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THE RELATIONSHIP BETWEEN EDUCATION AND FERTILITY:
A COMPARISON OF WESTERN SAMOA AND AMERICAN
SAMOA

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I. INTRODUCTION

Although there is widespread agreement that education (or literacy) is related in an important way to fertility, there are major disagreements about the direction of the effect and the theoretical explanation of the relationship (Graff, 1979: 106). There is, without question, a large body of evidence in support of the hypothesis that increases in education are associated with decreases in fertility (Bogue, 1969; McGreevey and Birdsall, 1974; also see Cochrane, 1980 and Graff, 1979 for excellent summary reviews of research dealing with the topic). There are, however, exceptions to this general pattern which raise important theoretical and methodological questions. In addition to the frequently observed inverse relationship, linear positive relationships, U-shaped relationships, and the absence of any significant relationship have been reported (Cochrane, 1980; Mason et al., 1971). The object of this study is, ^{utilizing an economic approach to fertility within the context} ~~on the basis of a household ecological framework,~~ to develop several hypotheses concerning the types of societies within which different relationships between education and fertility are likely to be found and then to evaluate those hypotheses using data from Western and American Samoa. The mechanism, within the household ecological framework, by which fertility is determined is maximization of the welfare of the household. Therefore, we begin with an evaluation of the relevance of economic models of fertility for developing populations.

II. THE RELEVANCE OF ECONOMIC MODELS OF FERTILITY FOR DEVELOPING POPULATIONS

Recent attempts to apply the economic theory of household choice to the analysis of fertility patterns have resulted in both an improved understanding of the nature of fertility differentials and widespread controversy about the correct specification of such ~~models~~ and assumptions made by the models. The economic approach to fertility has been summarized by Eastrelin: "The conventional view of consumer behavior views the individual as trying to maximize satisfaction, given a range of goods, their prices, and his own tastes and income. In the application of the theory to ^{of} fertility analysis, children are seen as a special kind of good, and fertility is seen as a response to the consumer's demand for children relative to other goods " (1975: 54). Easterlin goes on to say that, although there are problems with the approach, "a more comprehensive economic framework incorporating this theory remains the best point of departure for fertility analysis. Such a framework must be able to include the principal concepts of demographers, sociologists, and other scholars of human fertility. And it must be relevant to a wide range of circumstances, past and present, to the trends, differentials, and fluctuations in fertility observed throughout human history" (1975: 54).

Anthropologists would certainly agree with the concern that economic models of fertility be tested against data from premodern or primitive societies as well as western industrial nations. However, the claim of such universal applicability raises some concern. Are fertility decisions really made in the same way in all types of societies? Even more basic, is a decision-making model appropriate in societies lacking widespread

availability of contraception and where fertility approaches "natural fertility" levels? Easterlin attempts to broaden the applicability of earlier versions of the economic theory of fertility which emphasized determinants of the demand for children by adding a systematic treatment of the potential output of children (supply or C_n) and the costs, both psychic and financial, of fertility regulation, in addition to the demand for children (C_d).

In micro-economic theory, demand for any commodity (including children) is determined by income, prices, and tastes. The emphasis, however, in most of the "new household economics" (see Becker, 1960; and T.W.Schultz, 1973 and 1974) has been on income and prices, almost to the exclusion of tastes. In fact, most work in this area has assumed that tastes remain constant, although Easterlin (1975) has pointed out that this is not a necessary assumption, and Williams (1976) has discussed the ways in which tastes may change with modernization. It seems likely that, in the course of modernization, the same socio-cultural and economic factors which lead to changes in the value (utility) and costs associated with children may also lead to changes in tastes and preferences.

The ^{potential} contribution of anthropological theory to research in this area is that it provides a conceptual framework which specifies a mechanism by which ecological, socio-cultural, and economic factors influence individual behavior both directly and indirectly through their impact on household structure, which is the immediate context within which decisions are made (see Figure 1). As changes in the socio-cultural system occur (including increases in the educational level or changes in the structure of the educational system), these can affect the supply of children,

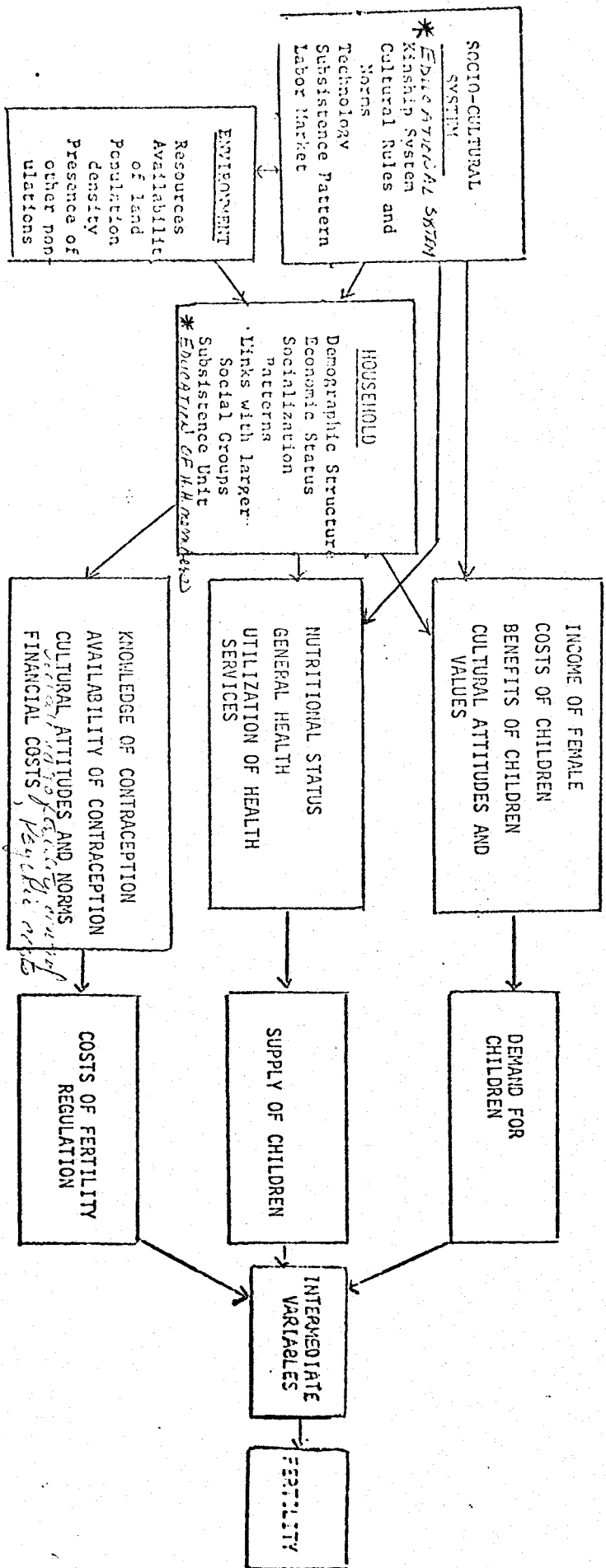


Figure 1: A Household Ecological Framework for the Impact of Education on Fertility

