



Scientific Reports

NUMBER 48 JANUARY 1984

J. MAYONE STYCOS

**Putting Back the K and A in KAP:
A Study of the Implications of
Knowledge and Attitudes for
Fertility in Costa Rica**

INTERNATIONAL STATISTICAL INSTITUTE
Permanent Office Director: E. Lunenberg
428 Prinses Beatrixlaan, PO Box 950
2270 AZ Voorburg
Netherlands

WORLD FERTILITY SURVEY
Project Director: Halvor Gille
35-37 Grosvenor Gardens
London SW1W 0BS
United Kingdom

The World Fertility Survey (WFS) is an international research programme whose purpose is to assess the current state of human fertility throughout the world. This is being done principally through promoting and supporting nationally representative, internationally comparable, and scientifically designed and conducted sample surveys of fertility behaviour in as many countries as possible.

The WFS is being undertaken, with the collaboration of the United Nations, by the International Statistical Institute in co-operation with the International Union for the Scientific Study of Population. Financial support is provided principally by the United Nations Fund for Population Activities and the United States Agency for International Development. Substantial support is also provided by the UK Overseas Development Administration.

For information on Country Reports, WFS publications, and WFS depository libraries, write to the Publications Office, International Statistical Institute, 428 Prinses Beatrixlaan, PO Box 950, 2270 AZ Voorburg, Netherlands. For information on the WFS generally, write to the Information Office, World Fertility Survey, International Statistical Institute, 35-37 Grosvenor Gardens, London SW1W 0BS, UK.

L'Enquête Mondiale sur la Fécondité (EMF) est un programme international de recherche dont le but est d'évaluer l'état actuel de la fécondité humaine dans le monde. Afin d'atteindre cet objectif, des enquêtes par sondage sur la fécondité sont mises en œuvre et financées dans le plus grand nombre de pays possible. Ces études, élaborées et réalisées de façon scientifique, fournissent des données représentatives au niveau national et comparables au niveau international.

L'EMF est entreprise, en collaboration avec les Nations Unies, par l'Institut International de Statistique, qui coopère avec l'Union internationale pour l'étude scientifique de la population. Le financement de ce programme est essentiellement assuré par le Fonds des Nations Unies pour les activités en matière de population et par l'Agence des Etats-Unis pour le développement international. Une contribution importante est aussi faite par le Département pour le développement des pays d'outre-mer du Royaume-Uni.

Pour toute information concernant les rapports d'enquêtes nationaux, les publications de l'EMF ou les bibliothèques depositaires, écrire au Bureau des publications, Institut International de Statistique, 428 Prinses Beatrixlaan, BP 950, 2270 AZ Voorburg, Pays-Bas. Pour tous renseignements complémentaires sur l'EMF en général, écrire au Bureau d'information, Enquête Mondiale sur la Fécondité, Institut International de Statistique, 35-37 Grosvenor Gardens, Londres SW1W 0BS, Royaume-Uni.

La Encuesta Mundial de Fecundidad (EMF) es un programa internacional de investigación cuyo propósito es determinar el estado actual de la fecundidad humana en el mundo. Para lograr este objetivo, se están promoviendo y financiando encuestas de fecundidad por muestreo en el mayor número posible de países. Estas encuestas son diseñadas y realizadas científicamente, nacionalmente representativas y comparables a nivel internacional.

El proyecto está a cargo del Instituto Internacional de Estadística, contando con la colaboración de las Naciones Unidas y en cooperación con la Unión Internacional para el Estudio Científico de la Población. Es financiado principalmente por el Fondo de las Naciones Unidas para Actividades de Población y por la Agencia para el Desarrollo Internacional de los Estados Unidos. La Oficina Británica para el Desarrollo de Países Extranjeros proporciona también un gran apoyo financiero.

Puede obtenerse información sobre Informes de Países como otras publicaciones de la EMF y las bibliotecas depositarias, escribiendo a la Oficina de Publicaciones, Instituto Internacional de Estadística, Prinses Beatrixlaan 428, Casilla Postal 950, 2270 AZ Voorburg, Países Bajos. Si desea información de carácter general sobre la EMF, escriba a la Oficina de Información, Encuesta Mundial de Fecundidad, Instituto Internacional de Estadística, 35-37 Grosvenor Gardens, Londres SW1W 0BS, Reino Unido.

Scientific Reports

Putting Back the K and A in KAP: A Study of the Implications of Knowledge and Attitudes for Fertility in Costa Rica

Handwritten notes:
"Population Growth"
643
1815
12050
6250

J. MAYONE STYCOS

International Population Program
Cornell University
Ithaca, New York

Contents

ACKNOWLEDGEMENTS	5
1 INTRODUCTION	7
2 RESPONSE RELIABILITY	8
2.1 The incidence and nature of unreliability	8
2.2 The correlates of unreliability	10
2.3 Conclusions	13
3 THE IMPORTANCE OF ASSESSING CONTRACEPTIVE KNOWLEDGE	14
3.1 Knowledge of contraception in Costa Rica	16
3.2 Variability and reliability	17
3.3 Age, modernity and current contraceptive knowledge	18
3.4 The timing of contraceptive knowledge acquisition	18
3.5 Determinants of early knowledge	20
3.6 Education and modernity	21
3.7 National trends	24
3.8 Conclusions	25
4 ARE ATTITUDES MEANINGFUL?	26
4.1 Trends in preferred family size	26
4.2 Reliability and validity	27
4.3 The pattern of attitude change	28
4.4 Other approaches to family size attitudes	30
4.5 Three dimensions of family size attitudes	33
4.6 Evaluation of the traditional measures	35
4.7 Attitudes and behaviour	35
4.8 The relation of predisposition and numerical pre- ferences to the desire for more children	36
4.9 Conclusions	37
5 CONCLUDING CASE FOR THE KAP	39
NOTES	41
REFERENCES	43
TABLES	
1 Agreement between S ₁ and S ₂ interviews on seven items, in per cent	8
2 Percentage of respondents with identical responses on various items, by degree of consistency in age reporting	10
3 Means of various characteristics according to degree of response consistency	11
4 Interview characteristics, by education of respondent	12
5 Interview characteristics, by education and reliability	12
6 Knowledge of specific birth control methods, by spontaneity of response, in per cent	16

7	Mean score on weighted knowledge scale, by education and residence, women aged 30+	18	22	Rotated factor analysis of family size attitudes	34
8	Contraceptive use, live births, age at marriage, parents' education and modernity, by time of learning first contraceptive, for women aged 30+	20	23	Intercorrelations of family size preference scales	34
9	Percentage who learned about family planning before age 20 and before marriage, by age group and residence	21	24	Zero order correlations between age, education and family size preferences	35
10	Simple correlations between age at which first method was learned and other variables, by age groups	21	25	Percentage who got pregnant between interviews by desire for more children and number of living children at the time of first interview, women less than 45 and not sterilized at S ₁	35
11	Mean age at learning about contraception by educational category and current residence, women aged 30+	22	26	Percentage using birth control at S ₂ , among those using at S ₁ , by desire for more children and discrepancy between actual and preferred number of living children, women under 45 not sterilized at S ₁	36
12	Preferred family size in three surveys, in per cent	27	27	Desire, intention for more children, by age and number of living children, fertile women only	36
13	Mean years of schooling, by change between interviews on two questions of attitude towards family size, women under 45 not sterilized at time of first interview	28	28	Desire for and change in desire for more children by age and preferred number of children in relation to actual number, S ₁ , women under 45 not sterilized at time of first interview	36
14	Directions of revision in family size preference between interviews, by occurrence of pregnancy after first interview and discrepancy between preferred and actual number of living children in first interview, women under 45 and not sterilized at time of first interview	29	29	Multiple regression: live births regressed on demographic, socio-economic and psychological variables, by age and sterilization status	39
15	Desire for and change in desire for more children, by preferred number of children in relation to actual number, S ₁ , women under age 45 not sterilized at time of first interview	30	FIGURES		
16	Photo preferences and reasons, in per cent	30	1	Path analysis, index of current knowledge of contraceptive methods, for women aged 30+	19
17	Desire for and intention to have more children	31	2	Age at which respondents first learned about birth control, by age and education	21
18	Value of children items, in per cent	32	3	Path analysis, age at which respondents first learned about contraception, for women aged 30+	22
19	Semantic differentials: adjectives to describe 'the small family', in per cent	32	4	Path analysis, age at which respondents first learned about contraception (modernity added), for women aged 30+	23
20	Definition of a large and small family, in per cent	33	5	Timing of contraceptive knowledge and national general fertility rates, Costa Rica 1953-77	24
21	Summary statistics, family size attitude scales	33			

Acknowledgements

Financial assistance for this report came primarily from the World Fertility Survey, with additional support from the Cornell University Center for International Studies. The collaboration of IDESPO, National University of Costa Rica, was critical in planning and executing the fieldwork, along with the participation of the Costa Rican Office of Statistics and Census. Data collection and preliminary analysis were supported by a grant from the US Agency for International Development. The assistance of Dr Odile Seeley, Dr Mauricio Culagovski and Dr Anne Pebley at early stages of data processing and analysis is gratefully acknowledged, as is that of Samuel Fridman, who served as research assistant during the present stage of the project.

1 Introduction

Almost two decades ago a reviewer of the social demographic literature on fertility wrote that 'significant relationships between psychological factors and fertility simply have not been found. Perhaps the relationships do not exist' (Mauldin 1965:98). Since that time there have been vast improvements in data collection, processing, analysis and interpretation. In particular, KAP studies (knowledge, attitude and practice) of human fertility have multiplied. Their very nomenclature presumes the general validity of psychological factors, subsumed under 'knowledge and attitudes'; but an examination of the evolution of KAP questionnaires would disclose the miniscule development of the K and the A aspects, accompanied by more extensive development of the 'P', and especially heavy development of other aspects related to fertility. Indeed, a time traveller from the KAP surveys of Mysore or Puerto Rico catapulted into a 1980s World Fertility Survey might flounder at the wealth of questions concerning breastfeeding, infertility, reproductive wastage, and open and closed intervals; but he would feel totally at home with the knowledge and attitude questions, and not especially uncomfortable with the questions on practice.

A desire to redress this unbalanced development prompted us to conduct a re-survey of women previously interviewed as part of the World Fertility Survey programme. We wanted, first, to expand the questions relevant to fertility-specific knowledge and attitudes; and secondly to test the hypothesis that psychological modernity was a principal variable intervening between education and fertility. It was felt that if the quantity and quality of questions concerning the dependent variables (contraception and fertility) collected in the first survey (S_1) could be supplemented by detailed data on the independent and intervening variables (modernity, knowledge and attitudes) in the second survey (S_2), there would be an unusual opportunity for increasing our understanding of some of the 'psychological variables' that have been the subject of continuing debate.

Why Costa Rica? We had initially chosen Costa Rica for historical research because of the remarkable decline in its fertility (a decline of 40 per cent in total fertility rate during the 1960s). Costa Rica, while somewhat in the vanguard on some characteristics of development, is still very much a developing nation by the usual social and economic measures. Thus, what could be learned about the causes of its decline might be of use to other nations, especially in Latin America, desirous of accelerating national fertility declines. The results of this research elucidated the roles of socio-economic development and family planning programmes (Stycos 1978a; 1978b; 1982); but they also highlighted certain intriguing aspects of the decline that begged further testing.

1 At a national level, Costa Rica's uniqueness seemed to lie

in its system of public education, which has been considerably in advance of other measures of development in Costa Rica; and

2 for at least two decades, Costa Rica has been well ahead of other Latin American nations as regards knowledge (and use) of birth control, but not as regards attitudes, at least as measured by the traditional questions on family size preference.

The National Fertility Survey, conducted in 1976 as part of the World Fertility Survey (WFS), confirmed that education at the individual level continued to have a powerful impact on fertility; and put in cross-national context Costa Rica's remarkable superiority in knowledge and use of contraception. Such findings have further strengthened the need for a more psychologically oriented study to clarify the education-fertility nexus by concentrating on attitudes and cognitive aspects.

In 1976 a formal agreement on the conduct of the study was signed by the International Population Program at Cornell University and the Instituto de Investigaciones Sociales en Población (IDESPO) of the National University of Costa Rica; and funds were obtained from the US Agency for International Development. An earlier pilot project, also funded by the AID, had pre-tested in Costa Rica a large number of measures of psychological modernity and attitudes toward family size (Seeley and Stycos 1978). This experience was utilized as the basis for a draft questionnaire that was pre-tested by IDESPO. An agreement was also signed between IDESPO and the Costa Rican Office of Statistics and Census, which had carried out the National Fertility Survey. The Statistical Office provided assistance in sampling, and in interviewer recruitment, training and supervision. In addition, they provided a copy of the S_1 magnetic tape, which was subsequently matched and merged with data from S_2 . Although the fieldwork for S_2 was carried out about one and a half years after the initial survey, 86 per cent of 2622 women aged 20-49 in a marital union in 1976 were contacted and 77 per cent were re-interviewed.¹ Initial findings from these surveys (Stycos 1980; Culagovski 1982; Pebley 1980) were promising enough to suggest the need for more detailed analysis, and in 1980 a contract between the author and the World Fertility Survey facilitated the preparation of the present report.

The three substantive chapters of this report examine the causes and consequences of knowledge and attitudes as they relate to fertility and its control. Before doing so however, an appraisal of the overall reliability of selected measures was considered essential. In chapter 2 we will deal largely with the reliability of factual questions. Attitude inconsistency, which will be described only briefly here, will receive more detailed consideration in chapter 4.

2 Response Reliability

Elaborate analysis of unreliable data is not only wasted effort but can also be dangerously misleading: it can lead to practical changes that seriously affect the welfare of the public and the viability of national programmes. Certainly there were early warning signs from some of the initial KAP investigations in developing countries. With cultures as varied as the Caribbean and the Indian, high rates of inconsistency of response within interviews and between husbands and wives were noted (Back and Stycos 1960; Hill, Stycos and Back 1959; Poti *et al* 1962). Nor were data from more developed country studies more reassuring. For example, in the Princeton Metropolitan Family Growth Study, re-interviews after three years with 900 urban white mothers found a 20 per cent discrepancy in reports of contraceptive use prior to first pregnancy; and one-third of the women were classified differently in the first and second interviews as regards their planning status (Westoff, Potter and Sagi 1961:52).

Despite such early signals, KAP studies have multiplied with little critical attention to data quality. As noted by Knodel and Piampiti (1977:55), 'the call to assess the extent of response error has rarely been heeded. The few attempts... have usually been based on samples that are either small or specialized or both'. In one of these 'few attempts', an Indian sample of 160 re-interviewed persons, the data proved to be so unreliable that the analyst concluded that in KAP surveys 'unless accuracy of measurement is substantially improved it will hardly be of use for planning and projection purposes, or even monitoring current trends and scientific study'² (Mukherjee 1975:141).

In the case of Costa Rica we have a sample that is both large and representative, and in which women were asked a number of identical questions one and a half years apart.

Costa Rica is of interest because it may represent, given its high levels of general education and sophistication about family planning, an upper limit for developing countries. If we find high levels of unreliability here, we can suspect higher levels still in the typical developing nation.

2.1 THE INCIDENCE AND NATURE OF UNRELIABILITY

We approached the question of reliability with two broad questions in mind: (1) What is the overall reliability of standard demographic and KAP questions among moderately educated women in a Latin American LDC? In short, can we have general confidence in the reliability of the findings? (2) Even if the answer to the first question is positive, we can assume that some unreliability exists. Is it randomly distributed or is it to be associated with certain kinds of questions, respondents or situations?

To answer the question of overall reliability, we compared responses to five factual and two attitudinal questions asked in both surveys: age, age at marriage, number of children born, use of birth control, husband's education, desire for more children, and preferred number of children (table 1). We begin with the critical variable of age. In the second interview, age and education were used as checks on the identity of the respondent, ie interviews were supplied with the age and education of the respondent as reported in the first survey to insure that the same person was being re-interviewed. They were, however, given age in years rather than birth date. Later in the interview, the precise date of birth was elicited. Hence, while it may not be especially meaningful that 91 per cent reported the same

Table 1 Agreement between S₁ and S₂ interviews on seven items, in per cent

	Identical response	One category discrepancy	2+ category discrepancy	Missing info.	Total
Birth date ^a	74	17	7	2	100
Number of live births ^b	83	14	4	-	101
Ever use of birth control ^c	88	9	-	3	100
Marriage date ^a	47	12	30	10	99
Husband's education ^d	53	23	21	3	100
Wants more children ^e	74	15	-	11	100
Preferred number of children	44	27	29	-	100

^aIdentical responses refer to day, month and year. 'One category discrepancy' refers to less than 12 months' difference.

^bCompares live births plus current pregnancies in S₁ with live births in S₂. Most of the one category discrepancies are due to births between interviews. See text and footnote 5 for further explanation.

^cThose who reported never-use in S₁ and ever-use in S₂ were divided into those who started using in the interval between interviews and those who reported starting earlier. The former were placed in the 'identical response' category.

^dScored in single years, ie a one-year difference qualified as a 'one category discrepancy'.

^eThose who wanted no more in S₁ but said they wanted more in S₂ were classified as inconsistent.

year of birth in both interviews, it is heartening that 74 per cent of the women reported the same *day, month, and year*. This may be compared with only 43 per cent in Fiji who reported the same year and month (Potter 1977); or with repeat interviews in Colombia, Peru and Indonesia where proportions reporting the same *year* were only 61, 66 and 43 per cent, respectively (Chidambaram *et al* 1980). In Costa Rica, only seven per cent were as much as two years off, and in over eight out of ten cases the dates were no more than two months off.

Correspondence was also very high on reported number of live births: 82 per cent reported the identical number and only 5 per cent reported differently by more than one child. Of course, in the year and a half between surveys, an additional birth (or more) would be possible. Of the 18 per cent who reported a different number, four-fifths reported more births in the second interview. Among the women who reported no pregnancy between surveys, nine out of every ten reported the same number of live births on both interviews. Of the 317 women who did report a pregnancy between interviews, 87 per cent reported one child more in the second than the first survey, while only six per cent reported two more (multiple births are, of course, a possibility). Moreover, of 154 who reported in their first interview that they were pregnant, 88 per cent reported in the second that they had a subsequent birth. Finally, 92 per cent reported the same number of child deaths in both surveys. In summary, if one child is added for women pregnant in the first interview, a correlation of .98 is noted between the number of living children in the two surveys. These data are especially impressive given that fertility data in the first survey were obtained by a detailed fertility history with many cross checks, while the second survey relied on a single summary question: 'How many live births have you had?' This confirms the conclusion drawn by World Fertility Survey analysts who compared fertility data obtained from extensive household surveys with those obtained through more intensive individual interviews: 'few, if any, additional live births were detected by means of the birth and pregnancy histories... household surveys can achieve as complete a coverage of children ever-born as individual surveys' (Chidambaram *et al* 1980: 15, 18).

