

Own-Children Fertility Estimates for American Samoa,  
Based on the 1974 Census

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This paper presents procedures used for collecting and editing 1974 Census of American Samoa data to obtain Own-Children fertility estimates. Since the American Samoa data set is small, editing procedures will be discussed in some detail to demonstrate the kinds of errors encountered in preparing the data set for analysis; the problems which developed in the detailed editing of this small population will be discussed for potential editing of larger data sets. The usefulness of the Own-Children approach for small populations will be shown.

American Samoa, a Pacific islands territory of the United States, is composed of six inhabited islands comprising 76 square miles. The 1974 population was 29,190. Although American Samoa is included in the United States decennial censuses, and was therefore censused in 1960 and 1970, many of the questions suitable for the continental United States were unsuitable for Samoa; the East-West Population Institute was contracted by the Government of American Samoa through the East-West Center to provide consultants for a special census to be taken in September, 1974.

#### COLLECTING AND EDITING DATA

Peter Pirie and I worked with Edgar Marcus and Evelyn Gebauer of the Development Planning Office and with other members of the Government of American Samoa to develop a useful questionnaire to obtain current demographic information, as well as information on education, employment, fertility, and migration (Figure 1). Since

an Own-Children analysis was planned, mother's person number for mothers present in the household (Question 10.3) was asked of all persons, as well as detailed fertility information. An enumerator's manual and enumerator aids (e.g., time lines, lists of places) were provided to maintain accuracy and consistency during the enumeration. The following information was provided for enumerators in the manual to help in collecting the data to be used for the Own Children analysis:

Questions 10 & 11. Own Father and Mother. "Own father" and "own mother" in this question means the true, (blood-related parents) of the person being enumerated, not parents who may have adopted the person being enumerated.... Note that if the true parent of the person being enumerated is not living, the word DEAD should be written in the space instead of the place name.

Question 10.3. Person number of Mother if present in this household. This question allows "mothers" and their "own children" to be linked by person numbers in the household. The person number of the mother of the person being enumerated should be marked in this box if she is living within this household.

The relevant parts of the information for the fertility question read:

...The questions should be asked only of Females who were born in 1960 or before. In all cases, it is own children born to the woman who should be counted, not including adopted children (who should be counted with the mother to who they were born).

Enumerators and supervisors were selected from the Department of Education in American Samoa; most were high school graduates, and all were fluent in English. There were 16 supervisors and assistant supervisors, and 100 enumerators. Each enumerator was to census approximately 300 persons, determined by village population size in the 1970 United States census data and probable population movements.

Enumeration areas were determined with the help of the supervisors for each of the four districts; each enumerator worked in the district where he or she lived or taught. There were three training sessions for supervisors who tested the questionnaires and materials which were modified as problems developed. Peter Pirie and I coordinated all training sessions. The enumerators on the main island of Tutuila were similarly trained in three training sessions over a two week period; all practice forms were checked and returned to the enumerators, and the manual was further modified to respond to further problems encountered by the enumerators. The seven enumerators on Manu'a, an island group located about 60 miles from Tutuila, were trained individually; I enumerated the residents of Swain's Island, an atoll of 33 people about 200 miles north of Tutuila, and with Evelyn Gebauer, censused the hospital and prison. Census day was September 25, 1974.

The questionnaires had boxes for coded information; it was thus possible to code and punch data directly from the original questionnaires. Errors were easily corrected with the printouts from checking programs and the questionnaires. Coders and checkers were selected from students at the Community College of American Samoa. All of these students were also high school graduates. Instructions for checkers and coders were developed; several training sessions with sample forms determined the best coders and checkers. Approximately 6 to 10 coders worked for three months to code all forms; since much of the coding was uneven, I sight-checked approximately 70 percent of the forms for non-computer determinable errors (e.g., legal, but incorrect, places, ethnicities, religions).

Computer checking programs were written to determine errors and inconsistencies in the data set. Several of the checks were to enhance the reliability of the Own-Children tabulations (e.g., all persons having a mother's person number in the house, but also having the mother listed as dead, were listed and appropriate information was changed.)

A separate program for checking other Own-Children information was also written. Each household was considered separately in this program. The following instructions were written for checking the printouts (the underlined information was printed with the line or lines of inconsistent information):

LAST CH SHOULD BE IN HOUSE. If there is information for last child on a woman whose last child was born after 1960, then the last child should be in the household. ... If no last child is found, this message is printed.

CHILDREN MISSING. If the mother's first child was born after 1960, then all children should be in the household. When all of the children are not in the household, this message is printed. This is not necessarily a mistake since children may be living in other households.

CHILD AFTER LAST CHILD. This is printed if there is a child in the household who has a 'mother's person number', but who was born after the last child indicated on the mother's card. Either the child should not have a mother's person number (i.e., the child was adopted), or the child should be indicated as the last child on the mother's card.