the demand for children, and the costs of fertility regulation either directly or through their influence on the structure and functioning of the household.

The framework presented in Figure 1 incorporates the assumptions, also made by Easterlin (1980), that "a family's utility function, whose arguments include a vector of commodities, and completed family size is viewed as endogenous to the society." In other words, attitudes, preferences, and values associated with children are determined by numerous aspects of the socio-cultural system. As the socio-cultural system changes and evolves, we may expect tastes and preferences to change as well.

This framework ^{also} suggests that the mechanism by which tastes, preferences and values are passed on is socialization in the context of the household. In this analysis we will consider how education influences the supply of and the demand for children, as well as the costs of fertility regulation.

← Such basic considerations as whether education is acquired in a village school or a centralized school away from the home village, the type of education, and the language used in the schools will inevitably influence the impact of education on fertility. Furthermore, the local economic and social structure will determine whether education increases the value of the woman's time and the relative cost of children.

| ← In order to examine these ^{general} questions we ~~will~~ compare age-specific fertility rates for the U.S. Trust Territory of American Samoa and Western Samoa, ^{and} contrast ^{its} local social, economic, and cultural factors related to education. These two populations provide a useful contrast because, although they share a common cultural background and traditional social structure, aspects of their economic and political history have led to major differences

between the two populations. More specifically, in looking at Figure 1, we hypothesize that of the three direct impacts on the intermediate variables, Demand for children will be the most important. Since health and medical care are at relatively high levels in both of the ~~two~~ populations, and mortality is relatively low, it seems unlikely that the supply of births will be a significant constraint. Furthermore, fertility control is available free of cost in both Western and American Samoa and, although contraceptive use is much lower in Western Samoa, knowledge of contraceptive practices seems fairly widespread in both populations. Therefore we ~~hypothesize~~ ^{anticipate} that the major determinants of differences in fertility between the two populations will be differences in the costs and benefits of children. It is anticipated that education of females will be related to increased household income in American Samoa, since there is a significant wage labor market for females. ^{here} Education of female does not however, necessarily increase the cost of children since household structure provides alternative caretakers for children. Therefore ~~we~~ hypothesize that the income effect will dominate and that fertility will increase as education increases in American Samoa. In Western Samoa, however, we hypothesize that the absence of a significant wage labor market for females, combined with the traditional nature of the educational system will result in a minimal impact of education on fertility.

III. CULTURAL CONTRASTS: AMERICAN AND WESTERN SAMOA

In order to examine some of these issues, we compare age-specific fertility rates for two societies which share a common heritage, cultural background, and traditional social structure -- American Samoa and Western Samoa. They provide a useful contrast because, despite aboriginal similarities in biology and culture, their recent political and economic histories have led to major differences between the two societies.

Traditional Samoan society in both Western and American Samoa was based on a division of authority and responsibility between family and village. The basic geographic and political unit, the village, consisted of a series of extended family households (aiga), each headed by a chief (matai). Subsistence was based on fishing and bush fallow agriculture (Greksa, 1980). The responsibilities of the matai to his aiga were to manage the household economy, allocate and manage family landholdings, direct the division of labor within the household, and represent the aiga in the village council (fono). The village fono has responsibility for the maintenance of communal lands, construction of community buildings, allocation of community labor force, and normative control (Farrel and Ward, 1962; Keesing, 1934; Goldman, 1970). Christianity which was incorporated into the system in the mid-19th Century, did not modify the basic social structure (Pirie, 1972; Ablon, 1971).

Western Samoa
Western Samoa, including the main islands of Upolu and Savaii, as well as several smaller islands, is the western part of the Samoan archipelago. Its total area is about 3,000 k² with most settlement being along the coastline. The population of the islands of Western Samoa was 131,377 in 1966, approximately 146,627 in 1971, and 151,983 in 1976.

The economy of Western Samoa is still overwhelmingly agricultural; the 1976 census indicated that approximately 61% of the economically active population was involved in agriculture. Cocoa, copra, bananas, and tarot are the major crops. Of the 11% of the total female population that was reported to be economically active in 1966, about 65% were involved in agriculture, and most of the rest were in some type of service occupation.

Fertility is very high in Western Samoa. In 1966, the total fertility rate was estimated to be 7.5 and the dependency ratio to be 118. In 1970, the total fertility rate was still well above 7 and the median age at marriage was 23 for females and 28 for males.

Migration has played, and continues to play, an important part in the determination of the demographic situation on Western Samoa. Movement from the villages to the Apia urban region, and from Apia to American Samoa, New Zealand, and Hawaii has had an impact on the social and economic structure of the villages, as well as on marriage patterns and the age-sex structure of the population. Migration has also affected the socioeconomic structure of Samoan villages through the remittances returned to the home village by the migrants.

Although education is not compulsory in Western Samoa, literacy rates are generally high for a developing nation, estimated to be as high as 80% (Western Samoa Third Five-Year Developmental Plan, 1975).

Almost every village in Samoa had its own primary school, and most children attended infant school in their own villages. Construction and maintenance of school buildings is the responsibility of the village fono, teachers' salaries the responsibility of the central government, and costs of books, uniforms, and fees for children attending school the responsibility of the aigas.

8

There is a positive cultural valuation on literacy and a high percentage of children attend village infant schools. Support for students beyond the primary level is a decision based on meritocratic as well as economic criteria. Since resources for education are in short supply, the aigas usually decide which children are most likely to benefit from further education. Ethnographic observation by one of the authors suggested that, because of crowding and staffing problems at the village level, only the most capable children were encouraged even in infant school.