Not all factual data were as reliable as age and number of births, however. When dates of marriage were compared, correspondence between the two surveys dropped markedly: less than half gave the identical date, and one-tenth gave no answer on one or the other survey. Fifty-nine per cent gave a response less than one year different. While seemingly low, such consistency compares favourably with Fiji, Peru and Indonesia, where only 43, 46 and 37 per cent, respectively, gave the identical response in single years³ (Chidambaram *et al* 1980: 29; O'Muirheartaigh and Marekwardt 1980: 343).

In Costa Rica, husband's education was the least reliable factual item. Although nearly all women were willing to respond to this question, only one-half gave the same response as previously in terms of single years of schooling, and one out of every five varied by two years or more.

As we move to factual questions of more complexity and delicacy, we would expect reliability to decline, and it does. Thus, on the important question of ever-use of contraception, about one-tenth of the women reported inconsistently

(see table 1, footnote c for definition of inconsistency). This is about half the proportions reported for Peru and Fiji (Chidambaram *et al* 1980: 29), but in this case the bias seems systematic: the second survey, despite the passage of a year and a half, produced a *lower* incidence of ever-use of contraception than the first. In addition to a small percentage (three per cent) for whom there is no information on one or the other interview, just under one-tenth claimed use in S₁ but not in S₂ or reported never-use in S₁ but in S₂ said they had started using a method *before* the date of the first interview. (Most of the inconsistencies were of the former type.) A particular source of discrepancy is sterilization, largely female. Of 256 women who reported contraceptive sterilizations in the first interview, 11 per cent failed to do so in the second; and of 67 women who reported non-contraceptive sterilizations in the first interview, 22 per cent failed to report them in the second.

As with fertility, the second interview relied on a single question to ascertain contraceptive practice. Rather than ask whether or not each of a list of specific contraceptives was known, and, if known, used, women were asked, 'Have you or your husband ever used a method to keep you from getting pregnant?' Only an affirmative reply was followed by a question asking which method had been used. It would appear that a substantial number of women did not immediately connect sterilization with the use of a method to inhibit pregnancy. This interpretation is made all the more likely by S₁ data showing that only five per cent of the ever-married women spontaneously mentioned sterilization as a birth control method, although an additional 89 per cent said they had heard of it after they were specifically probed. Thus virtually all women knew about it, but hardly any volunteered to cite it as a contraceptive.⁴ Whatever the reason, it is clear that the detailed questioning on contraception characteristic of the World Fertility Survey module does elicit more admissions of practice than a simple open-ended item. This can be contrasted with fertility data, where, as we have seen, a simple question is as productive as a fertility history.

We move next to the topic of attitudes, where two questions on ideal family size and desire for more children can be compared. The Costa Rica surveys did not use the more abstract type of question (eg 'What is the ideal number of children for a couple?') but instead asked, 'If you could choose exactly the number of children that you want to have in all your life, how many would you have?' and 'Do you want to have another child in the future?' Fewer than one-half of the women gave the same reply for preferred number of children in both surveys; and no less than 16 per cent gave a number on the second survey that was three or more children different from the number given on the first. The correlation between the two responses was only .54. This degree of reliability is lower than was found in Fiji where 60 per cent gave the same number in two interviews and where the correlation between responses was .74, but higher than in Peru where the corresponding figures were 40 per cent and .42. Only a few months had elapsed between interviews in these countries (O'Muirheartaigh and Marekwardt 1980: 343).

As was the case with preferred number, desire for more children was very similar in overall distribution in the two surveys, but cross-tabulation showed considerable discrepancy. Of those who said they wanted more on the first

survey, one out of every five said she wanted no more on the second, a not implausible shift given the increase in age and parity. However, of those who said they wanted *no* more at the time of the first interview, no less than one-third (301 women) said they wanted more a year and a half later.

The implausibility of this finding suggested the need to check several hypotheses. Gross error in the copying, processing or tabulation of the tapes was ruled out after checks of the data tapes. Further, interviewer bias seemed unlikely since the problem cases did not disproportionately originate with any particular interviewers. In terms of characteristics the women interviewed were high-fertility women with preferences for large families. One-half already had five or more children (about the same proportion as women who said in *both* interviews that they wanted no more children); and when asked what number of children they would choose if they were about to marry, one-half chose five or more. (Only one-third of the women who wanted no more in both interviews and one-quarter of the others preferred so high a number.) Finally, one-half said they intended to have another child in the next two years. Only one per cent of the other women who wanted no more in both interviews intended to have a child in the next two years.

The most anomalous difference of all was the finding that over one-third of the 301 women who said they wanted more children in S_2 were *sterilized*. On re-examining the coding procedures of the earlier survey we discovered that in the first interview sterilized women were not asked whether they wanted any more children but were coded as giving a negative reply. By asking the questions of all women in the second interview, we found 112 sterilized women who said they wanted more children. We retrieved the S_2 interview forms for these cases, read each in its entirety and concluded that the anomalous responses were not due to recording or punching errors. Not only was a 'yes' or 'no' recorded to the question, 'Do you want to have a child in the future?' but a digit had to be written out by the interviewer in response to the question, 'How many more?' Indeed, half of the 112 sterilized women expressed a desire for two or more additional children. Moreover, a large number of these sterilized women were generally opposed to sterilization. In response to the question, 'Some women have an operation called sterilization to keep from getting pregnant. Are you very much in favour, in favour, opposed, or very opposed to this type of operation?' just under one-half were opposed or very opposed.

Why then are they sterilized? The answer is provided by comments written in by the interviewers. In 70 out of 112 cases the women reported that the operation was performed for health reasons rather than as a contraceptive method *per se*; as indicated by such comments as, 'She had four Caesareans', or, 'She was sick'. In short, the weight of the evidence is that most of these women wanted more children at the time of their sterilization and still do. The sterilization in most cases was regarded as a necessary evil, performed for therapeutic reasons, and is not viewed as 'birth control'.

What we have learned from this analysis is that one cannot impute attitude from behaviour (ie many sterilized women in fact want more children); that the attitude itself may be relatively unstable; and that, at the very least, the usual procedure of asking a single question to measure

desire or intention about more children is likely to be of little reliability. Further, if the first survey was defective in the reporting and interpreting of attitudes, the second was defective with respect to certain questions of behavior, such as use of contraception.

2.2 THE CORRELATES OF UNRELIABILITY

There is some correlation among the various items we used to assess reliability, but it is not strong. As an example we have chosen a datum of fundamental analytic importance to the demographer, but one whose reliability is problematic in most LDCs: age. Table 2 relates the number of age discrepancies between S_1 and S_2 to discrepancies on other items we have discussed. We see from table 2 that there is a marked and linear relation to consistency in reporting date of marriage; a relation to the other variables that is generally marked only after an age discrepancy of at least two years; and a relatively weak relation to desire for more children.

In general, the more factual items do not correlate highly with one another, as measured by Pearson coefficients or Kendall's Tau (for use of birth control). Of the ten correlations among the first five variables in table 1 all were positive but two were not statistically significant (the correlations between husband's reported education and (a) birth control use and (b) date of marriage); and all others, though significant, were small: seven were between .05 and .07 and one was .13. The low correlations suggest that while any item can be expected to elicit inconsistency among a minority of the respondents, there is no strong internal pattern of inconsistency: ie most of the people who are inconsistent on one item are not inconsistent on the others. The simple sum of these items produces a total reliability score that correlates about .50 with three of the individual items and .30 and .18 with consistency on birth control use and number of births. About one-fifth of the respondents were consistent on all five of the more factual questions,⁵ and another two-thirds were consistent on three or four of the five. A substantial minority, however, 14 per cent, were inconsistent on three to five items. Using this index, we will investigate three possible sources of response unreliability: the interviewer, the respondent, and the situation.

Table 2 Percentage of respondents with identical responses on various items, by degree of consistency in age reporting

	Age consistency				NI
	Identical	1 year	1-2 years	2 years	
<i>Percentage identical response on</i>					
Use of birth control	90	90	81	69	28
Husband's education	57	57	44	32	21
Marriage date	56	45	28	30	8
Want more children	68	68	58	58	13

Interviewer effects

An analysis of variance showed no significant relations between interviewers and the reliability index. (For S_1 interviewers: $F = 0.8$.) We further calculated for each interviewer the proportion of cases that were highly unreliable (those with four or five inconsistent responses). Among the 28 S_1 interviewers there were only three who had at least twice their expected proportion of unreliable cases. All three did few interviews (6, 11, and 20 as opposed to an overall average of 71) and since their unreliable interviews represent only five per cent of all interviews with three or more inconsistent responses, S_1 interviewers do not seem to be a major source of error. Among the 25 S_2 interviewers, three had twice as many unreliable cases as expected, but they too had so few cases (43 in all) that the deviations could be ascribed to chance.

Respondent characteristics

Our first set of respondent characteristics is derived from interviewers' subjective appraisals of the subjects' reliability and co-operativeness. In the initial WFS survey the most unreliable group received a mean score on co-operation 14 per cent higher (ie poorer) than the most reliable, and the relation, as can be seen in table 3, is linear, though slight. The same can be said for the interviewers' reliability ratings, although the differences are trivial. The ratings on co-operation by a different set of interviewers in S_2 tend in the same direction and, again, the most reliable respondents are rated as 13 per cent more co-operative than the least.

A second type of respondent characteristic refers to social and demographic aspects. Table 3 shows that the least reliable respondents were three years older and had 54 per cent more children than the most reliable. Most striking of all are the differences by education and modernity, where the patterns are distinctly linear and the analyses

of variance highly significant. For age, births and consumer durables the pattern is also linear until the last two categories. These results duplicate those in Fiji and Peru where 'response reliability is closely related to a factor which might be called modernity, embodying such characteristics as literacy and level of education at the individual level, and degree of urbanization and individualization at the societal level' (O'Muircheartaigh and Marekwardt 1980: 356).

A third question about respondent characteristics concerns the extent to which respondents who are inconsistent on factual items are also inconsistent on questions of attitude. For those 53 women who were inconsistent on four or five of the factual items the inter-survey correlation for the questions on desired family size was only .22 and for all other women .55. Beyond this extreme of unreliability, however, there were no gradations in degree of correlation for the remaining reliability groups. This can also be seen from the other direction: among the 16 per cent whose ideal number of children varied by three or more children between interviews, the mean reliability index was only 3.1 (for all others 3.7), but among the remaining women there were no gradations in reliability by degree of discrepancy in answers concerning family size.

As a further test of the relation between factual and attitudinal reliability we created an index of attitudinal reliability by combining the questions of desire for more children and preferred number of children. There is, first of all, only a slight tendency for those inconsistent on one of these items to be inconsistent on the other (among those consistent on desire for more children, 46 per cent gave the same preferred family size in both interviews; among those who were inconsistent on desire for more children, 40 per cent gave the same preferred family size). Women who were consistent on both these items scored 3.8 on the factual items reliability index, women who were consistent on neither, 3.6, other women 3.6; that is, there is no relation

Table 3 Means of various characteristics according to degree of response consistency

	Number of consistent responses					Total
	0, 1	2	3	4	5	
Age	36.8	36.3	35.5	33.8	33.9	34.6
Live births	6.3	5.7	4.8	4.1	4.1	4.5
Consumer durables score ^a	47.5	49.3	50.2	55.5	57.3	53.5
Years of schooling	3.8	4.8	5.0	6.0	6.6	5.7
Modernity ^b	.78	.36	.29	-.18	-.36	-.00
Geographic region ^c	2.9	3.0	3.0	2.9	2.9	2.9
Level of co-operation, S_1	2.9	3.0	3.1	3.2	3.3	3.2
Level of co-operation, S_2	3.2	3.3	3.4	3.4	3.5	3.4
Reliability	1.3	1.2	1.1	1.1	1.1	1.1
Presence of others, early	1.7	2.0	1.5	1.5	1.5	1.5
Presence of others, later	2.0	1.5	1.3	1.3	1.4	1.3
Duration in minutes, S_1	26.2	26.2	25.1	24.1	23.4	24.5
Duration in minutes, S_2	52.1	51.0	49.7	51.7	50.0	50.8
Number of cases	57	192	547	783	400	1979

^aAn index summing a number of household possessions, weighted by the mean retail price of each article in 1975, as reported by the Costa Rican Office of Statistics and Census: refrigerator, electric iron, radio, clock, shower or bath, and flush toilet.

^bThe modernity measure summarizes 34 items reflecting conjugal distribution of power, sex role attitudes, exposure to mass media and the Inkeles short scale stressing instrumental activism. It is expressed in Z score form. See chapter 3, footnote 16.

^cRegions were ranked from one to five, based on their degree of rurality. The nearly identical means suggest a random distribution.

between attitudinal and factual unreliability. However, those less reliable on attitudes share some of the social characteristics of the less reliable on factual items. For example, those consistent on both attitude items averaged 6.5 years of schooling and .33 on the modernity scale; those who were inconsistent on both items averaged only 4.1 years of schooling and .79 on the modernity scale (other women fell between on these values).

Situation effects

By 'situation' we mean the general environment as measured by region of the country; and the immediate social situation of the interview as measured by the presence or absence of others during the interview. There seems to be no relation to region, as judged by the means referring to five possible geographic locations. However, there is a relation between reliability and the degree of privacy of the interview.

Most interviewing manuals warn against the distorting influence of others during a 'private' interview on intimate topics, and the S₁ questionnaire took this into account by indicating at two points during the interview whether others were present.⁶ At the earlier checkpoint others were present in one-third of the cases, and in 30 per cent at termination of the interview. Of those present about one-half were children. From table 3, we see that especially at the end of the interview, only those with 0-1 consistent items had notably higher scores than the average. (Scores reflect number of persons present, zero indicating a private interview.) For the earlier point in the interview, the two least consistent groups have scores above the mean.

A final characteristic that could be expected to vary with respondent, interviewer, or situation is the duration of the interview. Table 3 shows that the S₂ interviews lasted just twice as long as those in S₁, but, in both cases, those interviews with the lowest reliability took somewhat longer.⁷

Finally, in order to determine whether characteristics of women who failed to give a codable response were strikingly different from those who gave *contradictory* responses, all cases of missing information were removed and the characteristics listed in table 3 recalculated for women whose unreliability was based purely on inconsistency. Differences from the values in table 3 were trivial.

The influence of education

Interviewers in both surveys rated better educated women as somewhat more reliable and co-operative⁸ (table 4). This could be interpreted as a sympathetic response to women with similar social characteristics, or as stereotypes about the 'lower' class character. On the other hand, if interviewers are truly capable of identifying less reliable respondents, their appraisals could be useful for analytic purposes. In order to eliminate the 'education bias' we can determine whether interviewers were able to identify less co-operative respondents among women of similar education. The most critical break in education is between those who finished primary school (about 60 per cent of the sample) and those who did not. From table 5, we see that the better educated tend to be rated higher on reliability and co-operativeness regardless of their objective reliability (ie as judged by our

consistency questions); but within educational groups there are also differences by reliability. Among women who did not complete elementary schooling, those who answered consistently only two or fewer times were judged to be less reliable by S₁ interviewers and less co-operative by S₂ interviewers. Among the better educated women the less reliable were judged to be less co-operative, but the interviewers gave high reliability ratings to nine out of ten women in this class, regardless of objective reliability.⁹

Among the less educated, S₁ interviews among the less reliable consumed 23 per cent more time than among the more reliable, but there were no differences on S₂ interviews, nor among the better educated on S₁. Among the less educated, those who were less reliable were more likely to have had other adults present during the interview, but this did not occur among the better educated.

Table 4 Interview characteristics, by education of respondent

	Years of schooling		
	<5	5-6	7+
Percentage with good reliability, S ₁	80	91	92
Percentage with 'very good' co-operation, S ₁	22	33	34
Percentage with 'very good' co-operation, S ₂	40	49	58
Percentage with adults present during interview	21	19	15
N	(759)	(567)	(558)

Table 5 Interview characteristics, by education and reliability

	Primary schooling not completed		Primary schooling completed	
	0-2	3-5	0-2	3-5
Consistent responses				
Percentage judged as having 'poor' or 'fair' reliability, S ₁	28	18	10	8
Percentage co-operativeness judged as less than 'very good', S ₁	81	78	80	66
Percentage co-operativeness judged as less than 'very good', S ₂	66	59	55	46
Percentage interviews with adults present	32	22	18	19
Mean duration of S ₁ interview, in minutes	28	25	--	--
Average number of cases	(120)	(649)	(90)	(1057)

2.3 CONCLUSIONS

Compared with similar data from a number of other countries included in the World Fertility Surveys, Costa Rican response reliability for factual type data was high. This may in part be due to the higher educational levels of Costa Rican women, 30 per cent of whom had gone beyond primary school. Whatever the reason, it is very useful to keep the Costa Rican parameters in mind because they probably represent the upper boundaries for reliability in a developing country survey. This means that even using well trained and carefully supervised interviewers dealing with relatively sophisticated and co-operative respondents, we can expect that on any factual question such as age, number of children or use of birth control, at least ten per cent of the respondents will be inconsistent by a substantial margin; and questions about husband's education or own age at marriage will produce at least twice as many inconsistent responses. Questions of attitude produced the highest rates of inconsistency and non-response and will be considered further in chapter 4.

Although correlations on reliability among the five factual items were not high, a small core of respondents was found to be inconsistent on a majority of the items: four per cent were inconsistent on four or five of the five questions, and 14 per cent on three or more. Only one-fifth showed no inconsistency on any of the items. There was little relation between consistency on factual and attitudinal items, except among a very small core of highly incon-

sistent respondents. This could suggest that different causal factors are at work, with memory and ability with numbers affecting factual consistency, while genuine fluctuations in attitude may explain the variation in measures of desired family size.

These data suggest that complex probing may be indicated for factual items such as birth control use and for measuring fluid attitudes such as desired family size; but that other items such as number of births do not require elaborate probing for the sake of improving accuracy. We also learned that just as behaviour cannot be imputed from attitudes, attitudes cannot be imputed from behaviour; thus, many sterilized women in fact want more children.