MOTHER TOO YOUNG FOR CHILD. If the child is listed as being born before the year of birth of the first child of the mother, this message is printed to be compared with the child's year of birth.

TOO MANY CHILDREN IN HOUSE. If the total number of individuals in a household having a particular 'mother's person number' indicated exceeds the total number of surviving children for that woman, this message is printed.

DAY-LAST CHILD. This is printed when there is a child in the household who was born in the year of the mother's last birth and who has a mother's person number in the household, but who was born on a different day from that noted on the mother's last child information.

MONTH-LAST CHILD. This is printed when there is a child in the household who was born in the year of the mother's last birth and has a mother's person number in the household, but who was born in a different month from that noted on the mother's last child information.

OWN MOTHER IS SELF. This is printed when the individual's person number and the person number of the mother are the same.

LAST CHILD NOT ALIVE. This is printed if the information on the mother's card for the last child, and actual child's agree, EXCEPT that on the mother's card the child is listed as 'not living'. The child should be alive.

Errors may occur in the data set at any of the stages of the procedure. Sometimes, for example, an informant may make an error in a birthdate of a child, causing two children to be born less than nine months apart; these errors become magnified when some person other than the person for whom the information is recorded is giving the information. Enumerators may make errors either by recording incorrect information which the informant gives, or by misrecording or omitting information. Sometimes enumerators are not fully aware of the instructions in the manual; in American Samoa, two enumerators recorded each person in the enumeration area as his or her own mother. Errors may occur by miscoding, or rarely, by mispunching. In the American Samoan materials, however, there were too many errors appearing at the punching stage to make an error analysis possible; instead an error analysis was made on the 1,500 persons in the post-enumeration survey (Table 1).

Table 1 summarizes the errors found with the checking program described for the Own Children analysis checking. Sometimes, because of the construction of the program, when an error is found, a line of information is also printed which is not actually an error, but results from a real error; there is a column in Table 1 called "Not an error".

Approximately half of the errors are from coding mistakes. When all errors were corrected, age in completed years and interval since last birth for females were added to the data set. Tabulations were then made.

#### PREPARATION FOR OWN CHILDREN ANALYSIS

Since the mother's person number was collected in the 1974 census of American Samoa, and since the data set was small, Stage 1 of the Own Children package was not used to link mothers and children by age. A FORTRAN program was developed to assign children to their mothers if ages of both were known, and if the child had the mother's person number indicated. The number of non-own children for children of each age was also determined. Printouts were obtained for all women, women by urban-rural residence (in this case urban is defined as the Central area of Tutuila where the Government offices are located and the village of Leone in the Western district), and women by educational breakdown (Table 2).

Since, even for children aged zero, approximately 11 percent of the children did not have mothers present in the house, bothersome questions about the accuracy of the FORTRAN program resulted. A printout of all children up to age nine was obtained for all non-own children. A summary was made of these children by relationship to household head (Table 3 - the totals differ slightly from those obtained in Table 2 because of exclusions for unknown age of mother and unknown educational status). The zero year old Head of household occurred because all persons in the hospital were put in alphabetical order and then numbered; the first person happened to be a new-born baby whose mother was recorded in her own village census night. Approximately one-third of these children were in the first descending generation - usually child or adopted child

of household head. The original census forms of all non-own children aged zero were checked for accuracy, and for cause of being non-own child (Table 4). In approximately eight percent of the cases, the enumerator made an error which prohibited determining the actual reason for being a non-own child. In 19 cases the mother actually was in the house, but was misenumerated or miscoded. There were ten cases of new-born babies in the hospital whose mothers were listed in their own villages, and were not linked to them. Twelve persons were listed on the census form as 'adopted child'. In the remaining 55 percent of the cases the mother was outside the house, and in 20 percent of the cases the mother was not in American Samoa. In most of these cases the mother had gone either to Hawaii or the United States mainland, and had presumably left the child with a relative; this kind of movement and migration is prevalent among American Samoans and is probably the primary reason for the large number of non-own children among all ages of children.

#### USE OF OWN CHILDREN ANALYSIS FOR FERTILITY ESTIMATES

Vital statistics published in the annual reports to the Secretary of Interior for American Samoa (Government of American Samoa 1967-1974) were used to test the accuracy of the tabulations obtained by using the Own Children method. These statistics were used to check changes in fertility seen in the estimated age-specific birth rates and in the total fertility rates, and changes in mortality shown in the regional model life tables obtained from the BRASS part of the Own Children package.

Fertility. The estimated single-year central age-specific birth rates and total fertility rates for the 13 years preceding the 1974

census (Table 5) show a generally consistent level remaining above six children in completed families during the 1960s with a rather steep decline of approximately 25 percent from the 1961 figure during the last few years preceding the census (Table 6). Although, except for the first group, each of the five-year age groups of females showed a decline in age-specific fertility during the 13 years (Figure 2), females over 30 showed the greatest decline. The group of females aged 35 to 39 years, for example, experienced a decline in age-specific fertility of almost 50 percent between 1968 and 1974 (although 1968 may have been abnormally high). The decline in the total fertility rate has been similar for urban and rural residents, with the rural residents continuing to have larger family sizes than the urban residents (Figure 3).