← The behavior of Western Samoans suggests that once basic literacy has been achieved in village schools, enrollment for both sexes declines. This decline may be based on economic costs, family labor needs, and other socio-cultural considerations.

American Samoa

American Samoa, considerably smaller than Western Samoa, is comprised of six inhabited islands totalling 76 square miles. In 1975, the total population was about 30 thousand. Total fertility was about 6 during the 1960s, but decreased by about 25% during the early 1970s (Levin, 1976).

The traditional social structure described for Western Samoa is characteristic of American Samoa as well. However, the extent to which this traditional system has been modified by the process of modernization is a subject of some debate. Beginning in 1954, the process of modernization in American Samoa accelerated with the establishment of fish canneries, creation of a modern health care delivery system, the introduction of the U.S. educational system, a television network, and automobile transportation. According to Holmes (1976), modernization has neither seriously eroded the importance of the extended family system, nor significantly changed the role of the matai. It has however transformed in a major way the economy of American Samoa.

The major difference between the economies of American and Western Samoa is the degree of involvement in a wage economy. In American Samoa, approximately 68% of the men aged 20 years and above were full-time wage employees in 1974, and about 22% of the women aged 15 years and above were full time employees in that year. Pirie (1971) estimates that 90% of all American Samoan males of working age have some paid employment. In 1974, the principal employers were the government of American Samoa (employing over 3,700 males and females) and two tuna canneries (employing over 1,100 males and females). In addition, there were 50 other private firms employing some 3,000 individuals (Gas, 1974).

Educational levels are generally high in American Samoa: over 90% of the 14-15 year-olds were still in school in 1976, and over one-half of the

adult Samoans have now received education beyond the elementary school level (Park, 1979). Education is provided free of cost by the government, starting with early childhood centers and continuing through the community college level. Officially, all classes are taught in English.

Several cultural contrasts between Western and American Samoa relevant to the relationship between education and fertility seem clear. While Western Samoa remains predominantly dependent on village agriculture, American Samoa is increasingly a wage-labor economy. In Western Samoa, most individuals achieve a primary level education in their own village; the economic return to additional education in the context of the Western Samoan village economy is minimal. In American Samoa, many individuals attend ^{one of the three centralized high schools} ~~high school in Pago Pago~~. The economic return to additional education consists of improved chances in the labor market for better jobs. While education in Western Samoa is mainly in village primary schools staffed by local villagers, in American Samoa classes are taught in English, frequently by non-Samoans or by Samoans who have studied in Hawaii.

V. RESULTS :

Fertility Patterns in Western and American Samoa

Figure 2 presents age-specific fertility rates, estimated using own-children techniques, for three periods in Western and American Samoa. The Western Samoan rates are based on the 1971 census and include the periods 1957-1961, 1962-1966, and 1967-1971. During this 15-year period, there is ^{only minimal} ~~virtually no~~ evidence of a reduction in fertility rates. In each of the three periods, age-specific fertility reaches its maximum in the 25-29

year-old age group at a level approaching 400 per thousand. These rates represent very large completed family sizes. The total fertility rate, indicating the total number of children a woman would have if she went through all of her reproductive period at the prevailing age-specific rates, fluctuates around 8 for the three periods.

American Samoa contrasts quite sharply for overlapping periods. The own-children estimates are based on the 1974 census and represent the periods 1960-1964, 1965-1969, and 1970-1974. Although the ~~figures represent~~ ^{covered} ~~a period starting~~ ^{period} three years later than the Western Samoan ~~figures~~, the contrast is clear. In Western Samoa, age-specific rates indicated an average completed family size of approximately 8; in American Samoa the total fertility rate decreases from about 6.4 in the early period to 5.3 in the 1970-1974 period. ~~Furthermore,~~ There is a clear downward trend in fertility during the three periods. While the maximum age-specific fertility rate is reached in the 25-29 year-old age group in all three periods, the maximum rate decreases from about 322 per thousand in 1960-1964 to 277 per thousand in 1970-1974. Another contrast to be noted in the American and Western Samoan patterns is the slower dropoff in the older age groups in American Samoa, particularly in the most recent period. Marital age-specific fertility rates for both populations are virtually identical in shape and only slightly lower (see Figure 3)

Figure 4 presents the age-specific fertility rates for three educational groups of women in Western and American Samoa. ~~In Western Samoa, within a certain range, increases in education result in only minimal reductions in fertility.~~ Women with 0-6 years of education

comprise most of the female population and have the highest fertility (TFR = 9.03 for the 1962-1966 period). Women with 7-12 years of education show a ^{very} slight reduction in fertility for the 1962-1966 period (TFR = 8.43). Women in the most educated group, however, show a reduction of more than two children in total fertility; the shape of the age-specific fertility curve is very different as well.

In American Samoa a different pattern emerges. Women with 7-12 years of education have the highest fertility (TFR = 7.0 for the 1965-1969 period). Women with 0-6 years of education are intermediate (TFR = 5.7), and women with more than 12 years of education have the lowest fertility (TFR = 4.2). It appears that in American Samoa fertility rises with level of education up to a certain point (that is, high school level), and then drops off for the most highly educated group of women.

Figure 5 presents the total fertility rates for three periods for each of the educational groups in Western and American Samoa. In both populations, there is an overall reduction in fertility in the most recent period reported. The major point demonstrated by this figure, however, is the different impact of education on fertility in the two populations. While in Western Samoa education has a slight effect on fertility within a certain range and then has a negative effect, in American Samoa fertility rises as education increases up to a high school level. Women with education beyond high school have significantly lower fertility than the other two groups. Figure 5 also demonstrates that although there are differences in level, the direction of effect of education on fertility and the differences between Western and American Samoa, remains constant throughout the 15-year period reported.

V. Discussion

Socioeconomic contrasts, as well as structural differences in the educational systems provide the basis for a preliminary discussion of the nature of the relationship between education and fertility. Though the findings reported here are only suggestive, they provide guidelines for future multivariate analysis and are consistent with the work of several other researchers in the area. For example, Hull and Hull (1977), Arnold et al. (1976), and Simon (1974) report U-shaped curves similar to that of American Samoa for the relationship between education and fertility in other populations.