In looking at possible causes of the unreliability, we found little reason to suspect interviewer bias, but unreliable respondents, both on factual and attitudinal items, tended to be older, less educated and less modern in outlook. The most unreliable interviews tended to take longer and to take place in other than private surroundings. Even holding education constant, interviewers were able to assess the less reliable respondent as less co-operative or less reliable, suggesting that interviewer appraisals merit more attention than they are usually accorded. If likely candidates for unreliability can be identified by a combination of personal characteristics and interviewer ratings, some sort of differential interviewing approach, by means of special training, could be devised for future surveys; along with special attention to unreliable cases at the time of analysis.

3 The Importance of Assessing Contraceptive Knowledge

Among the priorities of family planning programmes, the dissemination of information on contraception would surely be outranked only by the provision and distribution of contraceptive supplies themselves. Much, if not most, of the content of in-clinic services and outreach programmes consists in improving client knowledge. At a common-sense level it is generally accepted that knowledge of the existence of fertility-inhibiting methods is a necessary but not sufficient condition for using them; and that the improvement of this knowledge should enhance acceptance and continuation of use of contraceptives.

In view of the programmatic importance of this variable, not to mention its analytic potential in understanding and predicting fertility, the absence of serious research is truly astonishing,¹⁰ for, despite the prominence of knowledge in the KAP trilogy, the typical analysis of contraceptive survey data gives only routine attention to it compared with attitudinal and behavioural data from the same survey.

Aggregate level data do suggest that adoption of family planning is more likely to be accompanied by improvements in contraceptive knowledge than by changes in attitudes toward family size. In Thailand, both knowledge and contraceptive practice improved markedly between 1970 and 1975; but preferred number of children declined only from 3.8 to 3.6. Moreover, in Taiwan, Thailand, and Korea any declines in desired family size occurred only *after* declines in fertility itself (Knodel and Debavalya 1978). In Taiwan during the period of most rapid change in use of contraception, 1965-70, there was little change in proportions desiring more children¹¹ (Freedman and Coombs 1974). In a comparison of two surveys conducted 25 years apart in Karnataka, India (formerly Mysore State), marked increases in contraceptive practice were observed. While there was some decline in desired numbers of children, the change in knowledge, especially among the less educated, was much more dramatic. For example, among illiterate women awareness of male sterilization rose from 1.5 per cent to 62 per cent, and awareness of female sterilization from 16 to 66 per cent (Srinivasan *et al* 1978).

In successive surveys in Iskan Nigeria 1969-72, knowledge and practice of contraception increased, while average desired family size did not decrease (Farooq and Adeokun 1976). The same phenomenon has been observed in surveys spanning 1964-69 in Bogotá (Simmons and Cardona 1973).

In 30 years of KAP studies, there has been little or no evolution of questionnaire technique on knowledge.¹² The World Fertility Surveys of the 1980s ask the questions much as they were asked in Mysore and Puerto Rico in the 1950s. In the WFS women are first asked whether they know any ways to delay or avoid getting pregnant and, if the response is affirmative, which methods they know of. This is followed by questions on whether or not the respondent has heard of up to eleven methods; ie all methods not

spontaneously mentioned by the respondent are specifically named. The spontaneous mentions suffer from unreliability due to memory, modesty about mentioning contraceptives, and variation in interviewer probing. A recent paper makes it clear that 'the level of knowledge derived from replies to the open-ended question may considerably underestimate the real level of knowledge' (Vaessen 1981: 361) and demonstrates convincingly that with the exception of the pill and the IUD, users 'under-report knowledge to an incredible degree if knowledge were to be estimated from replies to the open-ended question only' (363). On the other hand, the technique requiring only recognition of methods makes it easy to respond affirmatively, especially if the respondent is ashamed to admit ignorance, anxious to please the interviewer, or bored with saying no to a monotonous string of eleven nearly identical questions.¹³

Sweeping conclusions are often based on statistics stemming from responses to such questions. Thus, Brackett, Ravenholt, and Chao (1978: 322) state confidently that 'virtually all the ever-married women in six countries knew some method of family planning . . .'. But what does 'know' mean, even among those women who honestly report that they have heard of specified methods? In a national survey conducted in Korea around 1970, over two-thirds of the women said they had heard of the IUD and pill, but of these more than half replied negatively when asked whether they knew how either method was used (Chung *et al* 1972: 116). More detailed testing of family planning clinic clients in Colombia has shown that even after clinic instruction, large proportions of women (from one-third to one-half) cannot correctly answer questions about the availability, effectiveness, or mode of using pills or IUDs (Stycos 1975: 92-93).

With 'knowledge' as dim or fragile as this, the degree of interviewer probing can be critical, as can be seen from transcripts taken from three tape-recorded interviews conducted as part of the WFS-sponsored studies in the Dominican Republic and Fiji.

Some men use a condom (do you know what a condom is?) a condom during sexual relations, so that their wives don't become pregnant. Have you ever heard of this method?

No. I haven't heard.

Look, a condom is like a sheath that the man puts on, so that his wife does not become pregnant. Have you heard about this?

Yes. (Ramirez *et al* 1976: 30)

All right, I will ask you something about family planning. The pills or tablets which ladies take daily to prevent pregnancy. Have you heard of this?

No.

The family planning pills which ladies take every night so that they don't get pregnant. Have you heard of these pills?

Yes, I have heard of that.

Some women don't have sex with their husbands for months, so that they may not become pregnant. Have you heard of this method?

No.

Do you understand my question?

No.

Some women...do not have sex...with their husbands for months...

Yes.

So that they may not become pregnant. Have you ever done this? (I mean have you ever heard of this method?)

Yes. (Sahib, *et al* 1975: 52)

Perhaps such diligent probing techniques on the part of Dominican and Fijian interviewers account for the high proportions that knew of *coitus interruptus* in these countries (56 per cent) compared with only 20 and 30 per cent in Sri Lanka and Malaysia (Brackett *et al* 1978: 319).

In the light of such hazardous questionnaire technology, one might expect considerable attention to be given to problems of reliability and validity. For although such studies are rare, they almost invariably produce sobering results. Some studies have suggested that women under-report the degree of their knowledge. By cross-checking responses on own knowledge and attribution of knowledge to their partners in Dacca, Yaukey *et al* 1975, found that 'wives were relatively under-reporting not only their knowledge of contraception, but also the knowledge by their husbands'. In rural Bangladesh, eight per cent of a sample of known users of birth control denied knowledge of any methods, and one-third denied use (Stoeckel and Choudhury 1973). In Puerto Rico, twenty-two per cent of the clinic cases interviewed by nurses who were untrained in interviewing said they knew no methods of birth control, while less than one per cent of those interviewed in the same clinics by nurses trained by the investigators said they knew no methods (Hill, Stycos and Back 1959: 108).

Other studies imply over-reporting. Thus, Back and Stycos (1960) found that when they fabricated superstitions and asked Jamaican women whether or not they had heard of them, not insignificant proportions claimed that they had. Two per cent of a large clinic sample in Bogotá said they had heard of *el plomillo*, a fictitious contraceptive (Stycos 1975). Guessing rather than admitting ignorance can also inflate the knowledge data. In Colombia, when asked to name a contraceptive method that impeded ovulation, only ten per cent of a clinic sample replied correctly; but when asked if pills impede ovulation, half answered 'correctly' (*ibid*: 71). Such guessing is not limited to developing countries. When a sample of urban American mothers was given a six-category multiple choice question on the woman's most fertile period (including the option of 'don't know'), about one-half answered correctly. However, one-quarter of those who answered correctly gave an in-

correct response a year later, suggesting a high initial incidence of guessing (Presser 1981).

Repeat surveys to assess reliability have shown very high rates of inconsistent response. Mukherjee's re-survey in India (1975), using three categories to measure knowledge of specific methods, had test-retest reliability coefficients of .50 or less for vasectomy, tubectomy and the condom, rates which imply that about one-half responded randomly.

Srikantan (1979) has assessed a re-survey of 384 Fiji women interviewed seven weeks previously in a World Fertility Survey. Among 86 questionnaire items, he found contraceptive knowledge items to have the *lowest* reliability. Of course, information acquired in the seven weeks between interviews or learning from the first interview itself could have increased the initial knowledge levels. Even after correction for this possibility, however, Srikantan concludes that of all types of items covered – factual, attitudinal, and cognitive – 'contraceptive knowledge remains subject to large gross errors, if not the largest' (*ibid*: 28).

Returning to the substance of research on contraceptive knowledge, in addition to the dearth of studies dealing centrally with knowledge, those that include it in KAP analyses tend to be descriptive, presenting percentage distributions or average of methods 'known', cross-tabulated by a few traditional social and demographic variables. Knowledge is rarely related to such dependent variables as contraceptive practice or fertility. This may be related to problems associated with the way in which the general concept of knowledge has been put into operation.

If knowledge influences contraceptive practice, it must precede it in time; but while the typical KAP study records a detailed history of fertility and contraceptive use, it records knowledge at only one point in time – the day of the interview. Under the circumstances, it would not be unreasonable to attribute, to some degree, any positive correlation between knowledge and use to the effect of use on knowledge. Thus, a conclusion based on a cross-sectional survey in Korea which states 'the more a woman knows how to use contraceptive methods, the more likely [it is] she has practiced' (Chung *et al* 1972: 177)¹⁴ could just as reasonably be stated as 'the more a woman has used contraceptive methods, the more she will know how to use them'. Another ambitious model purporting to explain nearly 30 per cent of the variance in 'ever use' of contraception by three psychological clusters (social support, subjective assessability, and attitudes) is heavily loaded with contemporary knowledge measures (eg knowledge of family planning clinics and number of methods known) which could as easily be the consequence as the cause of contraceptive practice (Kar and Gonzalez 1978; Kar and Talbot 1980).

Similar problems occur if contemporary knowledge and attitudes are related – there is no way of determining which of these precedes the other: ie whether positive attitudes lead to knowledge seeking, whether knowledge acquisition leads to more positive (or negative) attitudes, etc. Further, an absence of correlation could mask important variation, early in the life cycle which become obliterated as knowledge becomes more universal. Thus, the contemporary measure of knowledge is scarcely useful in developed nations where most women have become aware of most contraceptives by the time they are interviewed. Similarly, such questions are rapidly becoming useless in developing countries.

When appropriately used, knowledge as a control variable for contraceptive practice can produce interesting results. For example, Baldwin and Ford (1976: 77) calculated for each contraceptive the proportions of those who had used it of those who knew about it, for each of ten residential and educational categories. Although, as might be expected, the proportions generally rose with urban residence and higher education, the arrangement of the data in this form produced significant findings which would otherwise not have been apparent, eg that uneducated rural women who know about withdrawal are just about as likely to have used it as are urban secondary school educated women to have used the pill if they know of it. This technique can be equally useful in comparing countries. Thus, Simmons and Culagovski (1975) have shown that although Costa Rican rural women are much more knowledgeable than rural Peruvians, the gap between knowledge and use is about the same.

Knowledge as a dependent variable has fared little better. Virtually all studies relating it to antecedent variables show it positively related to social status, but the nature of the connection is rarely explored. A productive exception is provided by a path analytic study relating knowledge, wife's education, husband's education, community educational level, and wife's newspaper reading (Simmons and Noordam 1977). Since the surveys were conducted in the rural areas of four countries at different stages of development in Latin America, it was possible to test an important hypothesis, that newspaper readership mediates a good deal of the education-knowledge relation where 'diffusion of knowledge is at an early stage, as it is in rural Peru'. At the other end of the scale lay Costa Rica where schooling and mass media failed to account for differences in contraceptive knowledge. Despite promising hypotheses and findings, the analysis relies on an extremely crude measure of knowledge: 'the recognition of at least one contraceptive method named by the interviewer' (*ibid*: 5). Since this measure was not evaluated, we can only assume that some significant portion of the intra-national and inter-national variation in contraceptive knowledge (from 28 per cent in Peru to 84 per cent in Costa Rica) might be due to response error.

To summarize, despite the great common-sense appeal of knowledge as a determinant of contraceptive use, despite its invariable inclusion in hundreds of KAP surveys around the world for the past three decades, and despite the evidence of its advance in developing nations concomitant with contraceptive prevalence, data on knowledge remain rudimentary. What little we know suggests: (1) disturbing degrees of unreliability and possibly invalidity of response; (2) analytic difficulties stemming from relating current knowledge to past contraceptive and fertility behaviour; and (3) a lack of systematic attention to the determinants of knowledge itself.

3.1 KNOWLEDGE OF CONTRACEPTION IN COSTA RICA

Among the women of Latin America, Costa Ricans have for some time been in the vanguard of contraceptive awareness. In surveys carried out in the major cities of eight Latin American countries in the early 1960s, 97 per cent of the

Costa Rican women said they knew at least one contraceptive method, a proportion approximated by the women in only two other cities - Buenos Aires and Panama City. Though few knew of the pill at the time, 45 per cent had heard of the diaphragm, 88 per cent the condom, 73 per cent sterilization, and 71 per cent periodic abstinence (CELADE and CFSC 1972: 155). In rural surveys conducted in the late 1960s, about 85 per cent of Costa Rican married women aged 20-39 recognized at least one method, compared with about 30 per cent in rural Peru, 58 per cent in rural Mexico, and 70 per cent in rural Colombia (Department of International Economic and Social Affairs 1979: 14). Costa Rican rural women even further outdistanced those in the other countries in the proportion able spontaneously to name at least one contraceptive (about twice as many as in Mexico, and three and a half times as many as in Peru (*ibid*: 16).

Nevertheless, the gap between knowledge and practice was almost as large in Costa Rica as in several other Latin American countries where knowledge was far less. Only about one-third of those who recognized at least one contraceptive method were using a method (compared, for example, with 31 and 27 per cent in Peru and Colombia) (Simmons and Culagovski 1975). Thus, the question, 'if they know, why don't they use' (*ibid*) is (or was) as relevant for Costa Rica as for other LDCs.

Moving to more current data, the 1976 WFS followed the procedures we have already described for first eliciting spontaneous replies, followed by questions probing recognition of methods. Table 6 shows that nearly all Costa Rican women had heard of the pill, IUD, condom, and female sterilization; and nine out of every ten had even heard of injections as a contraceptive method. Nine out of ten were able *spontaneously* to name a modern method, the highest proportion among 13 countries (Vaessen 1980). Costa Rican women were first in knowledge of the condom, tied for first place in knowledge of the pill, and for second place in knowledge of the IUD (Vaessen 1981). Levels of knowledge are generally superior to those reported for women in seven European countries which participated in a comparative round of surveys conducted under UN and EC/E (Economic Commission for Europe) auspices in the early 1970s.

Table 6 Knowledge of specific birth control methods, by spontaneity of response, in per cent

	Spontaneous mention	Total mention
Pill	87	98
IUD	59	91
Other female, modern	36	71
Condom	43	91
Female sterilization	5	94
Male sterilization	2	67
Injection	29	88
Doche	3	60
Rhythm	24	81
Withdrawal	2	67
Abstinence	1	31

Source: Vaessen 1980: 16

For example, whereas 91 per cent of the Costa Rican women had heard of the condom, only 44, 20, 52, and 79 per cent of the women in Turkey, Yugoslavia, Belgium, and France, respectively, had heard of it. Knowledge of rhythm in Costa Rica (81 per cent) was far higher than in Finland (33 per cent), Denmark (46 per cent), and Czechoslovakia (24 per cent); and even exceeded that of Catholic countries such as France (73 per cent) and Belgium (77 per cent)¹⁵ (Department of Social and Economic Affairs 1976). The degree of probing is not clear in these European Surveys and may account, in part, for the differences.

Nevertheless, Costa Rica's apparently extraordinary level of contraceptive knowledge raises several questions. First, is it true? By this question we mean not only are people telling the truth when they say they know a method; but even if they are, is it the case that 'knowledge of contraceptives is universal?' (Dirección General de Estadística y Censos 1978: 90). Secondly, if true, what are the causes and consequences of such a high level of knowledge?

3.2 VARIABILITY AND RELIABILITY

Since our second survey did not repeat the knowledge questions used in the initial World Fertility Survey, we cannot carry out the usual test-retest measures of reliability. However, we can look at internal variability to test the 'universal knowledge' hypothesis, and we can also determine whether those who claim the most knowledge are reliable on other kinds of items.

At a rather general level it is clear that not all women think they understand family planning, since as many as ten per cent replied negatively when asked 'Have you heard of family planning, that is, something people can do to avoid having children when they don't want them?' All of these women subsequently said 'yes' at least once when asked whether or not they had heard of specific contraceptives. Their initial denial, however, could imply that although they may have 'heard of' a pill, they know so little that they deny knowledge of 'family planning'. In short, there may be ten per cent who regard their knowledge as highly inadequate.

Another indication of variability in knowledge is provided in table 6 showing that the ability to name contraceptives is far from universal. Although the mean and median number of spontaneous mentions is high -- 3.0 -- the standard deviation is also quite large -- 1.8. Even though almost everyone admitted to having heard of the contraceptive pill when specifically asked, one in five were unable spontaneously to articulate any more than one method. At the other extreme were one in five who spontaneously cited five or more methods.

Which methods required probes? They fall into three or four categories ranging from methods that hardly ever required a specific question to those which always did. In the first category and first rank are pills: they were spontaneously mentioned by 89 per cent of those who knew them (as shown by other questions): ie probes were required for only 11 per cent of the knowledgeable respondents. Three other methods required probes for no more than one-half of the women: IUDs (34 per cent), diaphragms (49 per cent), and condoms (51 per cent). In the middle category are two methods which required probes

for about two-thirds of the women who knew the method: injection and rhythm. In the final category were five methods for which at least 95 per cent of the women required probes: male and female sterilization, abstinence, douche, and withdrawal. Methods in the first category are not only well known, but have been legitimized by clinics, campaigns, and the mass media. In the second category are methods which are rather novel (rhythm and injections). Women may feel less sure about their knowledge of these methods, even though they have heard of them. Methods in the last category are those whose very mention the respondent may find difficult or embarrassing (withdrawal), and those that may not have been conceptualized as contraceptive or family planning methods (sterilization, abstinence, douche, and, possibly, withdrawal). Further evidence that sterilization is not perceived as family planning is provided by the fact that 44 women who said in the first interview that they were sterilized (most of them after a probe) failed to mention it in the second interview in response to the question 'Have you or your husband used any method to keep you from getting pregnant?'

