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Abstract
The analytical framework proposed by Davis and Blake (1956) divides the process of reproduction into three elements: (i) exposure to the risk of pregnancy, (ii) the ability to conceive and (iii) successful gestation. This paper is concerned with the first element. Data from the 1973 National Demographic Survey of Tanzania (NDS) are used to investigate the role of marriage behavior in determining fertility levels. Coale's parameters of the age pattern of first marriage ao, k and C are translated into Im-type measures. A system of indices is developed to represent the effects of the prevalence and age patterns of first marriage, marital disruption and remarriage on fertility. Techniques for obtaining detailed information on the process of marital dissolution and subsequent remarriage are presented. The potential effects of changes in nuptiality patterns on fertility are discussed.

Keywords
Tanzania, Africa, nuptiality, marriage, fertility, National Demographic Survey of Tanzania, survey data, survey, marriage behavior, marital disruption, remarriage, marital dissolution, nuptiality patterns, age, first marriage, childbearing, cohabitation, widowhood, divorce, age patterns,

Comments

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Mechanisms Affecting the Link Between Nuptiality and Fertility: Tanzania, 1973

Emmanuel K. Sekatawa

June 1981
MECHANISMS AFFECTING THE LINK
BETWEEN NUPTIALITY AND FERTILITY: TANZANIA
1973

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I reserve my greatest thanks for members of my dissertation committee - Drs. Frederick W. Hollmann, Samuel H. Preston and Etienne van de Walle, Chairman - for their guidance during the course of this work. I also benefited from a number of cogent comments made by colleagues, notably Mahmood Issa, Wariara Mbugua and Edward Brown during numerous discussions that are part of the Center's tradition.

While I can only accept partial credit for whatever merit this work may be worth, I wish to absolve my advisors from guilt for any errors that may still remain.
ABSTRACT

The analytical framework proposed by Davis and Blake (1956) divides the process of reproduction into three elements: (i) exposure to the risk of pregnancy, (ii) the ability to conceive and (iii) successful gestation. This paper is concerned with the first element. Data from the 1973 National Demographic Survey of Tanzania (NDS) are used to investigate the role of marriage behavior in determining fertility levels. Coale's parameters of the age pattern of first marriage \( a_0 \), \( k \), and \( C \) are translated into \( Im \)-type measures. A system of indices is developed to represent the effects of the prevalence and age patterns of first marriage, marital disruption and remarriage on fertility. Techniques for obtaining detailed information on the process of marital dissolution and subsequent remarriage are presented. The potential effects of changes in nuptiality patterns on fertility are discussed.
1. AN INDEX OF THE PROPORTIONS EVER MARRIED

The relationship \( f(a) = C(a)M(a) \) factors fertility at age \( a \) into two elements; \( C(a) \) the proportion cohabiting, and \( M(a) \), the rate of childbearing among those cohabiting. In the context of the Davis-Blake framework, \( C(a) \) represents the level of exposure and \( M(a) \) describes both the probability of conception and successful gestation. Theoretically, the decomposition of \( f(a) \) into \( C(a) \) and \( M(a) \) can be performed for cohort as well as period fertility rates.

To represent the proportions cohabiting, Coale (1967) developed an index \( I_m \) which is the ratio of the number of children that would be borne to married women to the number that would be borne to all women if both groups had the age specific fertility rates of the married Hutterites, 1921-30. Thus,

\[
I_m = \frac{\sum_{i=1}^{7} \frac{F_i M_i}{W_i}}{7 \sum_{i=1}^{7} \frac{F_i W_i}{W_i}}
\]

where

- \( F_i \) is the number of births per married woman in the \( i \)th five-year age group, 15-19 being the first; Hutterite population 1921-30.
- \( M_i \) is the number of married women in the \( i \)th age interval.
- \( W_i \) is the number of all women in the \( i \)th age interval.

The index has a maximal value of unity, when all women aged 15-49 are married. However, the value of \( I_m \) is influenced by the number of women in the respective age groups and may give misleading results if used to compare marriage behavior in populations with very different age structures (e.g., migrants versus non-migrants). To abstract the possible effects of variations in age structure, the indices defined in this paper are based on proportions with the appropriate characteristic instead of numbers. An asterisk (*) is used to distinguish them from the Coale indices. Clearly, the indices are the same for rectangular age distributions.

We define the index

\[
I_{em} = \frac{\sum_{i=1}^{7} \frac{F_i G_i}{G_i}}{7 \sum_{i=1}^{7} \frac{F_i}{G_i}}
\]  

(1)
where \( G_i \) is the proportion ever married in the \( i \)th age interval. \( F_i \) is the age specific marital fertility schedule of the Hutterites.

The index \( I_{em} \) can be calculated either directly from cross-sectional data on proportions ever married by five year age groups or indirectly from knowledge of Coale's parameters of the age pattern of first marriage, \( a_0, k \) and \( C \).

**Linking \( a_0, k, C \) with \( I_{em} \)**

In developing model nuptiality schedules Coale (1971) proceeded from discerning a common pattern among a collection of age-at-first marriage curves and an essentially trial-and-error process led him to a mathematical expression. The evidence to support the existence of a standard pattern is circumstantial; the standard schedule has been found to fit well in a wide variety of situations. Among the populations the models have been found to fit are nineteenth century France, Taiwan, Korea and more recently the !Dobe Kung of southern Africa. (Coale, 1977; van de Walle, 1974; Howell 1979). Hernes (1972) independently arrived at the same age pattern and his function fitted well to the 1960 U.S. census data.

An invaluable feature of the existence of structural similarity among age-at-first marriage curves is that it is possible, on the basis of partial experience of a cohort to extrapolate the rest of the curve. The structural similarity observed among first marriage frequency distributions also allows representing any of them with a choice of three parameters. The parameters chosen by Coale (1971) are \( a_0 \) -- the origin, corresponding to the earliest age at which a substantial proportion of women marry, \( k \) to represent the variance in the ages at marriage and \( C \), the final proportion ever married at the age at which first marriages become negligible. It needs to be noted here that several other combinations could be used to describe the age pattern of first marriages (cf. Rodriguez and Trussell, 1980).

Under the assumptions that marital dissolution does not occur before age 50 and that there is no differential in mortality between the married and unmarried, then

\[
I_{em} = \frac{\int_{a_0}^{a} F(a) G(a) \, da}{\int_{a}^{b} F(a) \, da} \tag{2}
\]

where \( a_0 \) to \( b \) is the range for which \( F(a) > 0 \) and \( G(a) > 0 \); normally taken to be 15-49.