The explanation for this pattern is related to the way in which social structure and economic factors affect the supply of children, the demand for children, and the costs of fertility regulation, as outlined by Easterlin (1974). Hull and Hull (1977), in analyzing the relationship between economic class and fertility in Indonesia, suggest that "the distribution of women by education is a good indicator of social class" and that "insofar as the data on achieved schooling truly represent economic class, it can be seen that for most Indonesian women higher fertility is associated with progressively higher economic status." The lower fertility of the very highly educated women refers to a small percentage of the population. They suggest, as do Arnold et al. (1976), that the lower fertility of the relatively uneducated women may be related to health problems, lack of access to medical facilities, and fecundity impairment. In other words, increases in education may lead to increases in fertility by increasing the supply of children.

In Western Samoa, where education is primarily in the context of the local village, education within the lower and the middle range is not an indicator of social class. In fact, the traditional aiga system which dictates the sharing of food and resources, assures a degree of homogeneity within the society. In the local villages it seems unlikely that there are significant differences in health, access to medical facilities, or nutrition which would lead to systematic differences in the supply of children. Furthermore, since there is not a significant wage labor market for females, education does not constitute an investment in future earning capacity. Therefore, it does not increase the relative value of the wife's time or the relative cost of children. Finally, education provided within the village context by native Western Samoans is unlikely to reduce the preference for children by changing attitudes and values.

In American Samoa, on the other hand, the prevalence of wage labor, the availability of jobs for females, and in general the greater heterogeneity of the society, have transformed the nature of the relationship between education and fertility. Health care is widely available, but it may be true that the more educated are more likely to avail themselves of the service. Additionally, as traditional subsistence patterns are abandoned and more food is purchased, nutritional patterns change. In this situation, it seems likely that the more educated women may be more aware of nutritional considerations. Both of these factors would tend to increase the supply of children to more educated women.

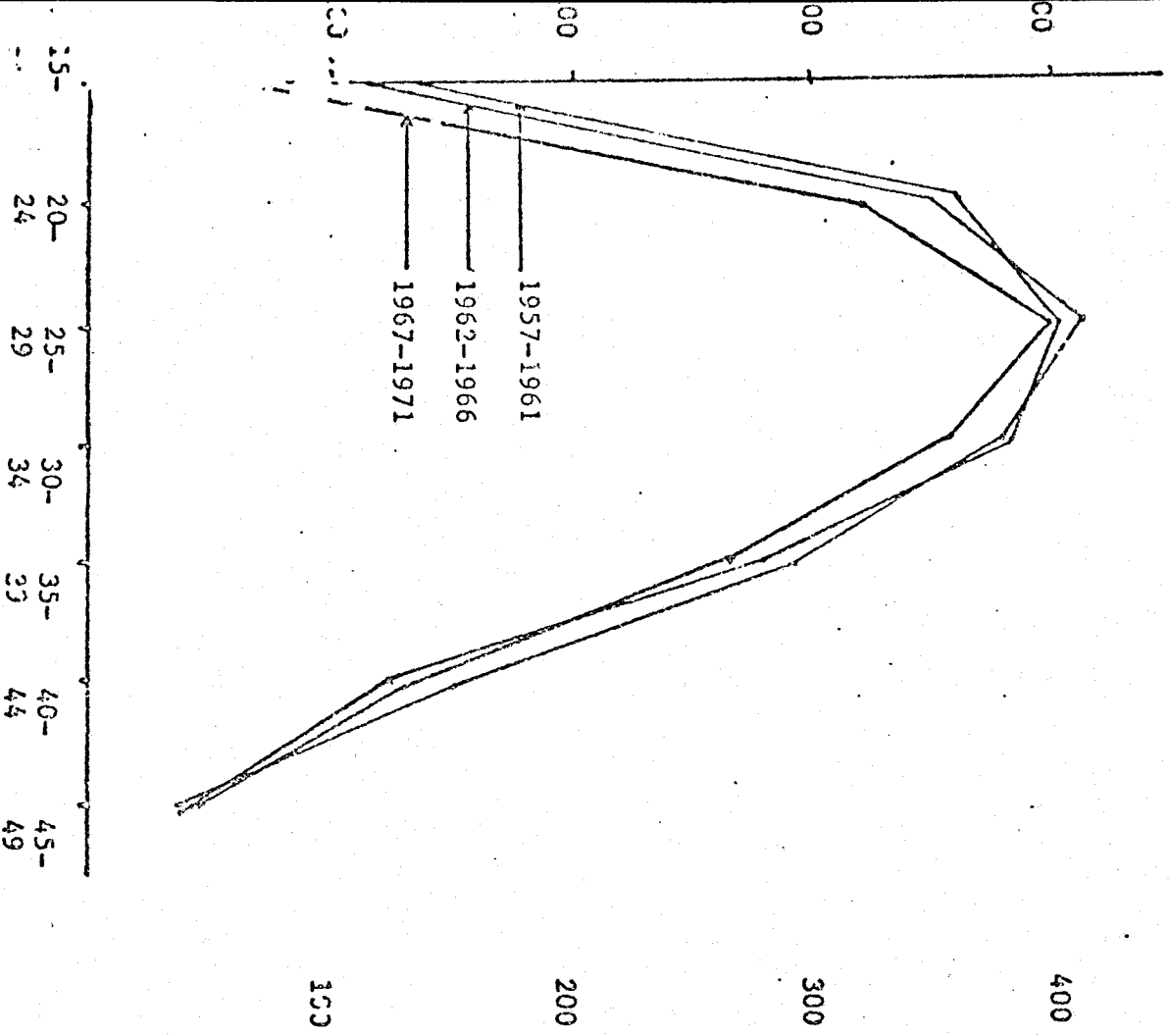
Economists have suggested that female education increases the relative costs of children by increasing the value of the wife's time, and

consequently the relative cost of children. However, in American Samoa household structure and definition of family roles provide many alternative caretakers of children. This aspect of the social structure reduces the cost of childbearing to the educated woman and permits quick return to the labor market. Since there is an active labor market for females, and education improves a woman's chances in that market, it seems reasonable to assume that the major way in which education is related to the demand for children on American Samoa is through income. If education lessens the budget constraint by providing women with marketable skills and additional income, then we would expect the effect of education on fertility to be positive. If both tastes and costs remain constant while income increases, then fertility will increase as well.