The traditional way of scoring the knowledge responses is to sum the number of methods known, regardless of whether they were known after probes or mentioned spontaneously. However, we found that the correlation between this traditional measure and the number of methods spontaneously mentioned was only .52. Moreover, the number of spontaneously cited methods correlated more highly with such variables as age and education (.19 and .44, respectively) than did the traditional measure (.09 and .37). Consequently, we decided to score these items somewhat differently, assigning a '3' to a spontaneously mentioned method, a '2' to a method recognized after being mentioned by the interviewer, and a '1' to a negative response following interviewer mention. This measure will be referred to as the weighted index of knowledge.¹⁶

As an indirect test of reliability, we related knowledge scores to the degree of consistency of response obtained from the two interviews to the five factual items discussed in chapter 2. We hypothesized that higher reliability would be more characteristic of those with high spontaneous knowledge scores, and lower reliability for 'yes sayers'. (The contrary hypothesis is also reasonable -- that women who volunteer more methods are the most eager to please, so that responses reflect courtesy differences as much as they reflect knowledge.) Reliability was found to be clearly associated with spontaneous mentions, but 'yes sayers' were not as unreliable as 'no sayers'. For each of the eleven contraceptives, women who mentioned the method spontaneously were found to score highest on reliability, those who denied knowledge scored lowest, and those who required a probe before affirming their knowledge fell in between. Further, women who mentioned more methods spontaneously tended to score higher on consistency, holding constant the total number of methods known.

However, since more reliable women are better educated, the relationships between knowledge and reliability were examined within each of three education groups (not shown). Within each educational category there were statistically significant positive relations between reliability and the first two measures of knowledge and weaker relations between reliability and the traditional index of knowledge (that weights spontaneous and probed know-

ledge equally). Since the weighted index also showed higher correlations with education and modernity than did the traditional index, the weighted score will be used as our measure of current knowledge. In a substantive sense, we conclude that not only are women who mention more methods spontaneously the most reliable on other questions of fact, but that the 'yes sayers' are at least as reliable as the 'no sayers', and probably more so.

3.3 AGE, MODERNITY AND CURRENT CONTRACEPTIVE KNOWLEDGE

We have already noted that the high level of general contraceptive knowledge in Costa Rica masks considerable variation. One of the sources of this variation is age, which exhibits a curvilinear relation with knowledge, the best informed in our sample being those under 30.

Age reflects both generation and biological/cognitive maturation. In terms of *generation*, the older women had much less opportunity to learn about family planning. Among women aged 30 and over, the correlation between age and the number of contraceptive methods known (weighted for spontaneity) is negative ($-.20$). In that generation older women were outdistanced in knowledge by younger women who learned earlier and from better informed sources. Among the younger generation of women, however — those under 30 — there is a small positive correlation between age and knowledge ($.12$). This may reflect the 'natural' tendency for *maturation* to enhance the accumulation of knowledge among a generation with more or less equal access to contraceptive information, via mass media and public health programmes. However, the 'natural' tendency is weakened by the recency of the programmes, which began only in the late 1960s and were still growing at the time of the survey.

In 1976 it was still the case that the more advantaged women knew more about contraception. For the older women the weighted knowledge score correlates moderately highly ($.28$) with early (until age 12) urban residence, current urban residence ($.31$), income as reflected by an index of household possessions ($.40$), husband's education ($.39$), and the sum of parents' years of schooling ($.33$). However, the strongest correlations are with education ($.46$) and psychological modernity¹⁷ ($.46$). Table 7 shows that among women over 30 years of age (about two-thirds of our sample), both education and urban residence are associated with knowledge, urban women who completed high school scoring five points higher than rural women who did not complete primary school (ie less than six years schooling). However, a high school education obliterates the distinction between urban and rural knowledge.

Table 7 Mean score on weighted knowledge scale, by education and residence, women aged 30+

Years of schooling	Rural	Urban
0-5	20.6	22.4
6	22.8	23.1
7-11	23.6	24.3
12+	25.4	25.6

In a multiple regression which included age and the seven other variables listed above, there were only four which independently explained significant amounts of variance in knowledge: education, residence, modernity and income (household possessions). These variables may be arranged in a logical (plausible) scheme better to explain their interrelations, sequence, and pattern of effects on knowledge. Thus we would expect that modernity and income might be consequences of education and residence, and in turn influence knowledge. Figure 1 presents a path analysis with the four critical variables, plus age. Education and modernity have independent and powerful net effects on knowledge. While income and urban residence are independently associated with higher knowledge, they have relatively small net effects in themselves. Both education and residence have powerful independent effects on income, and education is critical in the determination of modernity.

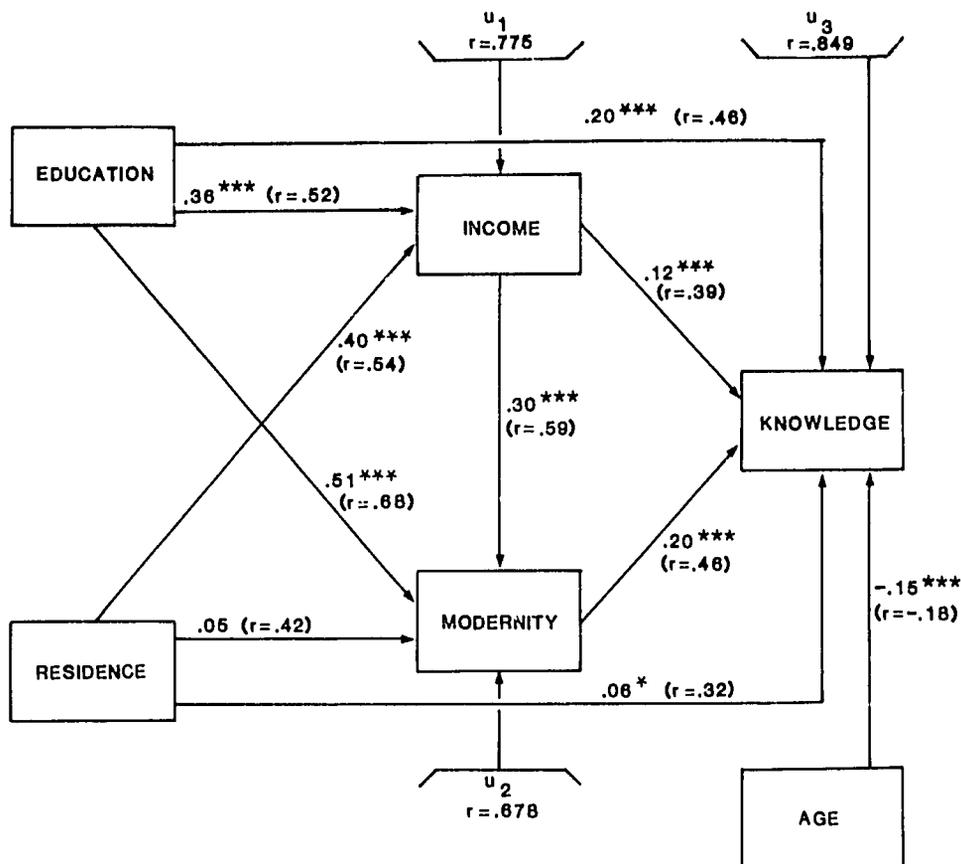
Since age has been roughly controlled by limiting the analysis to older women, we have simplified the diagram by including age only in terms of its net contribution to knowledge. Among these older women, age is scarcely related to residence, income or modernity (r 's $<.07$); and although more strongly related to education ($r = .17$) its inclusion at the starting point of the diagram (not shown) only trivially affects the betas of the other variables in their relation to knowledge. However, even with all the social/psychological variables controlled, age has a significant negative correlation with knowledge among older women.

Although these five variables by no means completely explain knowledge differentials, the amount of variance explained (nearly 30 per cent for each of the two major age groups) is far greater than the six per cent explained by the Simmons and Noordam (1977) model for rural Costa Rica in the late 1960s. In part this is attributable to the addition of variables not used by them (age, modernity, and income), but probably also to the use of a somewhat more reliable dependent variable.

Because of the curvilinear relation of age to knowledge, we repeated the path models for each of six five-year age groups. R^2 ranges from 23 to 35 per cent with no pattern by age progression. In all cases betas have the anticipated signs, but urban residence fails to achieve significance at the .05 level in four of the six age groups. The betas for education are considerably higher for the two oldest age groups, while those for modernity are highest among the four younger groups. Age continues to act positively among both age groups under 30: ie the older women in these groups have higher knowledge scores.

3.4 THE TIMING OF CONTRACEPTIVE KNOWLEDGE ACQUISITION

In the second interview with the respondents of the 1976 National Fertility Survey, we asked at what age the respondent first learned 'that you could do something to keep from getting pregnant'; the source of this information; whether it occurred before or after the first marriage or consensual union; which contraceptive method the respondent first heard about; and from what source she learned about this method.



* significant at .05 level
 ** significant at .01 level
 *** significant at .001 level

Figure 1 Path analysis, index of current knowledge of contraceptive methods, for women aged 30+

The average woman learned about contraception at a fairly mature age: 24.2 (Md = 22.6); but a standard deviation of 7.3 indicates considerable variation. While 10 per cent learned by the age of 16 and 28 per cent by 19, as many as 18 per cent were 30 years of age or over when they first learned about the possibility of contraception. Moreover, most women (71 per cent) learned about family planning only after they were married. At one extreme are 18 per cent who learned before marriage and at an early age (before 20); at the other, there are twice as many (38 per cent) who learned after marrying and after age 24.

As noted earlier, current knowledge of contraception cannot logically be used as an antecedent of birth control use since the knowledge may have been acquired, at least to some extent, subsequent to birth control practice and may have been directly influenced by it. While we did not, as would have been desirable, measure knowledge at different points in the life cycle, we can at least use our data on the timing of first contraceptive knowledge to establish more reasonable causal links between knowledge and

fertility control. While virtually all women now have a rudimentary knowledge of family planning in Costa Rica, only those who learned it early can be expected to have initiated contraception early in marriage. Of course, if everyone began using birth control as soon as she learned about it, it would be as difficult to unravel cause from effect as we argued in the case of *current* knowledge of contraception. Although we did not ask, unfortunately, for age at which contraception was first used, by piecing together other data we reconstructed age at first use of contraception for 955 of about 1600 women cases who have used it. Among these women there is a mean gap of 3.2 years between first learning and first use (a median of 1.9). Only 9 per cent used contraception in the same year that they learned about it; another 36 per cent used within a year, 14 per cent in two years, 17 per cent in three or four, and 24 per cent four or more years later. Thus, in nine out of ten cases use followed learning by at least a year; only in the remaining instances is there any doubt about the sequence.

To measure knowledge timing, we constructed six categories by cross-classifying age at which learning first took place (three categories) and whether this was before or after marriage. While ever-use of birth control is not related to knowledge timing, *how early* birth control was used is strongly related. Table 8, panel A, shows that among the women 30 years of age and over, virtually all of whom have practised some form of birth control, the earlier the knowledge the earlier the use. Thus, among those who learned about family planning before marriage and before the age of twenty, over three-quarters initiated family planning before the second child; but among those who learned after marriage and after age 25, only about one-third started birth control before the second child.¹⁸

Looking at this relation the other way around, women under 30 who started using contraception the earliest (before having any children)¹⁹ learned about contraception at an average of 19 years of age, while those who started only after five or more births learned at an average age of 24. The comparable figures for women over 30 are 27.7 and 31.2.

Panel B of table 8 shows that early knowledge acquisition is also conducive to low fertility. The basic distinctions appear to be between those who learned before the age of 25 and those who learned later; and between those who learned before marriage and those who learned after. Thus, given roughly the same length of marriage, women who learned their first method after marriage and after the age of 25 had 78 per cent more births than women who learned before they married and before the age of 20.²⁰

Another way of assessing impact on fertility is by using the 'open interval' (the period of time between the last live birth and the time of the interview) as the independent variable. We have limited the analyses to women aged 35 or more, that is, those approaching or at the end of the reproductive period. A multiple regression was carried out on 27 variables which seemed likely to affect the interval, including wife's employment, income, modernity, education, residence, church attendance, use of effective contraception, and current knowledge index. Only five other variables have significant relations to the open interval. These include neither current use of contraception (coded as use or non-use) nor current knowledge of contraception (the weighted score). On the other hand, two of the significantly related variables are age at learning about contraception ($\beta = -.31$, $F = 57$) and whether contraception was learned before or after marriage (.13, $F = 12$).²¹ Both these variables of course predict the *timing* of contraceptive use. This demonstrates a point which should be obvious but which is often overlooked — that cumulative fertility rates are better predicted by past than by current contraceptive knowledge and use.

3.5 DETERMINANTS OF EARLY KNOWLEDGE

Panels D, E, and F of table 8 refer to possible *causes* of differential knowledge timing. Since we have seen that most women learned about birth control only after marriage, it is not surprising to find age at marriage closely linked to knowledge timing. Perhaps in order to have learned before marriage a woman had to marry late! However, the relation holds even among women who

Table 8 Contraceptive use, live births, age at marriage, parents' education and modernity, by time of learning first contraceptive, for women aged 30+

Age learned	Before marriage	After marriage
A Percentage who initiated contraception before second child		
<20	77	65
20-24	67	55
25+	60	37
B Mean live births, standardized by marriage duration ^a		
<20	3.3	3.7
20-24	3.2	3.8
25+	4.3	5.7
C Mean age at marriage		
<20	21.2	16.2
20-24	23.2	19.1
25+	26.3	20.3
D Mean (sum of) years of schooling of parents		
<20	11.3	6.1
20-24	10.1	6.0
25+	8.1	4.5
E Mean modernity score, age standardized		
<20	.91	.00
20-24	.71	.30
25+	.27	.50
F Approximate number of cases		
<20	130	69
20-24	118	241
25+	42	740

^aThree length-of-marriage groups were used in the standardization, each representing about one-third of the sample: 0-9 years, 10-19, and 20+.

learned *before* marriage, suggesting that age at marriage may also be reflecting such social variables²² as are introduced in panels D and E of the table. Parents' education and respondents' modernity levels are higher when learning occurred before marriage and at a younger age.

Even though table 8 is limited to older women, we should note the strong relation between age and knowledge timing. The oldest women, those over 39 at the time of the survey, were an average of 30 years old when they first learned about family planning; those aged 30-39 learned at 24; and the youngest cohort (20-29) learned at 19. As a kind of summary of the social and demographic variables, table 9 shows that one-half of the women under 30 in metropolitan San José learned before marriage and before age 20, as compared with only 5 per cent of the rural women aged 30 and over.

Table 9 Percentage who learned about family planning before age 20 and before marriage, by age group and residence

	Under 30	30+
Metropolitan San José	51	16
Other urban	28	12
Rural	26	5

Table 10 Simple correlations between age at which first method was learned and other variables, by age groups

	Under 30	30+
Age	.32	.47
Age at first union	.15	.08
Consumer durables score	-.19	-.26
Years of schooling	-.26	-.36
Parents' education	-.21	-.30
Husband's education	-.17	-.22
Urban residence	-.09	-.26
Number of siblings	.12	.08
Modernity	-.22	-.32
Residence when young	-.17	-.22

In order more precisely to measure the weights of the various social and demographic characteristics, we turn to a multivariate analysis of age at which first knowledge was obtained. Table 10 shows that age is not only a powerful predictor of knowledge timing, but that virtually all the correlations are higher for older women. While universal education, the mass media and public facilities have democratized knowledge among the younger generation, early

learning for the older generation women probably required a higher social status.

Number of siblings was included on the hypothesis that siblings might learn about family planning from each other, thus giving women from larger families an advantage in early learning. However, the relation is not only small but *positive*, suggesting that it is based not on sibling communication but on the fact that larger families tend to have lower socio-economic status. Not shown in the table is frequency of church attendance or employment before marriage, which showed virtually no relation to knowledge timing. All other relations are in the expected direction.

3.6 EDUCATION AND MODERNITY

Next to age, education is the strongest correlate of knowledge timing. Figure 2 shows the linear relation, which is especially marked once primary schooling is completed.²³ The curve is flatter for the younger generation, most of whom learned early regardless of educational level. Among the younger, at least six years' education is required before any impact is apparent.

As was seen in the case of current knowledge (table 7), education and residence are both related to the age of knowledge acquisition (table 11). To cite the extremes, rural women who failed to complete elementary school learned over eight years later than the urban women who finished secondary school, among women aged 30 and over.