\( G(a) \) is the proportion ever married by age \( a \).

\( F(a) \) is the Hutterite fertility schedule.

The denominator in (2) is the total marital fertility rate of the Hutterite schedule and is a constant \( F \), so that

\[
I_{em} = \frac{\int_{a_0}^{a} F(a) G(a) \, da}{F}
\]

The proportion ever married by age \( a \), \( G(a) \) is given by the relationship

\[
G(a) = C \cdot G_s \left( \frac{a - a_0}{k} \right) \text{ where } G_s(x) \text{ is the standard schedule of the proportions ever married. } C \text{ is the proportion that ultimately marry.}
\]
Therefore

\[ I_{em} = \frac{C}{F} \int F(a) \frac{G_s (a-a_0)}{(k)da} \]  

(3)

and, in discrete form

\[ I_{em} = \frac{nc}{F} \sum_{i=1}^{k} F(a_i) \frac{G_s (a_i-a_0)}{k} \]  

(3a)

where \( n \) is the regular interval width between \( a_i \) and \( a_{i+1} \) of the summation. A table of values of \( I_{em} \) implicit from various combinations of \( a_0 \), \( k \) and universal marriage, \( C=1.0 \), is added as an appendix to this paper.

A corresponding index for the proportions currently married \( I^*_{m} \) is given by the relationship;

\[ \frac{\sum_{i=1}^{7} F_i M_i}{\sum_{i=1}^{7} F_i} \]  

(4)

where \( M_i \) is the proportion of currently married women among those in the \( i \)th age interval.

In the absence of marital dissolution and differential mortality between the married and unmarried women, \( I_{em} \) equals \( I^*_{m} \).

2. **THE ROLE OF DIVORCE, WIDOWHOOD AND REMARRIAGE IN DETERMINING \( I^*_{m} \)**

The best way to view the role of divorce, widowhood and remarriage in determining fertility is by answering the question; how much of the difference between \( I_{em} \) and \( I^*_{m} \) is due to the incidence of the respective phenomena? Thus we can write the index \( I_{m} \) of the proportions currently married as follows:

\[ I_{m} = I_{em} - I_{md} - I_{mw} + I_{mr} \]  

(5)

where \( I_{md} \) represents the amount by which \( I_{em} \) would be reduced if all ever divorced women did not remarry.

\( I_{mw} \) represents the amount by which \( I_{em} \) would be reduced if all ever widowed women did not remarry.

\( I_{mr} \) represents the portion of \( (I_{md} + I_{mw}) \) reinstated by remarriage.

\( I_{md} \) is defined by the equation:

\[ I_{md} = \frac{\sum_{i=1}^{7} F_i M_i}{\sum_{i=1}^{7} F_i} \]
where Mid is the proportion of ever divorced women in the ith age interval. Imw, Imr
are computed by replacing Mid with the proportions of ever widowed and the proportions
in their second or higher order unions respectively. The identity (5) holds if one
ignores the possibility of the same persons being both widows and divorced. It is
noteworthy too that these indices can be obtained for real as well as synthetic cohorts.
For real cohorts it is necessary to compute, for each age group, the number of person-
years spent in each of the state of widowhood, divorce and second marriages.

Table 1 shows the age specific distributions of women according to whether they
are ever married, currently married, ever divorced or widowed for two regions of
Tanzania, 1973. The last column shows the summary measure for each of the phenomenon.

The data presented in Table 1 indicate that there are slight variations in the
behavior of the various cohorts. Under conditions of stability we would expect a
monotonically increasing trend for the proportions ever married, ever divorced and those
married more than once. The departure from this expected pattern either signifies the
presence of cohort differences or reporting errors on the part of older cohorts or a
mixture of the two (see row of ever divorced). However, the indices derived provide an
adequate shorthand means for comparing the roles of divorce, widowhood and remarriage
in determining the overall exposure index, Im. The statistics of Table 1 are inter-
pretable as follows. If all marriages ever contracted had remained intact, we would
observe an Im value of 0.898; data on the proportions currently married yield an Im
value of 0.806 of which 0.172 is the contribution of polygamously married women. Further,
the difference between the values of Iem and Im is divided into the events of divorce,
widowhood and remarriage showing that divorce reduces exposure to a larger extent than
does widowhood. A more significant observation is that while the ratio of the
incidence of widowhood to divorce (disregarding cohort sizes) is 0.31:1, it is
0.26:1 when the fertility-weighted indices are used thereby pointing to the difference
in their age distributions. Widowhood is more heavily weighted toward the later, less
fertile age groups than divorce. The amount of exposure reinstated by remarriage is
shown by Imr (0.113) and is 63.5 percent of the sum of Imw and Imd.

3. RATES OF MARITAL DISSOLUTION, REMARRIAGE AND INTER-MARRIAGE DURATIONS

The indices of proportions ever-married, ever widowed or divorced and currently
in a second or higher order union (Iem, Imw, Imd and Imr) defined in the previous section
assign equal weight to each woman within an age group regardless of her fertility
experience. The interpretation of the indices is that in the absence of remarriage,
divorce and widowhood would reduce exposure to intercourse and therefore fertility by
amounts proportionate to Imd and Imw respectively. Similarly Imr represents the amount
of fertility reinstated by remarriage under the assumption that women in their
second or higher order unions have the same age specific fertility rates as women in
unbroken marriages. The computation of the indices also contains the supposition that
women are not exposed to the risk of pregnancy while out of wedlock. However, there is
evidence that (i) women are self-selected into various marital status categories on the
basis of their fertility experience and (ii) non-marital fertility rates are high in
this population (Sekatama, forthcoming). In this context the indices Imd*, Imw and Imr
exaggerate the effects of divorce, widowhood and remarriage on fertility. On the other
hand, the fact that single women bear children means that the index Iem underestimates
the proportion of women exposed to the risk of pregnancy.
Table 1: Age Specific Distribution and Summary Indices of Proportions Ever Married, Currently Married, Ever Divorced, Ever Widowed and Married More than Once, West Lake and Mwanza Regions, Tanzania 1973