Possible underregistration of births was investigated by using registered births from the annual reports and interpolated population estimates from the 1960 and 1970 censuses to obtain birth rates for comparison with annual birth rates obtained from the Own Children analysis (Table 7). Births by month were available only for years 1961 through 1966, allowing 'census' years to be constructed by splitting births for Septembers into two appropriate parts and then adding the months of the appropriate years (e.g., 1962 was constructed from September 26 through December, 1961, and January through September 25, 1962). Annual interpolated change was obtained from the appropriate age groups in the 1960 and 1970 United States censuses and adjusted since the 1974 census (used for the Own Children analysis) was taken in September, and the 1960 and 1970 censuses were taken on April 1. The age specific birth rates were then obtained by dividing births by the

Age specific death rates from 1969 through 1971 (Government of American Samoa 1971), and death rates determined from deaths by age for 1962 through 1965 with interpolated populations from the 1960 and 1970 censuses, were used as input to a program in the Demographic Computer Library (Shaw and Johnson 1971) to construct model life tables. In all cases the life expectancies at all ages were very close to the male life expectancies determined by BRASS; all were several years less than the expected results for females. All life expectancies were determined from data for both sexes, since death rates by sex were not available. In all cases the total death rate was somewhat below the registered death rate, indicating that the population used for the registered death rate may have been too high (i.e., there were more emigrants than were considered).

Infant mortality rates for different age groups of women were obtained from the  $q(x)$  values obtained in BRASS for values of  $x$  from 1 to 20. The infant mortality rates (Table 9) were obtained from the procedure presented by Brass <sup>(1968:104-20)</sup> and elaborated by Feeney (1976); the values are similar to those obtained by Feeney (1976) for American Samoa.

Life expectancy is unusually long and infant mortality is unusually low in American Samoa compared to other underdeveloped areas, probably because of the easy availability and small expense of health facilities. Few persons are further than one hour away by car or bus from Lyndon Johnson Hospital on Tutuila where medical care and medication are essentially provided at cost.

mid-year populations on the basis of the 1974 date. The 'underregistration' of births is less than four percent for all years except 1962 (13.7 percent, based on the total fertility rates). The birth rates determined from registration tend to be higher than from the census information for the lower age groups, but lower for the older age groups.

Two factors influencing these rates are the introduction of family planning programs and continued immigration from Western Samoa and emigration to Hawaii and the mainland United States. A comprehensive family planning program was introduced into American Samoa in the early 1970s and has apparently been successful. In 1970, apparently the first year of the program, there were approximately 125 new acceptors at the clinic, and by 1973 there were 700 new acceptors and 2200 return acceptors (Government of American Samoa 1974). Similarly, there were nine tubal ligations in 1970, but 105 in 1973.

The effects of migration are much more difficult to measure since emigration statistics are difficult to obtain. American Samoans are United States Nationals and can easily move between Samoa and Hawaii and the United States mainland. Park (1972) and the results of the 1974 census (GAS 1976) show that emigration continues to maintain lower growth rates than would be expected from the difference between births and deaths.

Life expectancy. The regional model life tables from the BRASS part of the Own-Children analysis give life expectancies at birth of 74.25 and 70.39 years for females and males, respectively (Table 8).

## CONCLUSIONS

This paper has presented methods for collecting and editing census data from one small population to obtain Own-Children fertility estimates. The Own-Children procedures have been shown to give results which compare favorably with vital statistics obtained from registration information. Although the Own-Children estimates cannot substitute for vital statistics, they are a useful supplement. Good and varied vital statistics are obviously essential for planning purposes; since these statistics are rarely available for many isolated populations, census data and demographic estimates obtained from them become increasingly important. The results for American Samoa show that Own Children census information is easy to collect and edit for small populations, and should be useful for other, similar populations.

Table 1  
Own-Children Error Analysis of Post-Enumeration Survey  
1974 Census of American Samoa

Error	Kind of Error					Total
	Infor- mant	Enumer- ator	Coding	Punch- ing	Not Error	
Last Child Should be in House		11	14		17	42
Children Missing		7	5	1	23	36
Child after Last Child	3	8	24			35
Mother too Young for Child	10	10	34		11	65
Too many Children in House	1	8	10		3	22
Day - Last Child	4	1	9			14
Month - Last Child	2		8			10
Own Mother is Self		18	16	1		35
Last Ch not Alive			1			1
<b>Total</b>	<b>20</b>	<b>63</b>	<b>121</b>	<b>2</b>	<b>54</b>	<b>260</b>
Percentage of Errors	7.7	24.2	46.5	0.8	20.8	100.0
Percentage of Actual Errors	9.7	30.6	58.7	1.0		100.0