Despite the intuitively appealing argument for a direct connection between education and knowledge, we should recall that years of schooling are closely related to most of the other variables in table 10 related to knowledge. For all women, the correlation of education with age is $-.22$,

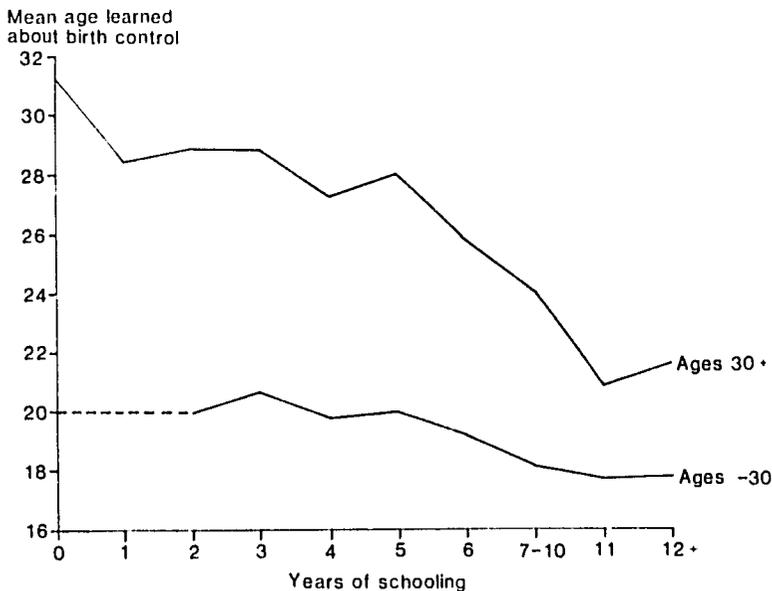


Figure 2 Age at which respondents first learned about birth control, by age and education

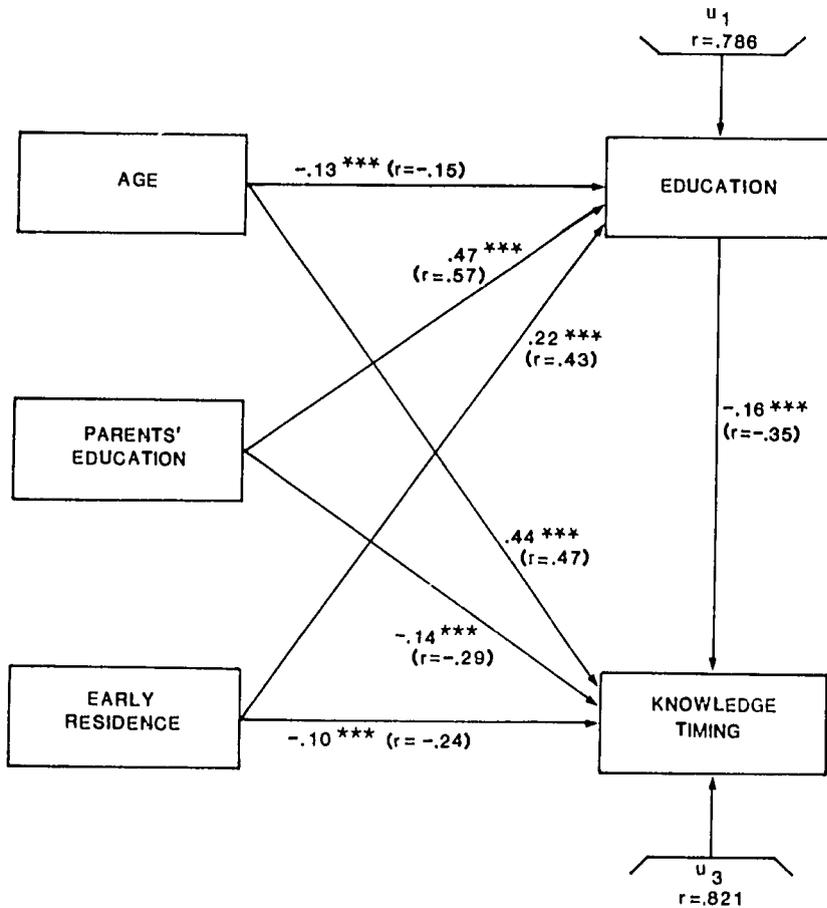
Table 11 Mean age at learning about contraception by educational category and current residence, women aged 30+

Years of schooling	Urban	Rural
0-5	26.8	29.4
6	28.1	26.8
7-11	22.7	24.5
12+	21.1	24.9

with parents' education .58, with consumer durables (income proxy) .50, with urban residence .40, with husband's education .45 and with modernity .68. Moreover, the sequence of these variables *vis-à-vis* education varies. Thus, income, age at marriage, and even husband's education can be viewed as consequences of the respondent's education rather than as causes of it. Two variables that are clearly

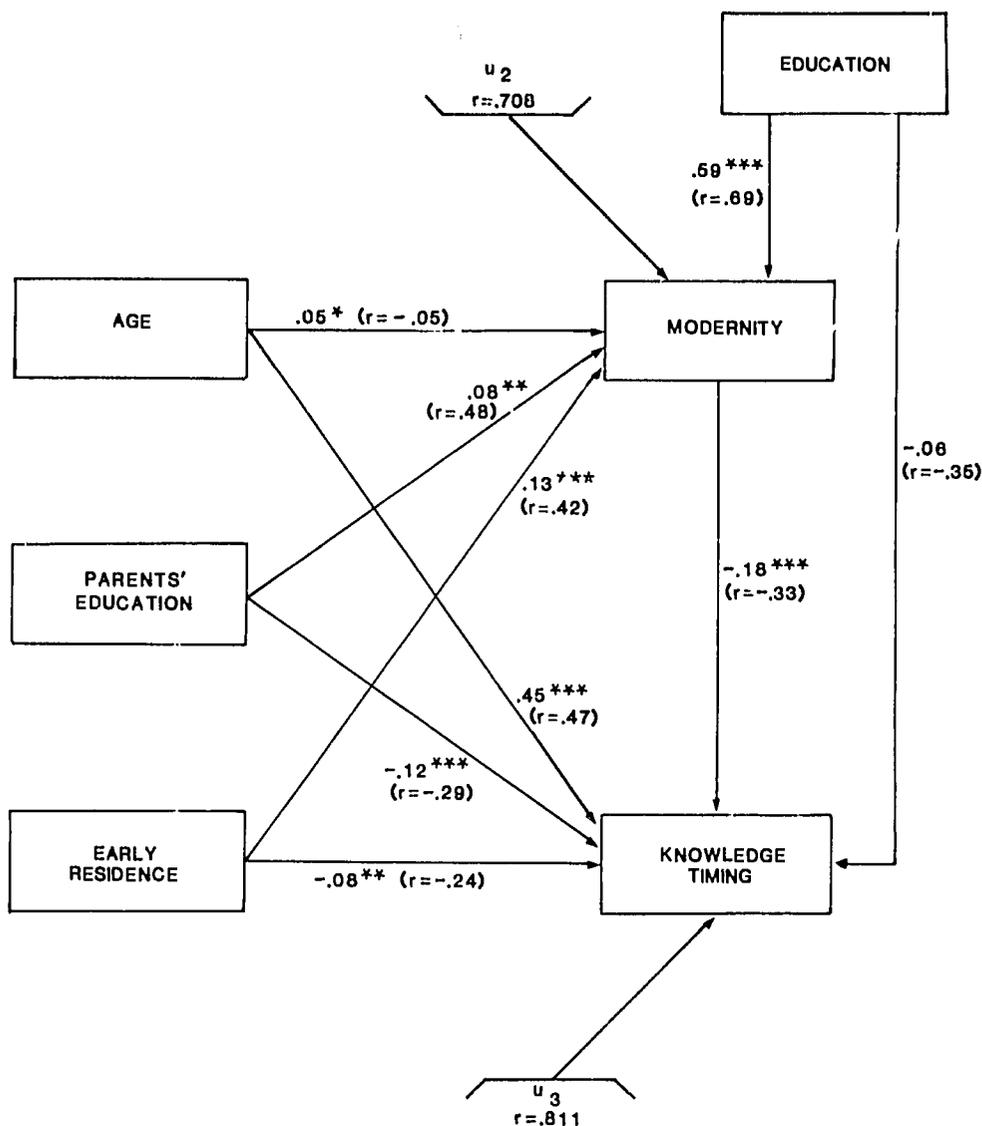
antecedent and relevant are the place of residence of the respondent until the age of 12 (taken from the S₁ interview and scored as a three point scale from country to city), and parents' education (the sum of years of schooling of mother and father, taken from S₂). These two variables and age account for 39 per cent of the variance in the education of respondents 30 years of age and over; and each is independently related to education. (Standardized regression coefficients = .47 for parents' education, .22 for early residence, and -.13 for age, with all F's significant at the .001 level.)

Do these background variables, which were seen to have moderately strong correlations with age at learning about contraception (table 10), operate through their impact on the respondent's education or do they have independent effects? The path model (figure 3) shows that both parents' education and early residence not only affect knowledge through the daughter's education, but also affect it directly. The original correlation of -.35 between education and



* significant at .05 level
 ** significant at .01 level
 *** significant at .001 level

Figure 3 Path analysis, age at which respondents first learned about contraception, for women aged 30+



* significant at .05 level
 ** significant at .01 level
 *** significant at .001 level

Figure 4 Path analysis, age at which respondents first learned about contraception (modernity added), for women aged 30+

knowledge shrinks to $-.16$ when the other variables are controlled. Age remains the most powerful predictor ($pc = .44$).

Our next question is whether the addition of psychological modernity to the scheme improves our understanding. Modernity is strongly related to education, and although its addition to the model only raises the explained variance from 32 to 34 per cent, it has a highly significant direct relation to age at first knowledge ($-.18$). On the other hand, the original correlation between education and age at learn-

ing contraception essentially disappears once modernity and the other variables are held constant. The total effect of education can be seen to be only $-.17$ ($(.59 \times -.18) - .06$). Its indirect effect through modernity ($-.11$) is almost twice as strong as its direct effect. Other than age, the background variables make only modest independent contributions to the dependent variable (figure 4).

The critical role of modernity led us to re-examine this measure, a composite of five indices designed to reflect familial decision making, norms about sex roles, exposure

to mass media (TV and newspapers), level of information about extra-community events, and the Inkeles short form stressing activism-fatalism. Each of these sub-scales was in turn substituted for modernity in the models presented in figures 2 and 4. With respect to current knowledge of contraception, the substitution of either sex roles or the information index scarcely affects the betas for modernity. Relationships between knowledge and the other three components of modernity do not reach statistical significance.

In the case of age at learning about birth control, the same two variables (sex roles and information) are important. When both are included each has about the same beta (-.09 and -.10),²⁴ the former significant at the .05 level, the latter at the .01. The Inkeles scale, mass media exposure, and family decision making, on the other hand, do not reach significance. The variable sex roles maintains its relationship both for the younger and older generation, and the variable information for the older women only. Thus, the importance of psychological modernity as an explanatory variable for the education-knowledge association has been demonstrated, and some clues have been provided concerning which aspects of modernity are critical. That women who are generally better informed about the outside world are also better and earlier informed about family planning seems clear enough. That women who are

more modern in their attitudes toward husband-wife roles are also better and earlier informed could provide further leads for the content of educational programmes destined to influence young people's receptivity to family planning. Sophistication about the world outside one's community and non-traditional attitudes about marriage roles may be a by-product of formal education which could be intensified in programmes more directly aimed at family planning consequences.

3.7 NATIONAL TRENDS

The importance of these more psychological dimensions should not blind us to the national trends in family planning; indeed, plausible links can be inferred between national birth rates and the timing of contraceptive knowledge. We have already demonstrated and attempted to explain the two stages of the Costa Rican fertility decline (Stycos 1982), and have attributed the accelerated decline after 1968 to the National Family Planning Programme. By establishing a calendar year for the timing of each woman's knowledge about contraception, we can express the number of women who learned in each year as a proportion of those who did not know about contraception at the beginning of the year. The relation between this measure and

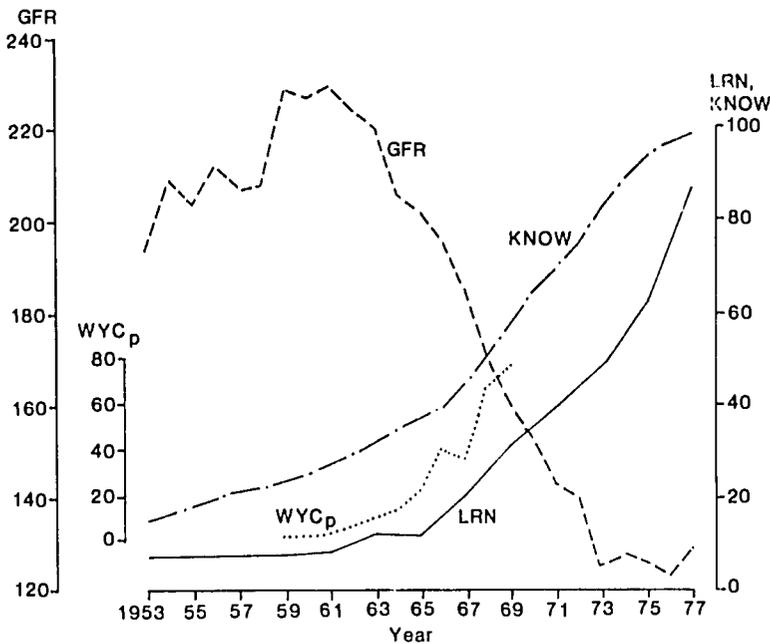


Figure 5 Timing of contraceptive knowledge and national general fertility rates, Costa Rica 1953-77

NOTES:

GFR = General fertility rate

WYC_p = Potential women years of contraception imported, in thousands. (Source: Thein and Reynolds 1972)

LRN = Percentage who learned about contraception in specified years, of those women who did not know about contraception at the beginning of the year

KNOW = Percentage of women who had learned about contraception by specified year

the national General Fertility Rate for the 16 years 1960–1975 is $-.93$, a correlation that rises to $-.98$ if the natural logarithms of the variables are used. (Lagging the fertility rate by one or two years scarcely affects the correlation coefficient.) Generally speaking, each ten per cent increase in knowledge was soon followed by a three per cent decline in national fertility. (The raw coefficient of the equation is $-.31$.)

That family planning programmes were in part responsible for this could be inferred from figure 5. In the 1940s and 1950s knowledge acquisition proceeded at a low and constant rate: less than five per cent of the eligible (ie non-knowledgeable women of fertile age) learned per year (LRN). Until the mid 1960s the LRN Curve is essentially flat, and the cumulative proportion of women who had learned (KNOW) rose slowly. After 1965 however, the LRN Curve takes off, around the same time that contraceptive imports rose sharply and the General Fertility Rate fell precipitously. By the early 1970s knowledge (KNOW) approached its limit, and the GFR had bottomed out at a level about 100 points lower than that of a decade ago.

While these parallel developments do not demonstrate causation, the launching of the private family planning association (the Asociación Demográfica) in 1966 and the National Program in 1967 are certainly consistent with the 'knowledge explosion' of the late 1960s.

3.8 CONCLUSIONS

The role of contraceptive knowledge and knowledge acquisition, though rarely studied, has been shown to be of great importance in helping to account for national fertility trends in Costa Rica. Indirect appraisals of reliability suggest that the high knowledge rates in Costa Rica can be believed – at least, the most knowledgeable women are also the most reliable on other questions – but what appears to be 'universal knowledge' conceals: (1) a good deal of variation in contemporary knowledge, especially when spontaneously mentioned methods are emphasized in the knowledge measurement; and (2) much variation

in the timing of knowledge acquisition. Among the older women, few learned before marriage or early in marriage, thus vitiating the potential application of the knowledge until late in the life cycle. Moreover, the late learners did not learn as much, as judged by our measure of contemporary knowledge, possibly due to the poorer reliability of information sources in earlier generations. Younger women in the sample not only know somewhat more about contraception than older women, but show less variation in knowledge by socio-economic characteristics. Nevertheless, while the recent democratization of family planning information via rural clinics and the mass media has brought *some* knowledge to all, the urban and better educated have learned earlier and better regardless of age, and have therefore been in an advantageous position with respect to the use of family planning.

Multivariate analysis showed that modernity explained much, though not all, of education's relation to both contemporary contraceptive knowledge and the timing of knowledge acquisition, with modernity generally exercising a significant independent effect. How then does modernity operate to bring about such a powerful effect on knowledge? We had assumed, following Inkeles and Smith (1974), that it reflected a greater openness to new ideas and experiences, and a greater sense of 'personal efficacy'; ie psychological characteristics that might expedite knowledge seeking and a search for technology which would give women greater mastery over their lives. In fact, decomposition of our modernity measure showed that the critical ingredients were a generally higher level of information about the world outside one's community on the one hand, and more liberal attitudes towards the appropriate roles for the sexes on the other. These were found to be strongly influenced by education and early home environment. Whether these characteristics could be influenced more directly and speedily by special programmes is unknown; but the acceleration of knowledge acquisition following the Costa Rican national family planning programme, and the sharp decline in birth rates following knowledge acquisition is eloquent testimony to the effectiveness and utility of contraceptive specific programmes of education in a developing country.

4 Are Attitudes Meaningful?

The World Fertility Survey, in attempting to measure attitudes toward family size, chose traditional questions directed at desire for more children and preferred number of children. Such questions, relating to the expected, wanted, or ideal number of children, have met with considerable criticism; responses to them allegedly reflecting rationalizations of existing family size, courtesy bias (giving socially acceptable answers), or pure fantasy. On the other hand, even so abstract a concept as 'ideal family size' has been judged to be of value in analysing fertility trends (Blake 1974); and Ware (1974) has argued convincingly in favour of survey questions on 'the best number of children for a family to have'. Because of the controversial nature of measurement of attitudes toward family size, we took particular pains to elaborate special questions in this area. Before considering these, we will review the evidence stemming from the more traditional questions used in various surveys in Costa Rica.

Among the twenty countries that have reported results from WFS research, Costa Rican women are unexcelled in contraceptive knowledge and use and far outdistance the average Latin American country in current use of contraception (Mamlouk 1982; Lightbourne and Singh 1982). No such distinction, however, marks their attitudes. Fifty-two per cent of the women in the 1976 Costa Rican National Fertility Survey said they wanted no more children, compared with an (unweighted) average of 53 per cent for eleven Latin American countries and 52 per cent for nine Asian countries covered by World Fertility Surveys (Lightbourne and Singh 1982: 43). Among contraceptive prevalence surveys conducted in twelve countries, nine of them Latin American, Costa Rica ranked tenth in the proportions wanting no more children. Controlling for parity (under four and four and more living children), Costa Rica ranked tenth or eleventh²⁵ (Morris *et al* 1981: 172).

A second type of question used internationally refers to ideal or preferred number of children. In Costa Rica the question was, 'If you could choose exactly the number of children you want to have in your whole life, how many would you have?' Just over one-quarter of the married women expressed a preference for six or more children, and the overall mean of 4.7 is, internationally speaking, distinctly on the high side. In a review of 21 surveys conducted in ten Asian nations in the late 1960s and early 1970s only surveys in west Malaysia and the Philippines exceeded this figure, with most surveys averaging less than four even for the more abstract question about 'ideal number of children for a family' (Department of International Economic and Social Affairs 1979: 226-27). The results of more recent World Fertility Surveys also indicate that the Costa Rican preference is high. The means for ten Asian and twelve Latin American countries averaged only 4.0 and 4.3 respectively (Lightbourne and Singh 1982: 43).

Costa Rican attitude conservatism is not new. In the round of eight urban surveys in Latin America in the early 1960s, the median woman in San José, Costa Rica, expressed a desire for 4.1 children, a number exceeded only in Mexico City. In Rio de Janeiro, Buenos Aires, and Quito the medians were 3.5 or lower (Elam 1971: 264; CELADE and CFSC 1972: 103). Rural surveys in four Latin American countries in the late 1960s showed that Costa Rican women regarded a mean of 4.8 children as the 'best number for a woman to have', not especially low compared with 4.6, 5.2, and 6.0 in Colombia, Peru, and Mexico (Simmons 1974: 135), countries with considerably higher birth rates.

In short, as early as two decades ago and as recently as 1976, Costa Rica, which has been in the vanguard of knowledge and use of contraception, has lagged behind in attitudes toward family size. This could indicate that such preferences have little impact on contraceptive behaviour; or that the measures used have been only pale or misleading reflections of the attitudes. We can assess the reliability of the traditional items by comparing responses drawn from different Costa Rican samples, as well as by comparing responses from two interviews with the same women conducted one and a half years apart. Further, for the second interview we can compare responses to the traditional questions with a variety of related questions less subject to rationalization. Finally, we can see to what extent either type of question is related to behaviour.

4.1 TRENDS IN PREFERRED FAMILY SIZE

Given the dramatic shifts in fertility and contraceptive practice characteristic of Costa Rica over the past two decades, an absence in the reduction of preferred family size would be one indication of the lack of connection between attitudes and behaviour. However, comparison of the 1964 CELADE-Cornell survey of San José with the National Fertility Survey shows that by 1976 the nation as a whole had moved to where the capital city had been a decade previously (table 12, columns 1 and 2). This demonstrates consistency between the attitudes and behaviour, though it tells us little about causality.