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportions ever married</td>
<td>.459</td>
<td>.914</td>
<td>.972</td>
<td>.970</td>
<td>.971</td>
<td>.977</td>
<td>.984</td>
</tr>
<tr>
<td>Proportions currently married</td>
<td>.438</td>
<td>.842</td>
<td>.910</td>
<td>.876</td>
<td>.849</td>
<td>.793</td>
<td>.722</td>
</tr>
<tr>
<td>(i) monogamously</td>
<td>.356</td>
<td>.690</td>
<td>.723</td>
<td>.672</td>
<td>.644</td>
<td>.596</td>
<td>.536</td>
</tr>
<tr>
<td>(ii) polygamously (Mip)</td>
<td>.074</td>
<td>.152</td>
<td>.187</td>
<td>.204</td>
<td>.205</td>
<td>.197</td>
<td>.186</td>
</tr>
<tr>
<td>Proportions ever divorced (Mid)</td>
<td>.015</td>
<td>.095</td>
<td>.148</td>
<td>.187</td>
<td>.208</td>
<td>.185</td>
<td>.183</td>
</tr>
<tr>
<td>Proportions ever widowed (Miw)</td>
<td>.006</td>
<td>.022</td>
<td>.031</td>
<td>.037</td>
<td>.061</td>
<td>.069</td>
<td>.088</td>
</tr>
<tr>
<td>Proportions married more than once (Mir)</td>
<td>.015</td>
<td>.076</td>
<td>.150</td>
<td>.146</td>
<td>.157</td>
<td>.111</td>
<td>.091</td>
</tr>
<tr>
<td>Hutterite Schedule $F_i$</td>
<td>.300</td>
<td>.550</td>
<td>.502</td>
<td>.447</td>
<td>.406</td>
<td>.222</td>
<td>.061</td>
</tr>
</tbody>
</table>

Indices

- *I_{em} = .898*
- *I_{im} = .806*
- *I_{mp} = .633*
- *I^{*}_{md} = .141*
- *I^{*}_{mw} = .037*
- *I^{*}_{mr} = .113*

---


Data source: NDS tape.
In this section we first present a methodology for the calculation of rates of marital dissolution, remarriage rates and inter-marriage durations from classifications of women according to whether they are ever married, currently married and the order of their union. The methodology is then used to calculate the extent to which the indices derived in the previous section misrepresent the effects of marital disruption and remarriage on fertility. We also indicate the potential effects of changes of marriage behavior on fertility through their influence on marital status distributions.

Methods of computation

A central assumption underlying the calculation of rates of marital dissolution and remarriage in this paper is that they are only age dependent. This assumption is justified to the extent that if the variance in the age at first marriage is small (i.e. a small k value) then the age of woman minus the age at first marriage closely approximates the duration of the first marriage. Under these circumstances a representation of marital dissolution rates involving the age of woman would be fairly similar to one using the duration of the first union or one incorporating both of these factors. The marital dissolution rates at age \( a \), \( DR(a) \) is defined as the increase in the proportion currently divorced or widowed at age \( a \) divided by the proportion at risk, namely those currently married. Thus the population's rate of marital dissolution is a weighted sum of rates for women dissolving their first order, second order and so on, unions. In symbols,

\[
DR(a) = \left( \frac{\Delta_1 D(a) W_1(a)}{\sum_{i=1}^{n} W_i(a)} + \frac{\Delta_2 D(a) W_2(a)}{\sum_{i=1}^{n} W_i(a)} + \ldots + \frac{\Delta_n D(a) W_n(a)}{\sum_{i=1}^{n} W_i(a)} \right)
\]

where \( DR(a) \) is the annual rate of marital disruption at age \( a \) for all currently married women.

\( \Delta_i D(a) \) is the annual rate of marital dissolution at age \( a \) for the \( i \)th order marriages.

\( W_i(a) \) is the number of currently married women aged \( a \), in their \( i \)th order union.

Because data were unavailable on the proportions dissolving their second or higher order unions, it was necessary to assume that the age specific rates of dissolution of first unions are representative of the entire population.

To derive remarriage rates, the following basic relationship was used. Let \( CD(x) \) be the proportion of the total population currently divorced or widowed at age \( x \) and \( D(a) \) the proportion dissolving their marriages at age \( a \), \( RM(a) \) is the proportion of the total population remarrying at age \( a \). (The argument for age is \( x \) where the proportion is cumulative and \( a \) for age specific proportions.)

Then,

\[
CD(x) = \int_0^x D(a) - \int_0^x RM(a)
\]

where \( \int_0^x D(a) \) is the sum of proportions ever dissolving a marriage up to age \( x \) and \( \int_0^x RM(a) \) is the sum of the proportions ever remarrying up till the age \( x \). Differentiating equation (6) with respect to age and dividing every term by \( CD(a) \) we obtain:
RM(a) = D(a) - d CD(a)  \hspace{1cm} (7)

RM(a) is, by definition, the remarriage rate at age x. D(a) is estimated by the change with age in the proportions ever divorced or widowed. CD(a) is obtained as the change in the proportions currently divorced or widowed and d CD(a) is given by the rate of change with age in the proportions currently divorced or widowed.

Data and computational procedure

Table 2 sets out the basic data necessary for the computation of rates of marital dissolution and remarriage.

Marital dissolution rates were calculated on the basis of data for two consecutive five year age groups as follows. Using linear interpolation each of the figures in Table 2 is attributed to the mid-point of the age group so that the proportion currently married for the age group 20-24 is taken to be the proportion at 22.5 and so on. The rate of change in the proportions who have ever dissolved a marriage is then obtained by subtracting the proportions for the successive age groups (row 3) and dividing by five to obtain an annual rate. The rate so obtained applies to the ages between the two age group mid-points; the first referring to ages 12.5 to 17.5. Similarly, the proportions in their first union at 15, 20, ..., 45 were obtained as the arithmetic means for two adjacent age groups, 10-14 and 15-19, 15-19 and 20-24 and so on. Rates of marital dissolution among first order marriages were then taken as the rate of change in the proportions ever widowed or divorced divided by the proportions in their first unions at a central age. The computational procedure is shown below:

<table>
<thead>
<tr>
<th>Central age</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>0.0058</td>
<td>2.150</td>
<td>0.02698</td>
</tr>
<tr>
<td>20</td>
<td>0.0192</td>
<td>6.175</td>
<td>0.03109</td>
</tr>
<tr>
<td>25</td>
<td>0.0124</td>
<td>7.950</td>
<td>0.01559</td>
</tr>
<tr>
<td>30</td>
<td>0.009</td>
<td>7.695</td>
<td>0.01169</td>
</tr>
<tr>
<td>35</td>
<td>0.009</td>
<td>7.240</td>
<td>0.01243</td>
</tr>
<tr>
<td>45</td>
<td>0.0034</td>
<td>7.180</td>
<td>0.00474</td>
</tr>
</tbody>
</table>

The average period between the start of simulation and marital disruption was calculated by starting out, at various ages, with a radix of currently married women (in their first union) and subjecting them to the marital dissolution rates derived for West Lake and Mwanza regions. It is necessary to note that because the computation of the marital dissolution rates was only age dependent, the radix is composed of women of varying lengths of first union. The mean durations of first marriages for those who divorce or become widows before the age of 47.5 is therefore the period since the beginning of the simulation plus the mean duration prior to the simulation. For all the computations, marital dissolution rates were assumed constant within each five year age group. Under this assumption the person-years lived in the married state within an age group x to x+n, \( nL_x(m) \), is given by the relationship:

\[
nL_x(m) = \frac{1}{x} (1-e^{-kn})
\]  \hspace{1cm} (8)
Table 2: Proportions Currently Married, Currently Married in Unbroken Marriages, Ever Divorced or Widowed and Currently Divorced or Widowed for Rural Residents, West Lake and Mwanza Regions, Tanzania 1973

<table>
<thead>
<tr>
<th>Five Year Age Group of Woman</th>
<th>10-14*</th>
<th>15-19</th>
<th>20-24</th>
<th>25-29</th>
<th>30-34</th>
<th>35-39</th>
<th>40-44</th>
<th>45-49</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportions Currently Married</td>
<td>0.000</td>
<td>0.430</td>
<td>0.842</td>
<td>0.910</td>
<td>0.876</td>
<td>0.849</td>
<td>0.793</td>
<td>0.722</td>
</tr>
<tr>
<td>Proportions Currently Married (in first union)</td>
<td>0.000</td>
<td>0.430</td>
<td>0.797</td>
<td>0.793</td>
<td>0.746</td>
<td>0.702</td>
<td>0.723</td>
<td>0.713</td>
</tr>
<tr>
<td>Proportions Ever Divorced or Widowed</td>
<td>0.000</td>
<td>0.029</td>
<td>0.117</td>
<td>0.179</td>
<td>0.224</td>
<td>0.269</td>
<td>0.254</td>
<td>0.271</td>
</tr>
<tr>
<td>Proportions Currently Divorced or Widowed</td>
<td>0.000</td>
<td>0.021</td>
<td>0.072</td>
<td>0.062</td>
<td>0.094</td>
<td>0.122</td>
<td>0.184</td>
<td>0.262</td>
</tr>
</tbody>
</table>

*The column for the age group 10-14 is an assumption.
<table>
<thead>
<tr>
<th>Central Age (x)</th>
<th>Proportions Divorced or Widowed at Exact Age X CD(x)</th>
<th>Annual Rate of Change in Proportions Ever Divorced or Widowed D(x)</th>
<th>Annual Rate of Change in Proportions Currently Divorced or Widowed dCD(x)</th>
<th>Annual Remarriage Rate RM(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>0.0145</td>
<td>0.0058</td>
<td>0.0042</td>
<td>0.1103</td>
</tr>
<tr>
<td>20</td>
<td>0.0505</td>
<td>0.0192</td>
<td>0.0086</td>
<td>0.2099</td>
</tr>
<tr>
<td>25</td>
<td>0.067</td>
<td>0.0124</td>
<td>-0.002</td>
<td>0.2149</td>
</tr>
<tr>
<td>30</td>
<td>0.078</td>
<td>0.009</td>
<td>0.0064</td>
<td>0.0333</td>
</tr>
<tr>
<td>35</td>
<td>0.108</td>
<td>0.009</td>
<td>0.0056</td>
<td>0.03148</td>
</tr>
<tr>
<td>45</td>
<td>0.223</td>
<td>0.0034</td>
<td>0.0156</td>
<td>-0.0547*</td>
</tr>
</tbody>
</table>

*Probably reflects an underestimate of the column D(x) as women who have been in a second union for long durations may report it as their first. Subsequent computations assume a value of 0.03.*
where \( l_x \) is the number currently married at the beginning of the age group.

\( k \) is the annual rate of marital dissolution assumed constant for the age range \( x \) to \( x+n \).

The \( l_x(m) \) column, of persons remaining in their first union, is obtained by converting the annual rates of marital dissolution into analogous \( nq_x \) values using the formula:

\[
nq_x = 1 - e^{-n \cdot nM_x} \text{ where } nM_x \text{ are the annual marital dissolution rates.} \]

The sum of \( nL_x(m) \) terms is the number of person-years lived by the cohort in the married state. For those who remain in their first union at age 47.5 their contribution to the total person-years is \( l_{47.5}(m) \) multiplied by the duration of the simulation. For example, starting out with a cohort of currently married women of unbroken marriages aged 17.5, the mean duration before divorce or widowhood (\( t \)) is calculated from the equation:

\[
1_{47}(m) \cdot 0.30 + (1_{17.5}(m) - 1_{47.5}(m)) t = \sum_{x=17.5}^{47.5} nL_x(m) \]

Table 3(a) summarizes the results of these computations.

