence from mortality data that childhood and adult mortality increased during the crisis period (Marindo-Ranganai, 1995, p. 253) and this suggests that fertility could have declined through an increase in intra-uterine mortality which usually increases during famine (Riley et al., 1993, p. 57) and also through increasing maternal mortality. It appears as if the drought and famine might have led to a reduction in fertility. Whether this decline can be sustained over a long period can not be ascertained from the data.

CONCLUSION

Local communities, even illiterate ones, can provide quantitative data on the number of their children if methods are used which allow them to express their knowledge. The creation of rapport during modelling, diagramming and dramatisation of fertility histories allowed for cross-checking of quantitative information because the respondents and their children were known by the researcher by the time the demographic questionnaire was completed. By allowing respondents to provide data in their own way, we may get more reliable data.

Although the data may not be perfect, the study offers some ideas on how current fertility information can be obtained, and how the birth history may be refined to make it more usable with illiterate populations. This contribution may be useful to many African demographers who are frustrated by rural people's lack of numeracy. The study provides a starting point from which other ideas may be generated in an effort to collect better demographic data from most of the rural populations in Africa. With larger populations however, applications of models and diagrams have to be fine-tuned because they require a lot more time and involvement than precoded questionnaires.

References


BRASS, W., (1971) 'Methods for Estimating Fertility and Mortality from Limited and Defective Data', Based on Seminars held 16–24 September, CELADA.