In the 1964 San José survey, a correlation of .26 was found between number of living children and preferred number of children (CELADE and CFSC 1972: 112). In the 1978 survey the correlation was .50 for the nation and .40 for the metropolitan area. This increase is what would be expected as women gained control over their fertility, ie as they were increasingly able to realize their preferences. On the other hand as women have become more sophisticated about contraception and more conscious of modern norms about family size, it is possible

Table 12 Preferred family size in three surveys in per cent

	San José ^a	Costa Rica	
	1964	1976	1978
One	5	3	1
Two	18	15	17
Three	23	24	27
Four	24	21	21
Five	9	11	10
Six	7	9	9
Seven or more	13	18	15
Total	99	100	100

^aCELADE and CI-SC 1972: 103.

that they feel more constrained to appear 'rational' and effective about their fertility goals and behaviour. Thus, we need to look more closely at the reliability and internal consistency of the attitude measures.

4.2 RELIABILITY AND VALIDITY

A group of experts convened by the IUSSP in 1974 to discuss cross-national KAP surveys concluded that responses to single questions on preferred or ideal family size were 'likely to be unreliable for at least some and perhaps many respondents. But the real issue is: how unreliable, for how many, and in what kinds of situations?' (Freedman and Coombs 1974: 69). Discussing the use of questions on desire for more children, a recent United Nations analysis noted that 'an increasing number of investigators have questioned the validity and reliability of the measures of this key motivational variable and pointed to the likelihood that respondents in many surveys give interviewers answers that are grossly biased toward smaller family sizes' (Department of Social and Economic Affairs 1979: 33).

There seems little doubt that the reliability of attitude items is lower than that of factual items, and as low or lower than that of knowledge measures. The number of children wanted and the desire for more children showed low reliability in the Fiji re-survey, although knowledge items were even worse (Srikantan 1979). In Peru, correlation between two questions on preferred family size administered a few months apart was only .42 (O'Muircheartaigh and Marekwardt 1970: 343.) Mukherjee's re-survey of a small Indian sample found test-retest reliability coefficients of less than .40 for most family planning attitudes toward family size, compared with coefficients of about .80 for demographic and social characteristics. Mukherjee concluded that 'the information on desired family size is so liable to error and uncertainty that it can be confusing and misleading if used for policy formulation and implementation' (1975: 141).

Even if the attitude questions were reliable, there is no consensus on their relevance. One reviewer states that 'examination of the KAP survey literature reveals little consistent evidence that attitudes strongly predict family planning behavior' (Werner 1977: 294). Based on the

results of a Venezuelan survey, Kar (1978: 180) concluded that 'a generalized fertility attitude measured in terms of ideal family size is not likely to be a good predictor of family planning'.

Recent evidence on attitudes, however, leads to a more positive conclusion concerning the relation of fertility attitudes to fertility control. Examining desire for more children data from 11 WFS studies, Palmore and Concepción (1981: 38) conclude that 'fertility preferences are related to contraceptive use and are often as highly correlated with it as such standard variables as educational attainment'. While the attitude variable in fact explained only a small fraction (1-3 per cent) of the variance in current use of contraceptives net of a number of controls, it accounted for a sizeable proportion (10-28 per cent) of the explained variance. These findings confirmed those of an earlier analysis of Pakistani data, which also pointed out the major defect in such cross-sectional surveys 'they do not permit causal inferences' (Shah and Palmore 1979: 149). As Pullum expressed it in his study of fertility preferences in Sri Lanka, 'with a cross-sectional survey it is impossible to evaluate statistically the impact of an earlier preference upon subsequent fertility' (1980: 12). In the few instances in which this has been done by means of panel surveys, however, the results have shown that desire for more children is strongly predictive of subsequent fertility. Indeed, in Taiwan 'whether wife wants more children is a better predictor than contraceptive use for subsequent fertility' (!) (Hermalin *et al* 1979: 81). In both Taiwan and the United States, even more generalized family size preferences have been found to predict subsequent behaviour (Coombs 1979).

In short, the reliability and validity literature is sufficiently varied so that further research would seem justified and needed. Evidence of attitude unreliability in Costa Rica has already been summarized in chapter 2. We will now analyse it in more detail, and at the end of this chapter return to international comparisons.

Comparing responses to the same family size preference question administered to the same women in 1976 and 1978, we find means, standard deviations, and frequency distributions of responses to the family size preference questions to be virtually identical (table 12); however, as noted in chapter 2, less than half of the women cited the same number of children on both occasions; and as many as 16 per cent gave a number at least three children different. The correlation between the two responses was only .54.

The second traditional attitude item refers to desire for more children.²⁶ Since there was an interval of nearly two years between surveys, a net decline in the proportions wanting more children was anticipated; but instead the proportion *increased* from 48 to 55 per cent. Not only did one out of five women who initially said they wanted more children shift to wanting no more on the second;²⁷ but, of those who initially wanted no more, one-third said they wanted more a year and a half later.

Part of the explanation was found to lie in the WFS coding procedures as noted in chapter 2. Sterilized women were never asked about wanting more children, but were classified as wanting no more in the analysis. In the second interview, where *all* women were asked whether or not they wanted more children, no less than 41 per cent of

the sterilized women said they wanted more! (Of those not sterilized, 57 per cent wanted more.) Of the women sterilized at the time of the first interview, all of whom were classified as wanting more children, almost two-thirds said they wanted their last child, not many fewer than the 74 per cent of non-sterilized women. Many of these women had operations they viewed as necessary evils (ie therapeutic) *despite* their desire for more children.

Restricting comparisons to women not sterilized at the time of the first survey considerably reduces but does not eliminate inconsistency of response. Although the marginals become virtually identical (just under one-half of the non-sterilized in each survey wanted more children), the large gross shifts in attitude cancel each other out. Women who first said they wanted no more children and later said they did still want more represent 11 per cent of all non-sterilized women, and 30 per cent of those who initially said they wanted no more. They were only somewhat more likely than other women to be inconsistent on the preferred number of children. (Whereas one-quarter of the other women in the sample differed by two or more children with respect to the preferred number, 35 per cent of those giving an inconsistent reply on desire for more children so differed.)

By combining the responses to these two questions an index of consistency was created. At one extreme are nearly one-third of the sample for whom there was perfect correspondence between surveys as regards both desire for more children and the preferred number. At the other extreme are four per cent who were inconsistent on desire for more children and whose family size preferences also varied by two or more children. There is no relation between this index and one based on the consistency between interviews of five *factual* items (birth date, number of live births, husband's education, use of birth control, and date of marriage).²⁸ However, consistency of response on the *attitude* questions is clearly related to education. Table 13 shows that (1) women who changed implausibly on desire for more children (from wanting no more to wanting more) average over one and a half year's less schooling than others; (2) women who revised their preferred number by at least two children usually had less education than those who revised by one or less; (3) the best educated groups (over six years) are those who changed little or not at all

on either question, or who changed plausibly on desire for more and revised their preference downward or not at all. The least educated groups (under four years) are those who changed plausibly on desire for more and increased their preferred number by two or more, as well as those who changed implausibly on desire for more and by at least two children on preferences. In short, attitude change, at least when large, less plausible or both, is associated with low levels of education. Clearly, conclusions based on cross-sectional attitude data from women of little education need to be regarded with some scepticism.

It might be thought that inconsistency stems from lack of prior consideration of family size issues on the one hand, or from conflicting pressures from husbands on the other. While, as we shall see, these characteristics are much in evidence in Costa Rica, the survey data do not lend them much support as explanations. Neither previous thought about family size nor communication with the husband was much related to consistency of attitude. If we define consistency as varying by no more than one child on preference as well as no change or a plausible only change on desire for more children, then 63 per cent of the women who had talked to their husbands about both desired number of children and birth control were consistent, compared with 49 per cent among those who had talked about neither topic. Finally, there was scarcely any difference in consistency between those who agreed with their husbands' preferred number of children and those who did not. We need to look elsewhere to understand the nature of the inconsistencies.

4.3 THE PATTERN OF ATTITUDE CHANGE

If we first examine the pattern of change in preferred family size we note a tendency to moderate the number over time. Only about one-half of those who initially chose two, three, or four children changed their preference in the second interview; but from two-thirds to three-quarters of those who had chosen only one child or a moderately high number (5-7) shifted preferences. Moreover, if they did change their preference, it was toward a more moderate number. Thus, nearly all the women (92 per cent) who had chosen only one or two children and changed their preference revised their preferences upward; while most of those who had originally chosen 5-7 children and then changed revised their preferences downwards.²⁹ Those who chose the modal numbers of three or four and subsequently changed were just as likely to revise the number upward as downward.

Not only do preferred numbers tend to be moderated in some general sense, but over time women whose preferences differ from their actual fertility tend to shift their preferences. Non-sterilized women under the age of 45 who had already exceeded their preferred number of children at the time of the first survey were more likely to revise their preferred number in the second interview (70 per cent) than were women who had not (52 per cent). Moreover, among those who did shift their opinions, most women (71 per cent) who had reached or exceeded their preferred number tended to *raise* it, whereas most of those who had not achieved it *lowered* it (also 71 per cent). In other words, over time the revisions in prefer-

Table 13 Mean years of schooling, by change between interviews on two questions of attitude towards family size, women under 45 not sterilized at time of first interview

Change in number of children preferred	Change in desire for more		
	No change	Plausible change (Yes to no)	Less plausible change (No to yes)
-2	4.5 (143)	6.2 (31)	3.8 (26)
-1	6.7 (162)	8.0 (37)	4.8 (20)
No change	6.7 (510)	6.4 (54)	5.3 (73)
1+	6.4 (154)	4.8 (6)	4.9 (33)
2+	5.0 (103)	3.8 (12)	3.9 (33)
Total	6.2	6.5	4.7

ence give the appearance of attempts to close the gap between actual and preferred numbers of children. (These tendencies are not affected by controlling for parity.)

While the revisions are usually in the appropriate direction, there is no guarantee that they will be precise in relation to actual fertility. For this reason, and because of compensatory shifts in other directions, the correlation between living children and preferences at Time₁ (.52) was not inferior to the correlation between fertility at Time₁ and preferences at Time₂ (.48); nor, for that matter, to preferences and fertility at Time₂ (.48).

Does getting pregnant affect the preference? First, it is of interest that pregnant women in the first interview had slightly larger family size preferences than did non-pregnant women for each number of living children up to five. For example, women who had three living children had a preference for 4.1 children if not pregnant but 4.9 if pregnant. The sequence of preference and pregnancy cannot be determined within the same survey, but a good number of women got pregnant between surveys. Among women who initially had less than their preferred number of children, those who subsequently got pregnant were no more likely to change their preferred number than those who did not get pregnant. But among those who had already reached or exceeded their preferred number, 82 per cent of those who got pregnant changed their preference (compared with 53 per cent in the rest of the sample), and most of these women increased the preferred number, i.e. adjusted it in a way that brought it more into line with behaviour. Table 14 shows that upward revisions were related both to pregnancy and to whether the preferred number had already been achieved at the time of the first survey. Among those who had already achieved the preferred number, almost three-quarters revised it upward if they got pregnant between interviews, thus yielding strong, though by no means conclusive, evidence of rationalization after the fact.

We now move to consider more fully the pattern of change in the second traditional question—desire for more children. It comes as no surprise that this measure is strongly related to the number of living children; but it is of interest that the relation becomes attenuated at high parities. In the initial survey, the same proportion of women wanted no more (25 per cent) whether they had five, six or seven children; and those with nine or more showed no difference in desire for more from those with seven or eight (15 per cent). As will be seen, once

age is held constant, after three or four children there is little change in the mean number of additional children wanted. A selective process could be at work, isolating at the higher parities a small core of women who are *planning* large families.

It is reassuring to find marked consistency between the preferred number and the desire for more. On the first interview, among those who had not yet achieved their preferred number, just under three-quarters had wanted their last pregnancy and wanted more children at the time of the interview. Among those who already had more living children than their preference, over two-thirds neither wanted more nor wanted their last pregnancy. In between were those who had exactly the number they had expressed as their preference: almost one-half had wanted their last pregnancy but wanted no more, and another 40 per cent wanted neither the last pregnancy nor future children.³⁰

Despite their general correspondence, the data reveal a high degree of slippage around the attitudes. Thus, among women under the age of 45 who were not sterilized in S₁, as many as 30 per cent of those who wanted no more expressed a preferred number that was in excess of their actual number. In the Sri Lanka WFS study the comparable figure was only eight per cent. In Costa Rica, among those who wanted more, only 58 per cent wanted exactly the number that would bring them up to their stated ideal. In Sri Lanka the comparable statistic was 90 per cent (Pullum 1980: 20). In most instances of discrepancy in Costa Rica, the preferences were higher than the sum of living children plus additional children desired.

The high turnover between interviews in attitudes toward having additional children was, as noted earlier, by no means random. Although the proportions (about one-quarter) who changed at all were the same whether the preferred number had been achieved or not, the *direction* of the shifting was quite different. Practically all (86 per cent) of the 'anomalous switchers' who changed from desiring no more to desiring more were women who had not yet achieved their ideal number at the time of the first interview. As seen in table 15 nearly all women (82 per cent) who in the first interview had achieved their preference but who said they wanted more children subsequently changed to not wanting more; but of those who had achieved their preference and wanted no more children only five per cent changed. In short, among women who change, most of the change is associated with prior

Table 14 Directions of revision in family size preference between interviews, by occurrence of pregnancy after first interview and discrepancy between preferred and actual number of living children in first interview, women under 45 and not sterilized at time of first interview

	Percentage who revised preference upward			
	Had less than preferred number in S ₁		Had more than or same as preferred number in S ₁	
	All women	Women who revised preference	All women	Women who revised preference
Got pregnant	22	42	72	87
Did not get pregnant	12	24	36	63

Table 15 Desire for and change in desire for more children, by preferred number of children in relation to actual number, S₁, women under age 45 not sterilized at time of first interview

	Had less than preferred number	Had more than or the same as preferred number
Percentage who wanted no more children, S ₁	24 (982)	70 (542)
Percentage who changed response on desire for more, S ₁ S ₂	26 (982)	29 (542)
Percentage of changers who switched from no to yes	45 (261)	13 (155)
Of those originally saying no, percentage who switched to yes	50 (238)	5 (379)
Of those originally saying yes, percentage who switched to no	19 (744)	82 (163)

discrepancy in attitudes. Before taking comfort from the plausibility of these findings, we will explore a wide variety of other measures of family size attitudes and then determine how they relate to the simple questions just posed.

4.4 OTHER APPROACHES TO FAMILY SIZE ATTITUDES

In an early study of fertility in a developing country context, Hill, Stycos and Back (1959: 107) noted that 'simple statements of family size preferences, while not meaningless, are deceptive in a context where attitudes may be uncrystallized or ambivalent'. A 1968 survey of rural Costa Rican women certainly indicated just such attitude uncertainty or ambivalence. For example, of those women who gave a numerical response to the family size preference question, about one-third were unable or unwilling to express a preference between a large and a small family; and about one-quarter failed to say how many more children they wanted. Less than one-half had a 'relatively clear idea of family size preferences', and about one-half reported that they had never thought about the number they wanted (Conning and DeJong 1976: 27-30).

In addition to the traditional questions on family size preferences and desire for more children, our survey (S₂) employed a variety of questions designed to tap attitudes toward family size: (1) a set of projective questions; (2) an abbreviated Coombs IN Scale; (3) a battery of items on desire for and intention to have more children; (4) value of children type items, including use of the Semantic Differential Technique; and (5) numerical definitions of the large and small family.

Projective methods

Early in the second wave questionnaire, before any other questions on contraception or family size attitudes had been asked, a series of semi-projective questions was introduced. (They followed ten background questions and an abbreviated pregnancy history.) Using techniques developed by Stycos and Back (1964) and Simmons (1971), two sets of two photographs of Costa Rican families with

different numbers of children were presented to respondents. One set of photographs contrasted families of two and three children; the other set contrasted families of three and seven. For each set the respondent was asked which family she preferred and why. She was then asked to rank all three families in order of preference. This technique was intended to lessen the tendency toward courtesy bias and avoid the loaded nature of directed questions by reducing the salience of family size in the stimulus and by eliminating it from the questions themselves. Moreover, this technique should encourage the articulation of possible subconscious preferences that could be stifled in response to structured questions.

Responses to each set of photos were scored from one to four, depending on the preference and whether or not the reason for the choice was related to the *number* of children (table 16).

If there is a subconscious bias for the large family or one that is consciously repressed out of courtesy, it does not surface in response to the projective technique. When shown families of three and seven, two-thirds of the women chose the three child family, and nearly all of these did so *because it was smaller*: ie they explained their choice as due to the size of the family. In the case of two versus three children, two-thirds chose three, but less than half of these did so for reasons of size. Finally, when women ranked all three families in order of preference, irrespective of reason,

Table 16 Photo preferences and reasons, in per cent

	Two vs three children	Three vs seven children
Prefers smaller family, gives reason of size	19	57
Prefers smaller family, gives other reasons	12	10
Prefers larger family, gives other reasons	37	10
Prefers larger family, gives reason of size	30	21
Total	98	98

few ranked the seven child family high or highest. The preference was clearly toward the three child alternative.

Coombs IN scale

This short form of a scale that reflects not only an individual's first choice but her response to deviation from it involved the following question series: 'If you could have an equal number of girl and boy children, how many children would you prefer in all: 0, 2, 4, or 6?' Depending on the response, pairs of alternatives are then presented until the respondent picks 0 or 6.³¹ Although this question was immediately preceded by the more general question, 'If you could choose exactly the number of children that you want in all your life, how many would you have?' it may have been subject to less rationalization, since the range, the sex ratio, and the number of alternatives are limited and specified. With scores ranging from one to eight, the mean and median were six, with a standard deviation of 1.6. By way of comparison, means in 1973 were 3.8 for American women (Coombs 1979: 29) and 4.7 for Taiwanese women (Coombs and Sun 1978: 46).

Desire for and intention to have more children

In addition to the traditional question concerning desire for more children, a number of other questions were asked, in roughly the indicated order:³²

- 1 Whether or not the respondent had ever thought about the number of children wanted;
- 2 Whether or not the respondent had ever discussed family size or family planning with her husband;
- 3 Whether having another child in the next two years would: (a) make the respondent feel more like a mother; (b) provide a companion to her other children; (c) make her marriage more stable; and (d) worsen her economic problems;
- 4 Wife's intention to have a child in the next two years, and her degree of certainty about the intention;
- 5 Wife's report of husband's intention to have a child in the next two years, and her report of the degree of his conviction;
- 6 How various persons would feel about the respondent having a child in the next two years: mother, mother-in-law, doctor, children and siblings;
- 7 Wife's desire and husband's reported desire for more children in the future.