Table 3(a): Percentages Divorcing or Becoming Widows by the Age of 47.5 Years of those in Unbroken Unions at Beginning of Simulation and Marital Disruption: Marital Dissolution Rates for Mwanza and West Lake Regions, Tanzania 1973

<table>
<thead>
<tr>
<th>Initial Age of Simulation</th>
<th>12.5</th>
<th>17.5</th>
<th>22.5</th>
<th>27.5</th>
<th>32.5</th>
<th>37.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage divorcing or becoming widows by age 47.5 of those in unbroken unions at start of simulation</td>
<td>40.3</td>
<td>34.4</td>
<td>23.2</td>
<td>17.0</td>
<td>12.0</td>
<td>6.3</td>
</tr>
<tr>
<td>Average period between start of simulation and marital disruption for women dissolving their marriages before age 47.5</td>
<td>11.8</td>
<td>9.6</td>
<td>9.8</td>
<td>8.3</td>
<td>6.2</td>
<td>4.9</td>
</tr>
</tbody>
</table>

The shape of the age specific marital dissolution rates is reflected in the expected duration of first marriages shown in the second row of Table 3(a). At the age of 17.5 women in unbroken marriages expect 9.6 childbearing years before widowhood or divorce and this figure does not change if one considers the age 22.5. In other terms, given that a woman is destined to divorce or to be widowed before the end of her reproductive period she would expect the same number of years in her first marriage at ages 17.5 and 22.5. The age 17.5 is noteworthy because of its closeness to the Singulate Mean Age at Marriage (SMAM) of the population which was found to be 17.7 years. If the assumption is made that all women are automatically married on attaining SMAM then the results show that, on average, for women dissolving their unions before the age of 47.5 the first union ends 9.6 years later and that 34.4 percent dissolve their first unions by that age.
Remarriage rates and inter-marriage durations were calculated in essentially the same fashion. The analogous functions \( n_q(x) \) and \( n_L(x, d) \) representing, respectively, the probability or remarriage and person years lived in divorce or widowhood were computed using equations (7) and (8). The computational steps are shown below.

Table 3(b) is analogous to 3(a) and shows the proportions that would remarry, before the age of 47.5 and the associated inter-marriage durations under the conditions of age-dependent remarriage rates observed for the two regions of Tanzania.

### Table 3(b): Percentages Remarrying by the Age of 47.5 of those Currently Divorced or Widowed at the Beginning of the Simulation and Inter-Marriage Durations Under Conditions of Remarriage Rates Observed for Mwanza and West Lake Regions, Tanzania 1973

<table>
<thead>
<tr>
<th>Initial Age of Simulation</th>
<th>12.5</th>
<th>17.5</th>
<th>22.5</th>
<th>27.5</th>
<th>32.5</th>
<th>37.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage remarrying before the age of 47.5</td>
<td>97.7</td>
<td>95.5</td>
<td>83.9</td>
<td>46.6</td>
<td>36.9</td>
<td>26.1</td>
</tr>
<tr>
<td>Mean inter-marriage duration (years) for those remarrying before the age of 47.5</td>
<td>6.10</td>
<td>4.14</td>
<td>4.16</td>
<td>8.76</td>
<td>6.88</td>
<td>4.78</td>
</tr>
</tbody>
</table>

A note on the results presented in Table 3(b) is in order here. Because the simulations are terminated at age 47.5 the second row effectively represents the number of reproductive years that would be lost to divorce or widowhood for women in those respective categories at the beginning of the simulation. Thus the values for the inter-marriage durations are underestimates and are close to the true value to the extent that a majority are remarried. On the other hand, women remarrying soon after the dissolution of the first union are more likely to report themselves as never divorced. From this viewpoint the values in column D(x) are depressed as are the remarriage rates.

In order to understand the effects of marital dissolution and remarriage on current fertility it is imperative to superimpose the results of Table 3(b) on those in 3(a). This is done in the next section.

### 4. POTENTIAL EFFECTS OF CHANGES IN THE AGE PATTERNS OF FIRST MARRIAGE, DISSOLUTION AND REMARRIAGE RATES ON FERTILITY

#### Age patterns of first marriage

The recent changes in marriage behavior that have taken place in a number of less developed nations are fairly well documented (c.f., Duza and Baldwin, 1977; Smith 1980). The most pervasive of these have been an increase in the age at marriage either as a direct result of legislation or as a by-product of other forms of socio-economic development. There has also been a reduction in the incidence of endogamous marriages and a concomitant narrowing in the age differences between spouses. This shift from a predominance of arranged endogamous unions to individually taken decisions of who and when to marry should lead to an increase in both the variance in the ages at first marriage and the proportions never marrying. In this section, we shall attempt to quantify the potential effects of changes in the age pattern at first
marriage \((a_0, k)\) and the proportions ever marrying, \(C\), on fertility through their influence on marital status distributions.

A central assumption of the simulations in this section is that the age and marital status specific fertility rates remain constant while the distribution of women according to whether they are (i) never married (ii) currently married or (iii) currently divorced or widowed, vary. We proceed by first deriving marital status distributions by age (in single years) from various age at first marriage frequencies and imposing marital dissolution and remarriage rates computed in section 3. The age and marital status specific fertility rates for the two Tanzanian regions were then applied to the different marital status distributions to simulate what the total fertility rates would be under the assumptions of changing marriage behavior.

To characterize the effects of changes in the age patterns of first marriage we shall consider the following six cases:

\[
\begin{array}{ccc}
   a_0 & k & C \\
   (i) & 12.0 & 0.5 & 1.0 \\
   (ii) & 15.0 & 0.5 & 1.0 \\
   (iii) & 12.0 & 0.5 & 0.8 \\
   (iv) & 12.0 & 1.0 & 1.0 \\
   (v) & 15.0 & 1.0 & 1.0 \\
   (vi) & 12.0 & 1.0 & 0.8 \\
\end{array}
\]

Case (i) is our initial state (closest to the Tanzanian population) and a shift to case (ii) for example would correspond to an increase of three years in the age for the start of union formation. Similarly a change from case (i) to case (iv) would represent a slowing down in the rate at which marriages are formed.

Starting with a radix of 100,000 women, the number remaining single (never married) at every age is read-off from a table (Coale, 1971, Table 3), for cases where \(k\) is unity. For cases where \(k\) is different from unity the proportions remaining single \(t\) years after the age at which marriage starts, \(a_0\), \(S_k(t)\) are given by the equation:

\[
1 - S_k(t) = (1 - S_1\left(\frac{t}{k}\right)) \cdot C
\]

where \(S_1\left(\frac{t}{k}\right)\) is the proportion remaining single \(t/k\) years after \(a_0\) in the standard \((k = 1.0, C = 1.0)\).

\(C\) is the proportion ever marrying. Thus the proportion ever married by age 20 in case (i) is the same as that age 28 in case (iv). \((k = 0.5, t = 8, C = 1.0)\).

The proportions currently divorced or widowed at age \(x\), \(CD(x)\) were computed using the recursive formula:

\[
CD(x) = CD(x-1) - CD(x-1) \cdot RM(x-1) + RM(x-1) \cdot DR(x-1)
\]

where \(CD(x-1)\) is the number of women currently divorced or widowed aged \(x-1\).