While the findings reported here are admittedly of a preliminary nature, they do provide support for the hypothesis that the nature of the relationship between education and fertility is determined by the level of development of the population, the economic structure of the society, and socio-cultural institutions. The U-shaped relationship is most likely to be observed where there is a significant wage labor market for females and a monetization of the economy but, at the same time, traditional extended family structure provide alternative caretakers for the children if the mother chooses to work. In the absence of a significant wage labor market for females, as is the case in Western Samoa, there are minimal returns to additional education for women who remain in their villages. The impact of education there is very slight for all except the most educated women.

FIGURE 2: AGE SPECIFIC FERTILITY RATES (BASED ON OWN CHILDREN ESTIMATES) FOR THREE 5-YEAR PERIODS PRIOR TO THE CENSUS

WESTERN SAMOA
(based on 1971 Census)



AMERICAN SAMOA
(based on 1974 Census)

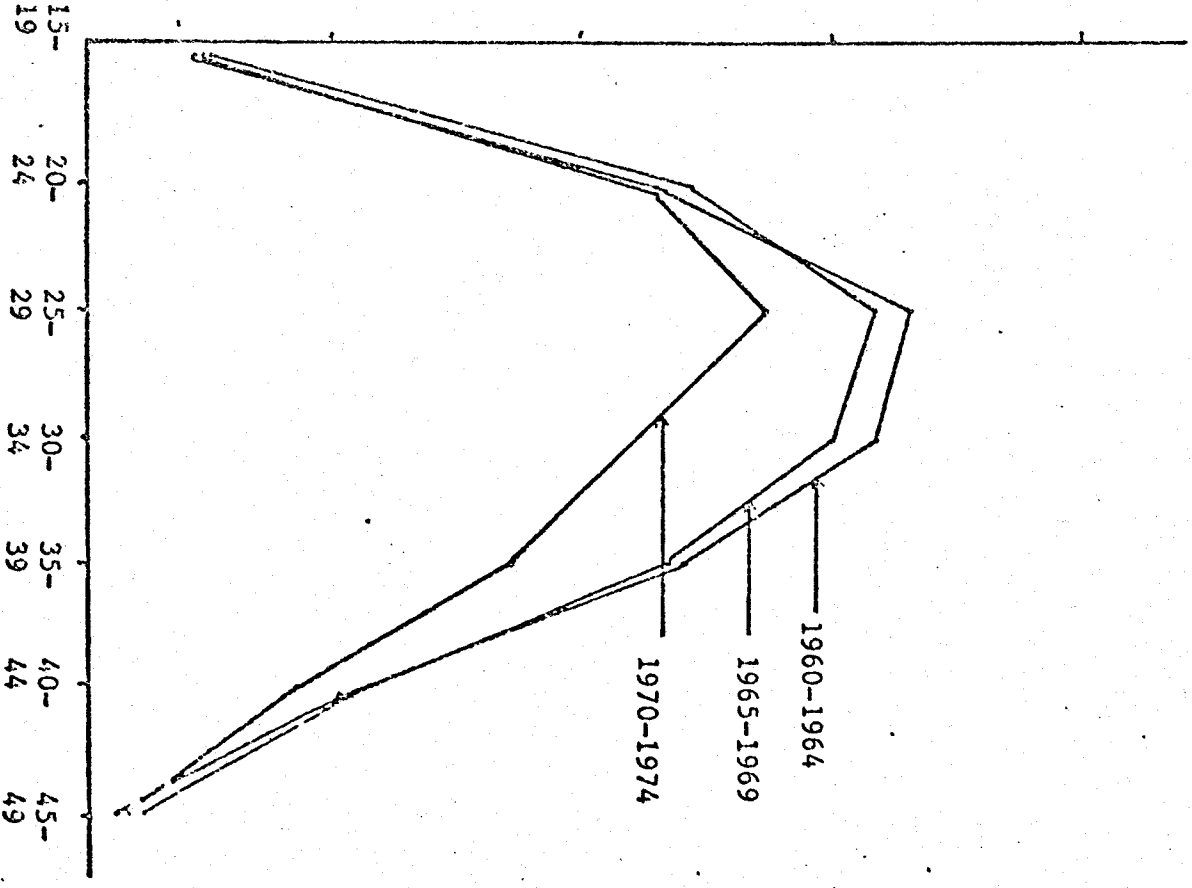
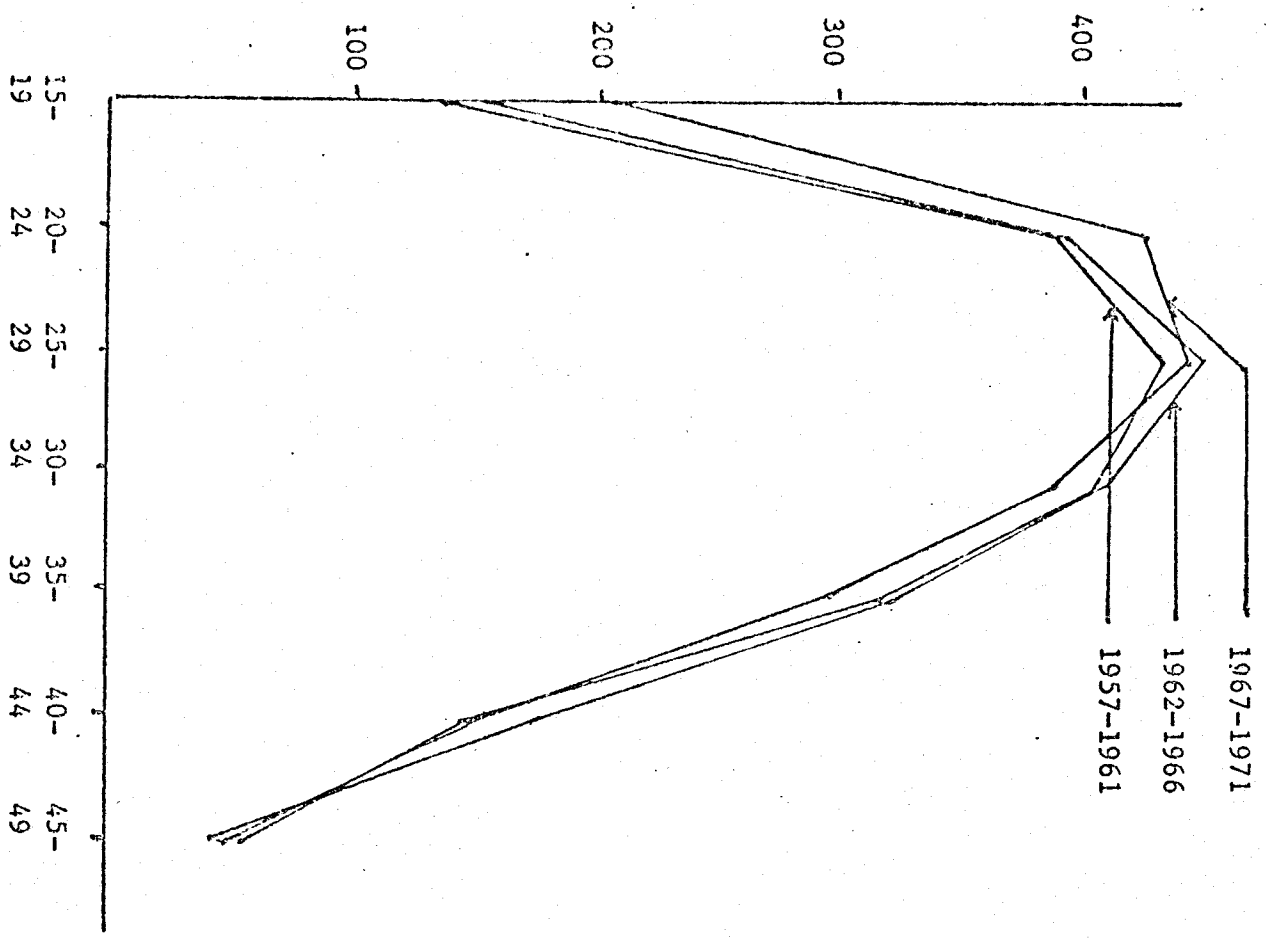