There were, almost as often as not, differences of opinion between husband and wife. In almost one-fifth of the cases, one partner wanted no more children while the other wanted at least one more; and in another 20 per cent one partner wanted only one more child while the other spouse wanted more than one. Differences in intention to have a child in the next two years also show large differences, with the husband viewed by the wife as more tolerant of additional children. While nine out of ten of the fertile women who intend to have another child in the next two years said their husbands would approve their having one, 61 per cent of those who do *not* intend to have another child in the next two years also said their husbands would approve if they had one.

This discordance between spouses may be responsible in part for the lack of certainty characteristic of about

one-half of the women with regard to having or not having an additional child (table 17). It is the case that more wives feel sure about their own decision if the husband's intentions are the same (54 per cent) than if the spouses' intentions are different (45 per cent). When both partners want no more children at all or where both want more, only about 40 per cent are uncertain of their intentions; but where the spouses differ, 56 per cent are uncertain.

On the other hand, a substantial proportion of women have never thought about family size preferences, even though, it should be noted, they were to some extent compelled to do so in the previous interview. Thirty per cent said they had never thought about desired family, and 37 per cent said they had never discussed the question with their husbands.

Concerning the implications of having another child in the next two years, there was overwhelming agreement (85 per cent) with the statement that an additional child would provide a companion to the other children. About two-thirds agreed with two other statements favourable to having another child: that it would make the marriage more stable, and make the respondent feel more like a mother. However, only 38 per cent agreed that another child would worsen the family's economic situation. These data further demonstrate that there is no invariable yes-saying tendency. They show, moreover, that most people see clear advantages to an additional child, while only a minority see economic disadvantages.

Most women believe that their relatives would favour their having a child in the next two years. Husbands are perceived as most favourable (three-quarters) and least indifferent (two per cent). Mothers, mothers-in-law, and siblings are somewhat more indifferent, but from 52 to 64 per cent were expected to approve. Doctors are seen as most negative (36 per cent) and most indifferent (19 per cent).

Table 17 Desire for and intention to have more children

Couple's desire for more children in the future	Percentage
Neither spouse wants more	38
One wants no more, the other one more	14
Both want one more	6
One wants no more, the other two or more	4
One wants one more, the other two or more	21
Both want two or more	17
Total	100
Wife's intention ^a	
Do not intend to have child in next two years; very sure	34
Do not intend; less sure	27
Intend another; less sure	19
Intend another; very sure	19
Total	99

^aNot asked of sterilized or infecund cases.

These questions become more meaningful when cross-tabulated with the respondent's own intentions. Among women who are not planning to have another child in the next two years, from one-half to two-thirds say their various relatives would *approve* of their having one. Only the doctor is seen as negative: less than one-third of those not intending a child view him as favouring a birth.

Value of children

From Arnold *et al's* (1975) core questionnaire on the value of children, a number of items which had demonstrated high item-to-scale correlations in international surveys were pre-tested. Seven were chosen for inclusion in the survey. From the distributions seen in table 18, there seems to be no overwhelming tendency to agree *per se*. Of the seven items, there are four in which less than half agree. On one item, as many as 83 per cent disagree.

There is clearly a strong belief in the value of children. Eight out of every ten agree that 'a person who has no children can never be happy' and that 'it is important to have children so that a family's traditions survive'. A surprising proportion, 44 per cent, agree with the statement against family planning. One is struck, in the light of the generally advanced situation *vis-à-vis* family planning in Costa Rica, by the prevalence of traditional attitudes.

As a crude measure of whether children were viewed as social security, three other questions were asked: (1) 'Do you expect to live with one or more of your children, or have one or more of them living with you when you are old?' (69 per cent replied affirmatively); (2) 'What means of financial support do you think you might have when you and your husband are old and your husband can no longer work?' (31 per cent said 'Help from children'); and (3) 'Do you expect to rely on your children for financial support... a great deal, a little, or not at all?' (31 per cent said 'a great deal,' 42 per cent 'a little', and 24 per cent said 'not at all'). Responses to these questions, whether wishful thinking or not, show that the average Costa Rican mother expects some kind of major future assistance from her children.

Semantic differential

Evaluation of small and large families and of families with and without children was accomplished by two additional sets of questions. The first set was adapted from Kothandapani (1971), who used Semantic Differential Scales to measure attitudes toward birth control. In three sets of questions we asked respondents to choose the most appropriate of two adjectives in describing 'a small family': empty/full, selfish/selfless, and sober/joyful.

Table 18 Value of children items, in per cent

	Agree		Disagree		
	1	2	3	4	5
It is important to have children so that a family's traditions survive	21	61	1	15	3
People respect one more when you have children	24	46	3	22	5
A girl becomes a woman only after becoming a mother	14	33	2	39	13
A person who has no children can never be truly happy	39	41	1	13	6
A couple should seriously consider the inconveniences which children bring, before having them	3	12	1	58	25
It is not right that a couple go against nature by deciding to limit the number of children they are going to have	10	34	2	41	13
Before having a child, a couple should consider whether it would be an obstacle to the woman's working	11	33	2	42	12

After picking an adjective, the respondent was further probed as to intensity, eg whether it was 'very or somewhat empty'. The distributions in table 19 show that substantial numbers of women chose the favourable adjective to describe the small family: almost one-half described it as full rather than empty, one-quarter as selfless rather than selfish, and one-fifth as joyful rather than sober. However, in each instance the majority chose the more negative adjective. The fact that from one-quarter to nearly one-half chose the more extreme negative alternative—very empty, very selfish, very sober—provides a warning signal about assuming that small family norms are well entrenched.

Family size concepts

Another set of items, often used in KAP studies, was designed to tap the respondent's concepts of a large and small family: 'When you think of a small family, how many children are there in such a family? And when you think of a large family, how many children are there?' (table 20).

By and large, the upper limit of a small family is four children, and the lower limit of a large family is six; leaving a five child family as neither large or small. That as many as one-third think of four or more children as a small family and that for 40 per cent a family must have at

Table 19 Semantic differentials: adjectives to describe 'the small family', in per cent

Very empty	31	Very selfish	24	Very sober	45
Somewhat empty	23	Somewhat selfish	37	Somewhat sober	23
Neither/neutral	2	Neither/neutral	12	Neither/neutral	3
Somewhat full	26	Somewhat selfless	21	Somewhat joyful	20
Very full	18	Very selfless	6	Very joyful	0
Total	100		100		100

Table 20 Definition of a large and small family, in percent

Number in family	Small	Large
0-1	4	-
2	34	-
3	30	1
4	21	5
5	5	6
6	4	23
7-9	2	25
10+	1	40
Mean	3.1	8.9
SD	1.4	3.7

least ten to be a large family suggest that perceptions of what constitutes large and small families tend toward the traditional side of the continuum.

4.5 THREE DIMENSIONS OF FAMILY SIZE ATTITUDES

In order for the large number of measures we have discussed to be useful in the analysis of fertility related behaviour, some consolidation of items is necessary. Moreover, this should sharpen the concepts about family size attitudes which guided our choice of items for the questionnaire.

Table 21 provides a summary of the 12 measures which, based on item analysis and examination of the marginal distributions, were judged potentially useful in measuring attitudes toward family size. A factor analysis was carried out to determine whether these 12 scales could further be reduced. Six factors were found to explain 89 per cent of

the total variance and led to the delineation of the six measures identified in table 22.

The factors in table 22 may be interpreted as follows:

HUWISCLE (Factor 1): This measure combines wife and husband's desire for more children (as reported by the wife) with degree of wife's certainty about having a child in the next two years. It is composed of the sum of the Z scores of these two items, and correlates .94 with Factor 1.

FOTOPREF (Factor 2): The sum of the two Z scores of size preference based on photos of families of differing size correlates .97 with Factor 2. Since it may represent a somewhat less conscious preference for family size than those elicited by direct questions, we will consider it a latent family size preference.

ARNIMP (Factor 3): Z scores of the four Value of Children items plus the Z scores of three items measuring how an additional child would affect the family can all be viewed as reflecting the value of children. The expectation of help from children which also loads highly on this factor, further supports this interpretation. The sum of ARNOLD and CHDIMP correlates .98 with Factor 3.

SEMEXH (Factor 4): The semantic differential concerning the small family and the expectation of help from one's children largely comprises this factor. This seems like a variation of the Value of Children concept. The semantic differential asks the respondent to *evaluate* a small family; and the other items ask whether one's children can be expected to help in one's old age. The measure correlates .82 with Factor 4.

COOMBS (Factor 5): This factor reflects a preference for number of children, but since we believe the Coombs measure is less subject to rationalization than the simple preferred family size question, we will often use the Coombs scale alone as the measure of family size preference.

LRGESMLL (Factor 6): This factor may be viewed as reflecting the acceptable limits on number of children, ie a floor and ceiling. The sum of the Z scores for definition of the small and the large family correlates .84 with Factor 6.

Since correlations between factor scores and the sum of

Table 21 Summary statistics, family size attitude scales

	Range	Median	Mean	Standard deviation
CHLDWANT (preferred number of children)	0-8	3.7	4.2	1.9
LRGEFAM (def. of large family)	2-29	8.1	8.9	3.7
SMALFAM (def. of small family)	1-9	2.9	3.1	1.4
COOMBS (Coombs forced choice)	1-8	6.1	6.0	1.6
FOTOSUM (photo choices)	2-8	4.8	4.7	1.8
PREFORDR (photo ordering)	1-6	3.0	3.1	1.6
ARNOLD (value of children)	4-20	14.6	14.3	3.1
EXHELP (expect child help)	3-7	5.1	5.0	1.3
SEMANTIC (semantic differential)	3-15	7.1	7.5	3.1
HUWIMORE (couple desire for more children)	1-6	2.3	3.1	2.0
CHLDSCLE (intention to have more children)	1-4	2.1	2.2	1.1
CHDIMP (implications of another child)	3-15	11.7	11.0	2.6

Table 22 Rotated factor analysis of family size attitudes

Factor	Percentage of variance	Two highest loadings	Next highest loading	Concept	New measure
1	28	HUWIMORE .89 CHLDSCLE .87	CHDIMP .41	Desire for more children	HUWISCLE
2	18	FOTOSUM .88 PREFORDR .90	COOMBS .25	Latent family size preference	FOTOPREF
3	13	ARNOLD .89 CHDIMP .60	EXHELP .33	Value of children ₁	ARNIMP
4	8	SEMANTIC .74 EXHELP .69	CHDIMP .28	Value of children ₂	SEMEXH
5	11	COOMBS .77 CHLDWANT .80	LRGEFAM .53	Family size preference	COOMBS
6	10	LRGEFAM .53 SMALFAM .87	EXHELP .32	Size tolerance	LEGESMLL

the two scores predominating in the factor proved to be near the maximum, we will use the sum of scores as our measure of the factor. From the pattern of inter-correlations seen in table 23, the six factors fall into two categories: the HUWISCLE and others. The HUWISCLE, measuring the couple's desire/intention for additional children, does not correlate with any of the other five; and the other five have generally low positive inter-correlations. However, the items that depended on number (COOMBS, FOTOPREF and LRGESMLL) tend to inter-correlate more highly (.16 to .36) among themselves, as do the two factors reflecting value of children (.35). We have also added the conventional question on preferred number of children (CHLDWANT), to show the extent to which it is correlated with the more complex measures. It is closely related to COOMBS (.59) but only moderately to the others.

By and large, we will follow conceptually what seems to be the empirical pattern, by suggesting three dimensions of increasing specificity regarding the will or 'demand' to have or not have more children. The first and most general dimension might be termed a *general predisposition* with respect to children and their psychic and economic costs and benefits. A second dimension refers to the *numerical preference* for children. The third dimension refers to the *actual desire* to have or not to have additional children and the even more concrete *intention* of having one within a specified period of time. The concept of what constitutes

a large and small family might be still another dimension, but we will tentatively group it with the predispositions despite its numerical character. The predispositions incline one toward a large or small family, but favouring a large family may be as far removed from a specific numerical preference as the numerical preference is from the actual desire to have or not to have a child at a given time.

Predispositions and even numerical preferences may be formulated before marriage and remain relatively stable throughout a marriage, but the specific desire or intention of whether to have a child is a highly dynamic variable, probably much more responsive to changes in the life cycle reflected by age, numbers of children, the immediate circumstances of the family economy and the woman's health. The question is, do the predispositions affect the immediate intention (and thus fertility) at all, or are they merely 'wishful thinking', that is, totally dominated by the economic and social demands of the moment? In the following section we will examine how the various dimensions of family size attitude are related to each other, how they affect fertility, and how they in turn are determined.

That we are dealing with different dimensions can be seen most clearly from table 24, which shows that education is strongly and negatively related to the predisposition variables, moderately to the numerical preferences, and not at all to desires for more children. Age shows exactly the reverse pattern. This suggests that while the basic predis-

Table 23 Intercorrelations of family size preference scales

	COOMBS	LRGESMLL	HUWISCLE	ARNIMP	SEMEXH	FOTOPREF
CHLDWANT	.59	.33	.00	.22	.31	.36
COOMBS		.27	.03	.16	.25	.36
LRGESMLL			.03	.15	.22	.16
HUWISCLE				.13	.02	.01
ARNIMP					.24	.09
SEMEXH						.18

Table 24 Zero order correlations between age, education, and family size preferences

		Age	Education
<i>Predisposition</i>			
ARNIMP:	Value of children, implications of another child	.02	-.43
SEMEXH:	Semantic differential small family; expectation of help from children	.10	-.41
LRGL MLL:	Definition of large and small family	.16	-.31
<i>Numerical preferences</i>			
CHLDWANT:	Preferred number of children	.29	-.24
COOMBS:	Forced choice preferences: 0, 2, 4, 6	.25	-.22
FOTOPREF:	Forced choice, photographs of families	.22	-.11
<i>Desire/intention</i>			
NUMBMORE:	Number of additional children desired	-.31	.00
HUWISCLE:	Number of additional children desired by husband and wife, plus assurance about immediate intention	-.43	.01

positions are much influenced by one's early education and change little over time, the desire for additional children changes markedly as one ages (and, of course, has children). Numerical preferences fall in between, moderately affected by both age and education.

4.6 EVALUATION OF THE TRADITIONAL MEASURES

We can now better evaluate the utility of the traditional attitude questions which have received so much criticism: preferred family size and desire for more children. We are reassured by the fact that there are positive correlations of moderate magnitude between the simple preferred number questions and the scales based on much more complex approaches. Thus, the number of children preferred by the respondent (CHLDWANT) correlates over .30 with four of the five more complex measures of attitudes toward having children. More importantly, CHLDWANT predicts the other attitude measures as well as or slightly better than COOMBS. The traditional desire for more children measure is less easily evaluated and has been incorporated into the theoretically more reliable HUWISCLE, with which it correlates highly (.71). We will normally use the scale as our measure of desire for more children, but occasionally introduce the other measure because of its conceptual simplicity.

4.7 ATTITUDES AND BEHAVIOUR

The ultimate test for attitudes is the extent to which they predict behaviour. As noted earlier, longitudinal data from Taiwan do support the hypothesis (Hermalin *et al* 1979; Coombs, Coombs and McClelland 1975) but Taiwan could easily be an exceptional case. From our own longitudinal data we see from table 25 that at all parities, those who wanted no more children at the time of the first interview were less likely to have had an additional pregnancy by the time of the second interview about one and a half years later.

The number preferred (in relation to the number one

has) was not predictive of pregnancy. At parities under four (ie at parities 0-1, 2, and 3) those whose preference already equalled or exceeded their actual number were somewhat less likely to get pregnant in the next year and a half, but at higher parities the difference disappeared. A cross-tabulation of desire for more children and the discrepancy between preferred and actual number demonstrated that the former still strongly predicted a subsequent pregnancy holding the preference discrepancy constant; but the preference variable itself was not predictive.

Although most Costa Rican women have practised contraception, it is still the case that women who did not want more children at S₁ were more likely ever to have used birth control, including sterilization, than those who wanted more (92 per cent compared to 84 per cent). A more sensitive measure, and one that involves behaviour subsequent to the attitude measurement, is the proportion of women using contraception at the time of the first interview who were also using it at the time of the second. For users who wanted more children in the first interview, 64 per cent were using contraception in the second, compared with 81 per cent of the users who had wanted no more.

The critical nature of the desire for more children as

Table 25 Percentage who got pregnant between interviews, by desire for more children and number of living children at the time of first interview, women less than 45 and not sterilized at S₁

Living children ^a	Wanted more		Wanted no more	
	%	N	%	N
0-1	36	(281)	19	(16)
2	27	(216)	17	(93)
3	33	(106)	15	(97)
4	19	(47)	15	(73)
5	18	(33)	15	(66)
6+	29	(57)	23	(171)

^aLiving children plus one, if pregnant.

Table 26 Percentage using birth control at S_2 , among those using at S_1 , by desire for more children and discrepancy between actual and preferred number of living children, women under 45 not sterilized at S_1

	Want more		Want no more	
	%	N	%	N
Have more than preferred number	58	(26)	79	(261)
Have same as preferred	59	(29)	79	(300)
Have less than preferred	64	(667)	84	(286)

compared with the family size preference measure can again be seen. Both in terms of current use (not shown) and continuation (table 26), it is the former variable that makes the difference. As the table shows desire or otherwise for more children, more than preferred family size, predicts contraceptive use, contraceptive continuation, and fertility, as measured by attitudes which preceded the behavioural measures in time. Since we have found an attitude that counts, what can we learn about its determinants?

4.8 THE RELATION OF PREDISPOSITION AND NUMERICAL PREFERENCES TO THE DESIRE FOR MORE CHILDREN

Age and parity

In order to understand how predispositions affect the desire for more children, we need to take into consideration two critical demographic variables — age and parity³³ — both of which are negatively related to the desire for more children. Table 27, panel A, shows mean values for NUMBMORE, the number of additional children desired by the respondent; and table 27, panel B, shows mean values for HUWISCLE.

Table 27 Desire/intention for more children, by age and number of living children, fertile women only

No. of living children	Age		
	20-29	30-39	40-44

A Mean number of additional children desired (NUMBMORE)

0-1	1.6	1.4	0.8
2	1.3	0.9	0.7
3	1.0	0.7	0.2
4	1.1	0.6	0.3
5+	0.9	0.7	0.4

B Mean HUWISCLE ($\times 100$)

0-1	155	139	59
2	60	34	32
3	22	-19	-115
4	31	-39	-109
5+	26	-39	-102

the composite of a couple's desire for more children and the strength of their intention to have another in the next two years. It is of interest that age has an effect independent of numbers of living children. With each parity women aged 20-29 want two to five times as many children as those over 40, and after three or four children, increasing parity is not important.