\(RM(x-1)\) is the probability for a currently divorced or widowed woman aged \(x-1\) to be remarried by age \(x\).

\(CM(x-1)\) is the number of women currently married (any order of marriage) at age \(x-1\).
DR(x-1) is the probability for a woman aged x-1 and married to be widowed or divorced by age x.

Under the assumption of the absence of mortality, the number of women who would be currently married at age \(x\), \(CM(x)\) is obtained by subtracting the never married \(S(x)\) plus divorces and widows, \(CD(x)\), from the radix. The person-years lived by a cohort of women in the single (never married), married, and divorced or widowed is arrived at by summing the columns \(S(x)\), \(CM(x)\) and \(CD(x)\) respectively for \(x = 15\) to 19, 20-24 and so on. The quinquennial age and marital specific fertility rates derived for West Lake and Mwanza regions were then multiplied by the corresponding person-years to give the number of births. An illustrative computation is added as an appendix to this paper. Table 4(a) shows the total fertility rates obtained under different assumptions of age patterns of first marriage and proportions ever marrying.

**TABLE 4**: Total Fertility Rates Under Various Assumptions of the Parameters \(a, k, C\) Using Age and Marital Specific Fertility Rates for West Lake and Mwanza Regions, Tanzania 1973

<table>
<thead>
<tr>
<th>(C = 1.0)</th>
<th>(C = 0.8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a_0 = 12.0)</td>
<td>(a_0 = 12.0)</td>
</tr>
<tr>
<td>(k = 0.5)</td>
<td>5.24</td>
</tr>
<tr>
<td>(k = 1.0)</td>
<td>4.29</td>
</tr>
</tbody>
</table>

The reductions in the total fertility rate due to changes in the age patterns of first marriage are smaller than would be expected because of the high incidence of non-marital fertility. On the basis of the index \(I_m\), which assumes zero fertility for women out of wedlock, a reduction by 20 percent of the proportions ever marrying would translate into a corresponding 20 percent reduction in the total fertility rate. In fact the results of Table 4(a) shows a reduction of only 11 percentage points, from 5.24 to 4.67.

Another effect of changes in the age patterns of marriage stems from the alteration of the age specific fertility rate of the population as a whole. Thus if we use a measure of fertility that takes into account the mortality of women then the effects of later and a slowed pace of marriage become more pronounced. Such an index is the net reproduction rate (NRR) given by the approximate relationship:

\[
NRR = \frac{\text{TFR}}{\text{SR}} \cdot \frac{p(m)}{p(\bar{m})}
\]

where TFR is the total fertility rate.

SR is the sex ratio at birth assumed constant for all age groups of women.

\(p(\bar{m})\) is the proportion in the life table population surviving to the mean age of the age specific fertility schedule, \(\bar{m}\).

On the basis of Table 4(a) it would appear that a reduction in the proportions ever marrying from universality to 80 percent results is the same decline in fertility as increasing the value of \(a_0\) from 12.0 to 15.0, namely to lower the total fertility rate from 5.24 to 4.67. In fact, in addition to lowering the overall fertility level,
increasing the age at which marriage starts by three years raises the mean age of the
fertility schedule from 28.5 to 29.6 years. The exact difference in terms of the net
reproduction rate depends on the mortality conditions. It is worth noting that the
increase in $m$ is the result of the relative magnitudes of the age and marital specific
fertility rates in this particular population. If the fertility of single women at
every age were the same as the rest of the population, we would observe the same overall
fertility schedule regardless of changes in the age at marriage. It is also possible
for changes in status distributions to compensate for changes in the fertility rates.

**Marital dissolution**

The effect of marital dissolution rates on fertility was simulated by doubling
the annual probabilities of marital disruption and calculating the fertility levels
associated with the resultant marital status distributions. A procedure similar to
one described above was used to obtain the age and marital status distributions with
the annual probabilities of marital dissolution doubled. Table 4(b) shows the results
of this simulation; the top row of Table (4)a is retained for easy comparison.
Table 4(b): Marital Dissolution Rates Doubled and Remarriage Rates Same as in West
Lake and Mwanza Region

<table>
<thead>
<tr>
<th>C</th>
<th>$a_0 = 12.0$</th>
<th>$a_0 = 15.0$</th>
<th>$a_0 = 12.0$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$k = 0.5$ Marital dissolution and remarriage rates same as in West Lake and Mwanza</td>
<td>5.24</td>
<td>4.68</td>
<td>4.67</td>
</tr>
<tr>
<td>$k = 0.5$ Marital dissolution rates doubled, remarriage rates same as in West Lake and Mwanza</td>
<td>4.98</td>
<td>4.46</td>
<td>4.43</td>
</tr>
</tbody>
</table>

The data presented in Table 4(b) show minimal reductions in fertility due to
the doubling of the annual probabilities of marital disruption. The reductions are
around 5 percent and vary little with the underlying age pattern of first marriage.
There are two explanations for the rather small effects of doubling marital disruption
probabilities: (i) high remarriage rates counteracting the effect of marital dissolu-
tion; and (ii) high fertility rates for currently divorced or widowed women. These
factors may reinforce each other, for instance by pregnancy while out of wedlock leading
to remarriage. Both of these factors are operating in the two Tanzanian regions. For
the prime childbearing ages, 15-30, the age specific fertility rate of currently
divorced or widowed women is in excess of 40 percent of the rate for currently married
women (see Appendix 1). Table 3(b) shows that the remarriage rates are very high
although there is a precipitous decline past the age 25 indicating the premium placed
on marrying a young woman.

However, the role of marital dissolution through divorce, in determining overall
fertility levels is not clear-cut. There is evidence that women were self-selected into
various marital categories on the basis of their past fertility experience in this
population (Sekatawa, forthcoming). The less fecund women were more likely to divorce
and subsequently enter a second order union. To prove definitively that high divorce
rates lower fertility it is necessary to ascertain the fertility of the women prior to
and after divorce. In cases where women bear children in their second union and not
the first, divorce may be viewed as an adjustment process replacing an infertile
union with a productive one. Data on the timing of divorce and births would allow the
investigation of this question. These are not available in this survey.
Remarriage rates

To represent the effects of changes in remarriage rates we carried out simulations in which the annual remarriage probabilities were doubled. The rest of the procedure is the same as in the section on marital dissolution. Table 4(c) summarizes the results of the simulations. Again, the top row of Table 4(a) is retained for easy reference.