FIGURE 3: MARITAL AGE-SPECIFIC RATES (USING OWN CHILDREN ESTIMATES) FOR THREE PERIODS

WESTERN SAMOA



AMERICAN SAMOA

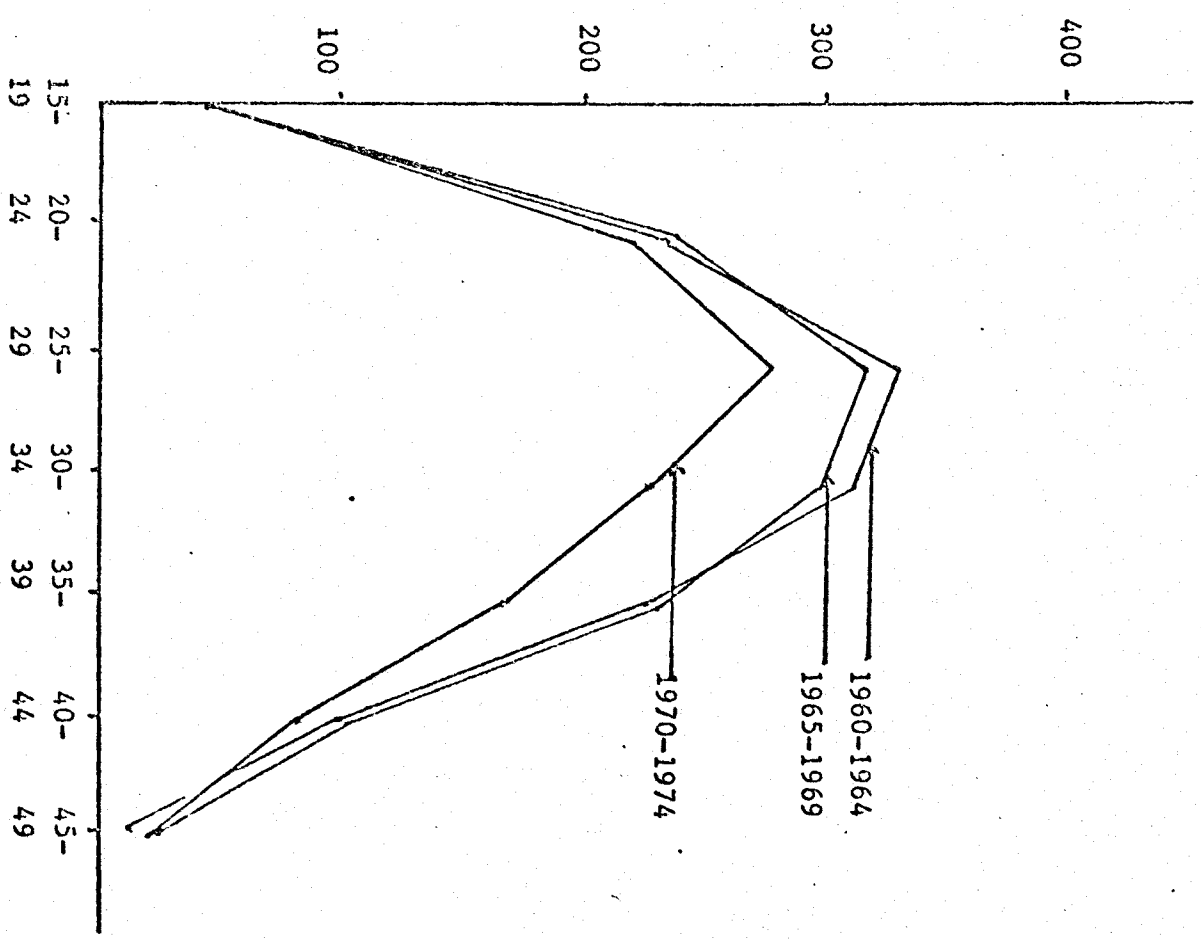
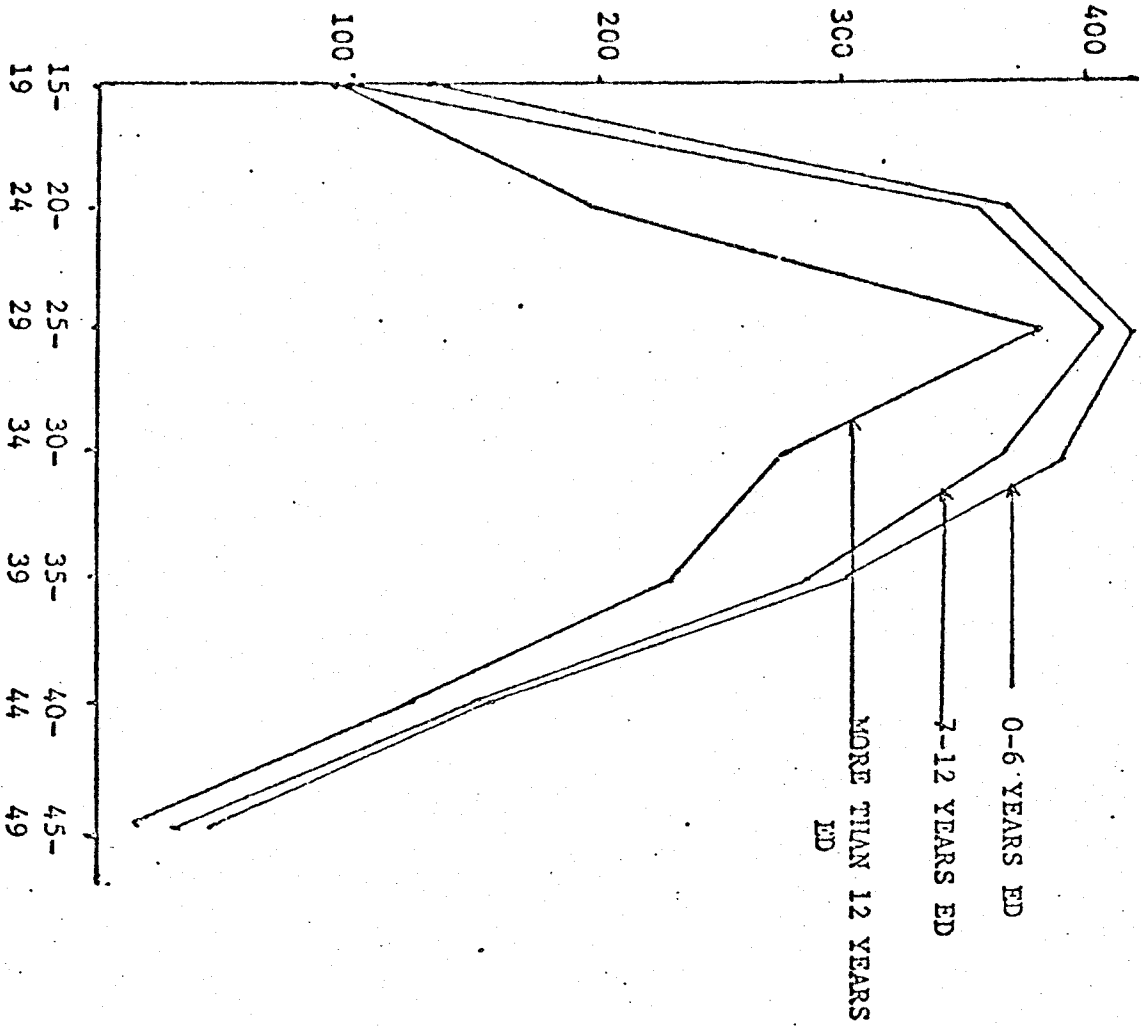