Table 4(c): Marital Dissolution Rates Same as in West Lake and Mwanza Regions, Remarriage Rates Doubled

<table>
<thead>
<tr>
<th></th>
<th>C = 1.0</th>
<th>C = 0.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>a₀ = 12.0</td>
<td>5.24</td>
<td>5.32</td>
</tr>
<tr>
<td>a₀ = 15.0</td>
<td>4.68</td>
<td>4.75</td>
</tr>
<tr>
<td>a₀ = 12.0</td>
<td>4.67</td>
<td>4.72</td>
</tr>
</tbody>
</table>

k = 0.5 Marital dissolution and remarriage rates same as in West Lake and Mwanza

k = 0.5 Remarriage rates doubled, marital dissolution rates same as above

Table 4(c) is more instructive when juxtaposed alongside Table 4(b). The increases in overall fertility due to a doubling of remarriage probabilities are smaller, less than 2 percent, than reductions arising from doubling the dissolution rates. The derivations of probabilities of marital disruption and remarriage were age dependent only. So were the rest of the simulations. Thus the same probabilities apply regardless of the age pattern of first marriage. Because women who have married for a shorter period are more likely to divorce and remarry quicker than those who have been married for longer periods of time, our simulations underestimate the probabilities of divorce and remarriage for the younger women. Also, a simulation that takes into account the duration of first marriage would produce different results for the various schedules of first marriage. In particular, if the assumption is made that marriages of short durations are more unstable, then later marriage will result in higher age specific divorce rates. Again, the fact that single (never married) and currently divorced or widowed experience high fertility rates reduces the effect of doubling remarriage rates on fertility.

5. SUMMARY

Two remarks are in order here regarding the indices of widowhood, divorce and remarriage presented in this report. The first is that for their validity it is only necessary that the pattern of the underlying fertility schedule of a population resembles that of the Hutterites. Secondly, the indices provide a means for viewing the events of first marriage, marital dissolution and subsequent remarriage as determinants of the level of exposure to the risk of pregnancy. In this context we note that the probability of marital disruption and the chances for remarriage may be the most important determinants of the proportions currently married in African populations.

The methodology of this paper provides a means of extracting detailed information on the process of entry and exit from the married state from tabulations of proportions currently married, divorced or widowed, never married and married more than once by five year age groups. A serious limitation is that the probabilities of remarriage and of marital disruption vary rather widely between two consecutive
five year age groups with the result that the assumption of constant probabilities within an age group leads to a bias. The direction of the bias depends on whether the annual probability of remarriage is rising or falling within the range for which it is considered constant. However, given enough cases to allow the computation of reliable annual probabilities, the methods can easily be extended to data tabulated in single year age groups. Another kind of bias in these simulations stems from the exclusion of duration of marriage as a factor determining the likelihood of marital disruption and subsequent remarriage. This omission is crucial in the comparison of the effects of changes in the age patterns of first marriage on fertility. Our simulations take into account the fact that in a later marrying population there are lower proportions ever married at every age but disregard the associated change in the durations of marriage. To the extent that unions of shorter durations are more unstable, the effects of later marriage have been underestimated especially at the younger ages.

Three marital status categories were identified in these simulations (i) single (never married), (ii) currently married and (iii) currently divorced or widowed. Each of these categories was assumed to be homogeneous and their age specific fertility schedule constant. In fact category (ii) consists of women in monogamous and polygamous unions. Also category (ii) can be decomposed into those in their first union and those in higher order unions. There is evidence showing that women marrying more than once were more likely to enter the less fertile, polygamous unions. Thus changes in the marital dissolution rates alter the internal composition of the category 'currently married' and consequently its overall age specific fertility rates. A more detailed simulation would need to incorporate these effects of higher marital dissolution rates on the composition of the currently married. Similar decomposition can be done to the category 'divorced or widowed' if the probabilities of divorce and widowhood are obtained separately.

There is no basis for judging what the future divorce rates will be in Tanzania. However, the future incidence rates of widowhood can be reasonably predicted, at least in direction. Marriage instability must be divided between three factors: (i) a large age difference between spouses (ii) the prevailing mortality conditions and (iii) divorce rates. These factors are clearly interrelated. For example, not only does a wide divergence in the ages of spouses lead to a high incidence of widowhood, it may also be a barrier to communication between them thereby increasing the possibility of divorce. The experience of other less developed countries is that the gap between the ages of spouses is narrowing (c.f. Smith, 1980). The mortality levels for the two regions are high, with life expectancies at birth below 50 years (Henin, et al., 1977). At a life expectancy at birth of 47, Singulate Mean Age at Marriage of 17 and a mean age difference between spouses of 8 years, the chances, in the absence of divorce, of widowhood are 0.39. For women entering polygamous unions as their first marriages the mean age difference between them and their husbands was found to be 12.5 years and the probability of widowhood before the age of 50 is 0.48. Thus from this viewpoint there is an enormous potential for reduction of marital dissolution as a result of gains in life expectancy.

The simulations presented in this paper show only the end products and skip the intermediary steps of the transition from one marriage regime to another. The possibility of feedback effects was also not considered. Leschaeche (1971) performed similar simulations using data from the Maghreb and Turkey as his initial conditions. His results indicate that nuptiality changes can produce the same effects on birth and growth rates as changes in marital fertility and that their effects during the transition become apparent sooner since they increase the mean length of generation. Non-marital fertility was negligible in the populations he considered. However, our data show that under conditions of appreciable non-marital fertility rates the
reductions in overall fertility rates due to changes in marriage behavior are diminished. A decline in the proportions ever marrying from universality to 80 percent would reduce the index $I_{60}$ by 20 percent. In fact the total fertility rate declines by only 10.9 percent, from 5.24 to 4.67. An increase in the chances of remarriage by doubling the annual probabilities of remarriage would increase the fertility level by only 1.5 percent while a similar doubling of marital disruption probabilities would reduce fertility by 5.0 percent. The small changes in the overall level of fertility, in spite of the fact that it would require considerable social change either to double remarriage rates or marital disruption rates, is partly indicative of the counteracting effects of high divorce rates followed by high remarriage rates. Moreover, because divorce and currently widowed women have non zero fertility, the balance between women out of wedlock and those currently married is not critical for overall fertility rates.
## Appendix 1