FIGURE 4: AGE-SPECIFIC FERTILITY RATES (USING-OWN CHILDREN ESTIMATES)
FOR THREE EDUCATIONAL LEVELS

WESTERN SAMOA (1962-1966)
Based on the 1971 Census



AMERICAN SAMOA (1965-1969)
Based on the 1974 Census

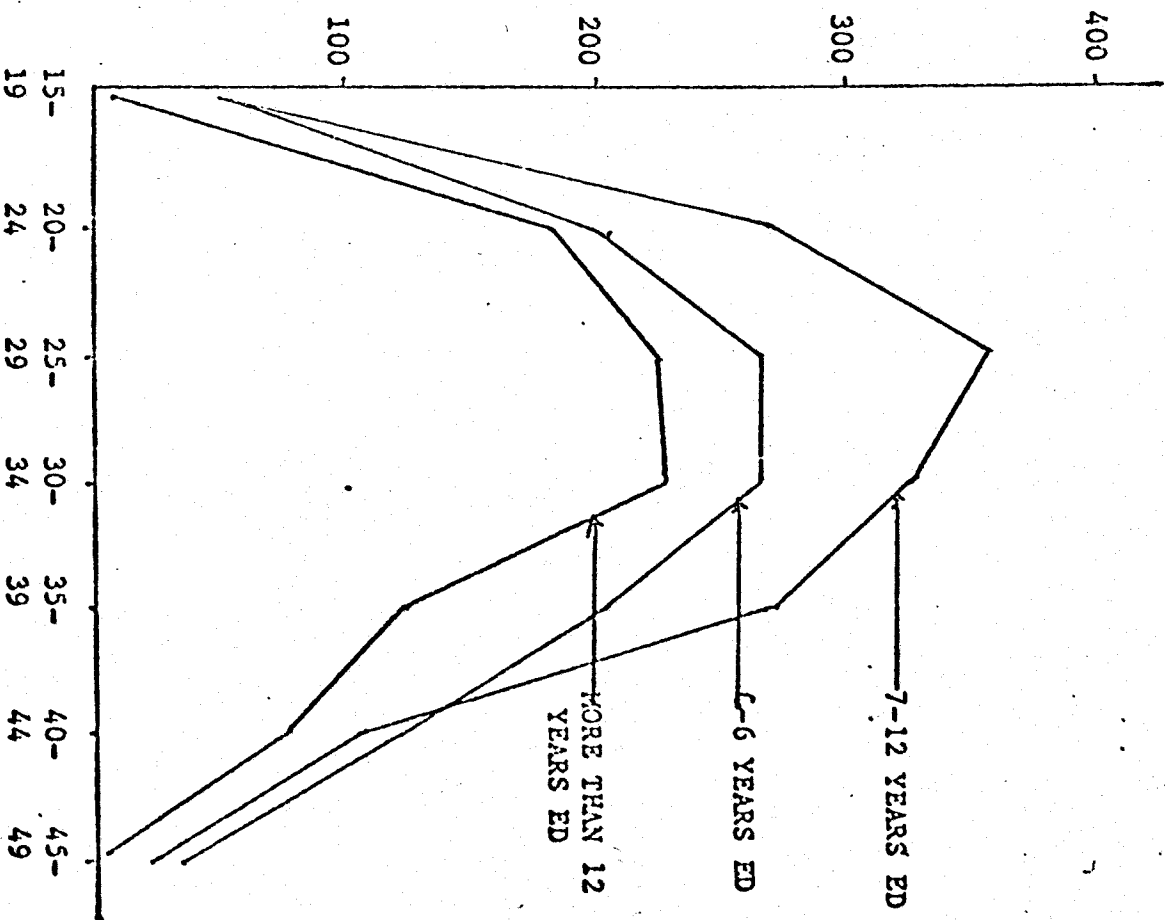


FIGURE 5: TOTAL FERTILITY RATES FOR THREE EDUCATIONAL GROUPS IN WESTERN AND AMERICAN SAMOA

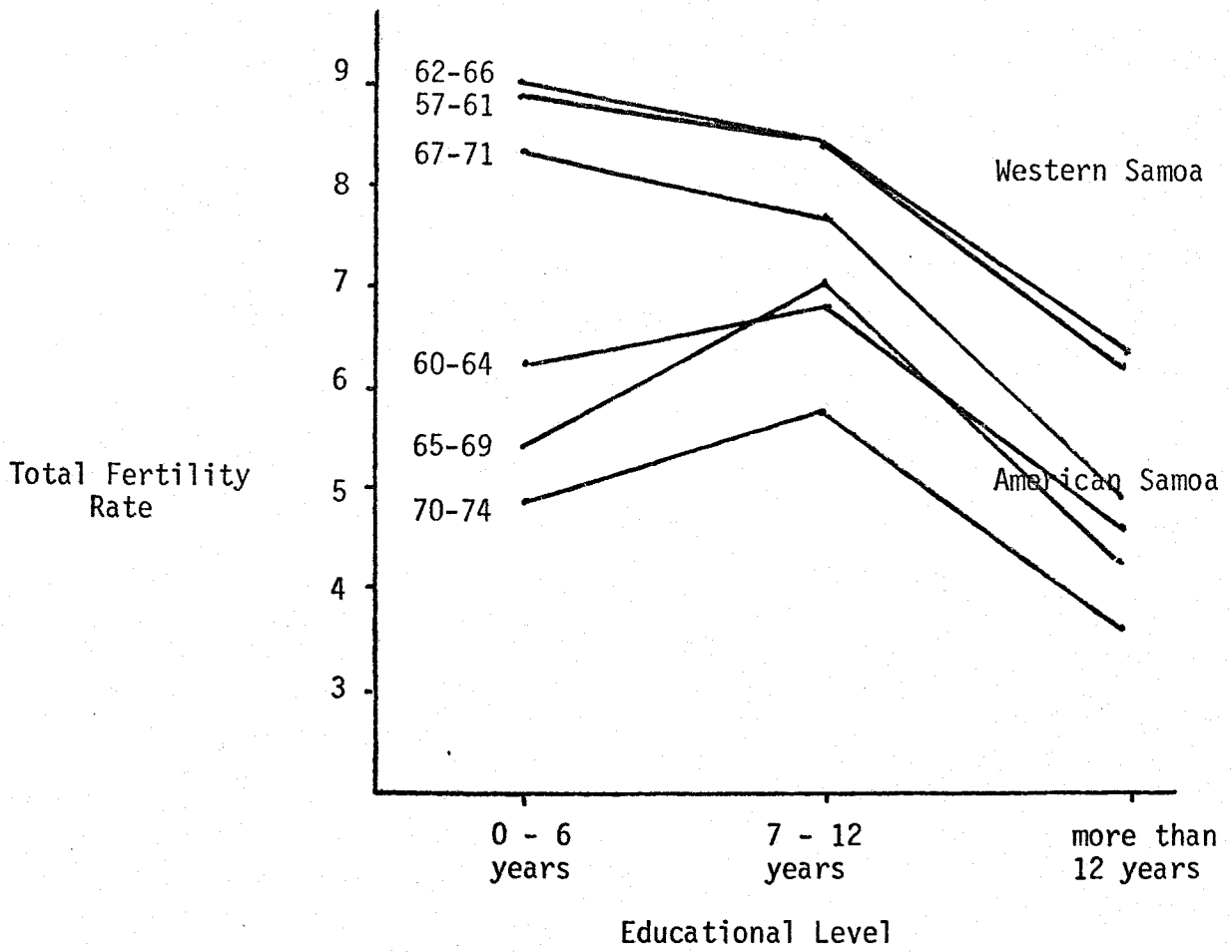


TABLE 1: AGE-SPECIFIC FERTILITY BY EDUCATIONAL LEVEL IN AMERICAN SAMOA USING OWN CHILDREN FERTILITY ESTIMATES BASED ON THE 1974 CENSUS

FOR THE PERIOD 1960-1964

AGE GROUP	Educational level					
	0 - 6	N	7 - 12	N	Greater than 12	N
15-19	71.5		39.4		19.9	
20-24	225.9		246.5		172.9	
25-29	292.7		361.5		277.9	
30-34	281.4		352.9		260.8	
35-39	239.0		238.4		208.7	
40-44	125.3		89.9		88.8	
45-49	17.5		22.3		0.0	
	TFR=6.26		TFR=6.75		TFR=5.14	

FOR THE PERIOD 1965-1969

AGE GROUP	N		N		N	
15-19	53.7		53.2		7.7	
20-24	200.5		268.8		184.3	
25-29	268.7		356.8		225.5	
30-34	266.9		328.9		229.7	
35-39	204.2		272.0		125.9	
40-44	120.9		106.3		75.5	
45-49	34.4		22.0		0.0	
	TFR=5.74		TFR=7.04		TFR=4.24	

FOR THE PERIOD 1970-1974

AGE GROUP	N		N		N	
15-19	63.1		43.5		19.9	
20-24	199.2		253.0		147.8	
25-29	252.3		296.2		226.2	
30-34	206.4		247.9		161.0	
35-39	159.6		190.3		83.0	
40-44	81.2		98.9		53.1	
45-49	29.0		25.5		18.1	