Implicit Values of $Iem$ for Various Combinations of $a$ and $k$ Under the Assumptions of Universal Marriage and no Differential Mortality Between the Married and Unmarried

<table>
<thead>
<tr>
<th>$k$</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>.9972</td>
<td>.9935</td>
<td>.9851</td>
<td>.9684</td>
<td>.9448</td>
</tr>
<tr>
<td>0.3</td>
<td>.9867</td>
<td>.9767</td>
<td>.9608</td>
<td>.9384</td>
<td>.9120</td>
</tr>
<tr>
<td>0.4</td>
<td>.9673</td>
<td>.9513</td>
<td>.9298</td>
<td>.9037</td>
<td>.8742</td>
</tr>
<tr>
<td>0.5</td>
<td>.9408</td>
<td>.9198</td>
<td>.8943</td>
<td>.8649</td>
<td>.8326</td>
</tr>
<tr>
<td>0.6</td>
<td>.9089</td>
<td>.8841</td>
<td>.8554</td>
<td>.8235</td>
<td>.7888</td>
</tr>
<tr>
<td>0.7</td>
<td>.8734</td>
<td>.8455</td>
<td>.8144</td>
<td>.7805</td>
<td>.7443</td>
</tr>
<tr>
<td>0.8</td>
<td>.8354</td>
<td>.8052</td>
<td>.7722</td>
<td>.7370</td>
<td>.7000</td>
</tr>
<tr>
<td>0.9</td>
<td>.7959</td>
<td>.7641</td>
<td>.7299</td>
<td>.6940</td>
<td>.6567</td>
</tr>
<tr>
<td>1.0</td>
<td>.7560</td>
<td>.7230</td>
<td>.6882</td>
<td>.6521</td>
<td>.6149</td>
</tr>
</tbody>
</table>
Appendix 2

(a) Age and Marital Specific Fertility Rates Adjusted for Timing Errors: West Lake and Mwanza Regions, Tanzania 1973

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Single</th>
<th>Currently Married</th>
<th>Separated or Divorced</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-19</td>
<td>.0273</td>
<td>.2426</td>
<td>.2133</td>
<td>.1254</td>
</tr>
<tr>
<td>20-24</td>
<td>.1087</td>
<td>.3142</td>
<td>.2355</td>
<td>.2914</td>
</tr>
<tr>
<td>25-29</td>
<td>.0960</td>
<td>.2564</td>
<td>.1047</td>
<td>.2403</td>
</tr>
<tr>
<td>30-34</td>
<td>.1280</td>
<td>.1934</td>
<td>.0728</td>
<td>.1784</td>
</tr>
<tr>
<td>35-39</td>
<td>.0873</td>
<td>.1297</td>
<td>.0228</td>
<td>.1137</td>
</tr>
<tr>
<td>40-44</td>
<td>.0000</td>
<td>.0653</td>
<td>.0139</td>
<td>.0511</td>
</tr>
<tr>
<td>45-49</td>
<td>.0000</td>
<td>.0486</td>
<td>.0104</td>
<td>.0374</td>
</tr>
</tbody>
</table>

TFR = 5.19

(b) Computational Steps for Person-Years Lived in Various Marital Statuses (Example $a_0 = 12.0$, $k = 0.5$, $C = 1.0$)

<table>
<thead>
<tr>
<th>Age</th>
<th>Single</th>
<th>Currently Married</th>
<th>Separated/Divorced</th>
<th>Probability of Remarriage</th>
<th>Probability of Divorce/Widowhood</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$S(x)$</td>
<td>$CM(x)$</td>
<td>$CD(x)$</td>
<td>$RM(x)$</td>
<td>$DR(x)$</td>
</tr>
<tr>
<td>12</td>
<td>100,000</td>
<td>0</td>
<td>0</td>
<td>.10453</td>
<td>.02662</td>
</tr>
<tr>
<td>13</td>
<td>98,517</td>
<td>1483</td>
<td>0</td>
<td>.10453</td>
<td>.02662</td>
</tr>
<tr>
<td>14</td>
<td>92,593</td>
<td>7368</td>
<td>39</td>
<td>.10453</td>
<td>.02662</td>
</tr>
<tr>
<td>15</td>
<td>80,857</td>
<td>18912</td>
<td>231</td>
<td>.10453</td>
<td>.02662</td>
</tr>
<tr>
<td>16</td>
<td>65,707</td>
<td>33583</td>
<td>710</td>
<td>.10453</td>
<td>.02662</td>
</tr>
<tr>
<td>17</td>
<td>57,476</td>
<td>40994</td>
<td>1530</td>
<td>.18996</td>
<td>.030614</td>
</tr>
<tr>
<td>18</td>
<td>37,463</td>
<td>60043</td>
<td>2494</td>
<td>.18996</td>
<td>.030614</td>
</tr>
<tr>
<td>19</td>
<td>27,351</td>
<td>68791</td>
<td>3858</td>
<td>.18996</td>
<td>.030614</td>
</tr>
<tr>
<td>20</td>
<td>19,757</td>
<td>75018</td>
<td>5231</td>
<td>.18996</td>
<td>.030614</td>
</tr>
<tr>
<td>21</td>
<td>14,165</td>
<td>79301</td>
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<td>.030614</td>
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<tr>
<td>22</td>
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<td>82194</td>
<td>7721</td>
<td>.19404</td>
<td>.015467</td>
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<tr>
<td>23</td>
<td>7,140</td>
<td>85366</td>
<td>7494</td>
<td>.19404</td>
<td>.015467</td>
</tr>
<tr>
<td>24</td>
<td>5,067</td>
<td>87573</td>
<td>7360</td>
<td>.19404</td>
<td>.015467</td>
</tr>
</tbody>
</table>
(c) Person-Years Lived by Women in Various Marital Statuses and Resultant Age Specific Fertility Rates by Five Year Age Groups

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Single</th>
<th>Currently Married</th>
<th>Separated/ Divorced</th>
<th>Resultant Age Specific Fertility Rate (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-19</td>
<td>268854</td>
<td>222323</td>
<td>8823</td>
<td>.1263</td>
</tr>
<tr>
<td>20-24</td>
<td>56208</td>
<td>409452</td>
<td>34340</td>
<td>.2857</td>
</tr>
</tbody>
</table>

(1) Derived by weighting the sum of person-years lived within each age and marital status category by the corresponding rates in Appendix 2(a).