Age is also critical for *change* in desired family size. We have already seen (table 15) that the preferred number in relation to actual number of children is strongly related to the desire for more children. Table 28 now shows us how age affects the relation. Young women (under 30) who had already achieved their preferred number were the most volatile in attitudes. They split 50-50 on desire for more children, and registered the highest proportions of attitude changers (53 per cent) among the six groups. When they changed, they virtually all changed to wanting no more children. However, most of the young women had not achieved their preferred number and wanted more children. Virtually none of this group changed their minds. The older women are a kind of mirror image of the young. Most of them had achieved their preferred number; but whether or not they had, more of them want no more children than do the younger women. Among the minority who had less than their preferred number, attitude shift is greatest among the oldest (42 per cent), just as it was among the young minority who had achieved its preferred number (53 per cent). However, unlike the young, most of whom shifted positively if they had less than their preferred number, most of the older women shifted negatively.

Table 28 Desire for and change in desire for more children, by age and preferred number of children in relation to actual number, S_1 , women under 45 not sterilized at time of first interview

	Age		
	20-29	30-39	40-44

A Percentage who wanted no more children at S_1

Had less than preferred number	16 (511)	29 (353)	48 (118)
Had more than or same as preferred number	48 (108)	71 (302)	84 (132)

B Percentage who changed response on desire for more, S_1S_2

Had less than preferred number	11	34	42
Had more than or the same as preferred number	53	25	17

C Percentage of changers who changed to wanting more

Had less than preferred number	60	39	33
Had more than or the same as preferred number	10	20	13

Social and psychological variables

Having seen the impact of parity and age, we now turn to other variables. Of special interest are the family size attitude variables. The questions here concern whether general predispositions about family size — predispositions that we have argued can be relatively constant over the life cycle — affect the specific desires for more children. If they appear to do so, are they merely proxies for other socio-economic characteristics, such as rural residence, education and modernity, or do they, as psychological variables, have independent relationships with the desire for children?

At the crudest level we can use NUMBMORE (the number of additional children desired, from 0 to n) as the dependent variable and preferred number as the independent variable, controlling a number of other potentially related variables: number of living children, marital duration, age at first union, household durables, region, education, years worked before marriage, modernity, age at learning about birth control, and current birth control knowledge. A multiple regression analysis performed separately for non-sterilized women 20–29 and those 30–44 produced similar results for both age categories: of the 12 variables only number of living children and preferred number (plus marital duration for the older women) reached significance. However, it can be argued that the correlation between numerical preference and number of additional children merely reflects a woman's logical consistency. Although we demonstrated earlier in this chapter that the two measures are hardly identical — much less so than in other countries for which such data were available — we can reduce the probability of 'synonymosity' by using COOMBS and other family size predisposition measures as independent variables, and the HUWISCLE, which includes both husband's desire for more children and wife's degree of certainty about her intentions, as the dependent variable. From a series of multiple regression analyses two conclusions may be drawn:

- 1 Predispositions as measured by latent family size preference (FOTOPREF) and size tolerance (LRGESMLL) added to the explained variance in number more desired, even after controlling for the numerical family size preference (and the other socio-demographic variables). The betas are significant at the .001 level and these two variables add three percentage points to the explained variance.
- 2 A regression using HUWISCLE as the dependent variable, with COOMBS and other size predispositions as independent variables was carried out for specific orders of living children: 0–1, 2, 3, 4 and 5+. In addition to age, which is critical at every parity, COOMBS has strong and significant independent relations with the HUWISCLE for parities 1, 2, and 3; and smaller, marginally significant relations for parities 4 and 5+. Usually powerful variables such as modernity and education show no significant relations at any parity, but other family size predispositions do. These predispositions (LRGESMLL, FOTOPREF and ARNIMP) are even farther removed from a simple numerical preference than COOMBS; but following the first parity (where they have no influence), together they add from three to nine per cent to the variance explained by age and COOMBS. On the whole then,

what counts is how many children a woman has, how old she is, and her general preferences about family size.

4.9 CONCLUSIONS

We began by noting that Costa Rican women, compared with women in other LDCs, seem unusually in favour of large families, especially in the light of their extraordinary rates of contraceptive knowledge and prevalence. Are such attitudes real? Do they have any significance for behaviour? The degree of attitude shift on traditional questions such as preferred number of children and desire for more children in the one and a half years between interviews also seemed extraordinary, but on analysis did not appear to stem from random response patterns. First, it was unrelated to general unreliability of response on factual items. Secondly, it was found to be unrelated to initial responses which were 'out of line', eg from respondents whose attitudes and behaviour were relatively far apart or who expressed relatively inconsistent attitudes in the first interview. Evidence of rationalization was found, but attitude change was strongly influenced by age and whether the desired family size had been achieved or exceeded. Women with greater attitude inconsistency also tended to be less educated, suggesting that special care needs to be exercised in interpreting attitudes expressed by women of little schooling.

Viewed in isolation, the degree of attitude change in Costa Rica seems unusual; but viewed in a comparative context, Costa Rica is hardly unique. In the Latin American region generally there is certainly nothing unusual about vagueness, ambivalence or inconsistency with respect to fertility attitudes. Early studies in Puerto Rico and Jamaica treated this problem extensively (Hill, Stycos and Back 1959; Stycos and Back 1964; Back and Stycos 1960). Subsequently, in seven metropolitan cities studied in the early 1960s, from 28 to 55 per cent of the women said they had never thought about the number of children they wanted, and Costa Rica was in the middle of the range. In the rural surveys conducted in four Latin American countries in the late 1960s the proportions who had not thought about preferred family size ranged from one-half to two-thirds; from 31 to 44 per cent failed to give a numerical response to the questions of preferred size or additional numbers wanted; and between one-fifth and one-third were unable or unwilling to choose between a 'large' and a 'small' family (Conning and deJong 1976). Based on the same round of rural surveys, Simmons concluded that 'levels of ambivalence in rural Latin America may be high relative to Asian nations'; cautioned that the 'use of any indicator by itself provides only a partial and perhaps erroneous view of the total attitude complex'; and recommended the development of measures for assessing 'the multiple dimensions of the attitudes themselves' (1974: 140–42).

With reference to the most commonly used attitude question in KAP studies — the preferred number of children — just under one-half of the Costa Rican women cited the same number in both surveys, and the correlation between the two responses was only .54. But in WFS sponsored post-enumeration surveys in Indonesia and Fiji, where the interval between surveys was only a few months, the proportions who gave different responses were about the same as in Costa Rica, and in Peru the percentages were even

higher. In Taiwan, where the interval between interviews was only one month, the correlation was only .54 (Coombs 1977: 22).

A more demanding measure of reliability is the reliability ratio, which compares the degree of coincidence between responses with what would be expected by chance (Ryder and Westoff 1971). The ratio appears extremely low in Costa Rica (33) until we compare it with those of countries with shorter intervals between interviews. In Indonesia, where the interval was only four months, the ratio was only .45³⁴; and in Taiwan, where the interval was only one month, the ratio was .48 (Coombs 1977: 223). In a country with a longer interval - Thailand (three years) - the ratio was only .27 in urban and .19 in rural areas (Knodel and Piampiti 1977: 59--60).

With respect to the desire for more children, only 73 per cent of all women and 76 per cent of the non-sterilized women gave the same response (yes or no) in both interviews.³⁵ In an Indian re-survey only a few months after the initial interview only 68 per cent gave the same response (Mukherjee 1975: 139). (If we categorize a shift from wanting to not wanting more children as a consistent change, then 87 per cent of the non-sterilized women were consistent, with a reliability ratio of .72.) In Srikantan's (1979) post-enumeration study in Fiji, desire for more children ranked 77th in a list of 86 items scored for reliability; and on a wide variety of statistical measures consistently showed low reliability.

In order to determine whether other more complex question techniques elicited attitudes different from those of the traditional type, several other approaches were examined. These disclosed very high values (favourable to large families) on the Coombs IN scale; very broad definitions of what constituted large and small families; consider-

able approval of large families from both Value of Children and Semantic Differential type measures; high approval of fertility on the part of 'significant others'; substantial proportions who had never thought or talked about how many children they wanted and notable lack of self-assurance about fertility intentions. On the other hand, projective techniques showed a clear preference for the three child versus the seven child family. Further, based on the pattern of response to a series of agree-disagree items, no clear bias in the direction of agreeing or 'yes-saying' was apparent. Given the moderate to large positive correlations between the less and the more traditional questions, we conclude that Costa Rican women in fact favour moderately large families, with a good deal of variation in what is meant by 'favour' and considerable tolerance for what constitutes 'moderately large'. One gets the impression that these women did not hesitate to say what they thought; but may not have thought much about what they said.

As to the question whether attitudes make a difference, we join the small group of longitudinal studies demonstrating that desire for more children (if not the preferred number) indeed affects subsequent contraceptive behaviour and fertility.

Finally, since the attitudes seem not only real but to make a difference, we investigated their determinants. Among the more common concomitants of desire for more children (measured in both simple and complex ways) were age and parity, with more emphasis on the former than the latter. Other demographic and social characteristics were of little consequence when these were held constant, but other *attitudes* - especially preferred family size, whether measured directly or by the COOMBS scale - have an important bearing on the desire for children at any particular point in the fertility history.

5 Concluding Case for the KAP

Putting back the K and A in KAP has not proved easy. From reviews of the literature, we have seen that there are substantial problems associated with the reliability of the measures typically employed, serious questions about the causal sequences involved, and unresolved doubts about the meaningfulness of knowledge and attitudes for contraceptive practice and fertility. Nevertheless, we arrive at this point with some optimism, since the general reliability of our respondents has been seen to be high, attitude reliability moderate and interpretable, and the initial indications concerning the relevance of K and A for behaviour promising. Can we now put the pieces together to explain fertility?

As noted in chapter 1, our study was in part motivated by the hypothesis that psychological modernity was a major variable explaining the relation between fertility and broad socio-economic influences such as education or social class. We further assumed that contraceptive knowledge and attitudes favourable to small families are influenced by modernity, and in turn more directly affect contraceptive behaviour and fertility. Our analysis thus far has already demonstrated modernity's strong role in contraceptive knowledge, accounting for a good deal of the relationship between knowledge and education. An earlier analysis of the same survey demonstrated strong relationships between modernity and the family size predisposition variables.³⁶ (-.18 to -.26) were not only highly significant but substantially higher than the partials between education and the predispositions, holding age and modernity constant. This was true for five age/parity groups (Stycos 1980).

The final pieces of the causal chain are behavioural: contraceptive use and fertility. We have already seen that knowledge acquisition precedes and is strongly related to the timing of contraceptive use (those who learned younger tended to start using at younger ages); that family size predispositions affect desire for more children; and that desire for more children affects subsequent pregnancy, contraceptive use and contraceptive continuation, as measured by change between surveys. If we now seek to estimate the impact of the social-psychological variables on cumulative fertility, we can include all the strategic variables other than desire for more children, which is only relevant for future fertility.

Beginning with our variable of special interest, education, we find the usual negative correlation between years of schooling and number of live births ($r = -.40$), but various other socio-economic variables are related both to fertility and to live births. Dividing the women into sterilized and non-sterilized groups and the latter into younger (under 35) and older groups, a multiple regression analysis for each age group was carried out using 12 socio-economic variables potentially useful in explaining fertility: duration of mar-

riage, education, parents' education, husband's education, number of siblings, urban-rural residence, residence prior to age 12, region of residence, current employment status, employment before marriage, frequency of attendance at religious services and an index of household possessions. Although more than 40 per cent of the variance in fertility for each group was explained by these items, most of it was due to duration of marriage. Education dropped out entirely as an independent variable, and of the other variables only the income proxy - the index of household possessions - maintained a statistically significant (negative) relation to fertility in at least two of the three groups. (In addition, current employment among the younger, and urban residence among the older, were marginally significant.)

The income proxy presents conceptual problems since it may be an effect rather than a cause of fertility. Nevertheless, since we wished to control the socio-economic variables, we included household possessions rather than education for the next regression. Household possessions is a proxy for education and may also reflect something else - social class/income - which makes it a more powerful independent predictor of fertility than education. To the two strongest demographic and social variables (marital duration and household possessions (and age) which captures age at first union), we then added the items of special concern: modernity, age at learning about contraception, and the COOMBS measure of family size preferences. The results are shown in table 29.

Even with the most critical demographic and socio-economic variables held constant, the knowledge and attitude items are both highly significant in all three groups. Values for modernity are in the expected direction, but the income proxy largely vitiates its independent influence. The regression was repeated substituting the simple family

Table 29 Multiple regression: live births^a regressed on demographic, socio-economic and psychological variables, by age and sterilization status

	Non-sterilized		Sterilized
	Younger	Older	
Age at first union	.06	.10**	-.17***
Duration of marriage	.54***	.37***	.37***
Household possessions	.14***	.28***	.04
COOMBS	.13***	.11***	.15**
Modernity	.08**	.07	.03
Age learned birth control	.12***	.20***	.27***
Adjusted R ²	.46	.47	.51
Number	(827)	(689)	(252)

**Significant at .01 level.

***Significant at .001 level.

^aNumber of live births plus current pregnancy, S_t.

size preference item for the COOMBS measure. The substitution resulted in about five percentage points being added to explained variance in each group, along with substantial increases in betas for size preference; but it resulted in no basic changes in other variables. Since this item is more subject to rationalization than COOMBS, however, the more appropriate and conservative estimate of the influence of family size preference is the one shown in table 29. We also added the projective measure of family size preference, FOTOPREF, with no substantial effect on COOMBS, and with betas for FOTOPREF that were significant at the .05 level among the young, though just below significance for other women.³⁷

We conclude that both the timing of contraceptive knowledge and general goals and values relating to family size help to account for cumulative fertility, independently of the most critical socio-demographic controls. Family size preferences are also useful in explaining desire for more children at any point in the fertility history; and the desire

for more children clearly affects contraceptive practice.

Despite their low reliability compared to factual items, the attitude and knowledge questions have proved useful; and, as best we can tell from our battery of less conventional measures, relatively valid. Given the high levels of desired family size in Costa Rica, attitudes would seem to be the next logical target, should national authorities wish to reactivate the fertility decline.

The role of psychological modernity seems important in accounting for the impact of education on knowledge and attitudes; though the evidence for an independent impact of modernity on fertility is not strong. Future research priorities should include how formal and informal education can further emphasize those aspects leading to heightened modernity. Our research suggests that three areas should be investigated more closely: mass media exposure, the acquisition of information about the world beyond one's community, and the liberalization of norms concerning sex roles.

Notes

1 Introduction

¹ The Statistical Office had selected a stratified area sample of 4563 dwelling units representative of all but three per cent of the population living in twenty-five remote and sparsely populated districts (Dirección General de Estadística y Censos, 1978). From these households, 4021 women between the ages of 20 and 40 had been interviewed, of whom 2626 were currently married or living in consensual unions. The maps and dwelling unit lists necessary for locating these women were made available, as well as were the respondent's age and education, to help in correct identification. If there were discrepancies (eg more than two years difference in age), the supervisor visited the woman and decided whether or not she should be interviewed.

The percentage of completed interviews ranged from 72 per cent in the rural areas outside the Central Valley to 86 per cent in the non-metropolitan urban area of the Central Valley. The metropolitan area of San José also had a relatively low re-interview rate - 75 per cent - and the other two strata, rural Central Valley and other urban, had rates of 81 per cent.

The present analysis is limited to those women who were interviewed on both occasions.

2 Response Reliability

² The proportion who appeared to respond at random (the coefficient of inconsistency) averaged .19 for background and contraceptive practice variables, .56 for contraceptive knowledge and .72 for attitude items (Mukherjee 1975: 140).

³ Since the Costa Rican study compares actual dates rather than single years, the comparison is only approximate.

⁴ Of 11 countries for which WFS knowledge data have been compared, only Peru and Bangladesh approach Costa Rica's low ratio (5 per cent) of spontaneous to total mentions of sterilization. In four countries the ratio exceeds 20 per cent (Vaessen 1980: 16).

⁵ (a) A 'no response' for an item in either interview was coded as inconsistent. (b) Number of live births was coded as inconsistent only if the number in the second interview was less than the number in the first, or if it exceeded the first by three or more. (c) Those 43 cases (2 per cent) which were inconsistent on all five items were next examined case by case. Thirty of them were found to have zeros coded on virtually all items in the original WFS interview: ie they were coded as blank interviews. There seems no good reason for their inclusion and they were therefore eliminated from the analysis, leaving only 13 cases inconsistent on all five items. These 13 cases were first compared on a number of characteristics with those having one or two consistent responses to ascertain if they seemed 'anomalous' or highly distinct. Since they were not, they have been grouped with those having only one consistent item, making a total of 57 cases in the least reliable category.

⁶ For discussion of field methods for obtaining privacy in interview see Back and Stycos 1960. Of eight Latin American World Fertility Surveys, Costa Rica ranks fourth in proportion of interviews which were private. While typical for Latin America, this figure is much higher than is found in the average Asian fertility survey. (Scott and Singh 1980: 32.)

⁷ The 13 most unreliable interviews (those with no consistencies) were the shortest, averaging only 23 minutes in S_1 .

⁸ There was some relation between (different) interviewers' appraisals of co-operativeness of the (same) respondents on the two surveys. Thirty-nine per cent of those rated as average or below on S_1 were rated as 'very good' on S_2 , as opposed to 46 per cent and 55 per cent of those rated in S_1 as 'good' or 'very good' respectively.

⁹ A similar analysis carried out in Peru also found interviewers'

appraisals to be correlated with response consistency. Moreover, for five educational categories, 'the same pattern emerged, although reliability differentiated better than cooperation' (O'Muireheartaigh and Marekwardt 1980: 350).

3 The Importance of Assessing Contraceptive Knowledge

¹⁰ A search of six years of *Population Index* 1976-81 turned up only 34 titles and descriptions which could be construed as dealing with knowledge, and in most cases the topic was peripheral to the central concern of the paper. As a further check, the Index to three years, 1976-78, of *Studies in Family Planning* was consulted (Cumulative Index, 1978). In a subject index of 20 pages, despite 22 sub-headings under KAP, Attitude-Behavior Studies, Desired Family Size, and Ideal Family Size, there was only one item and one reference concentrating on knowledge. All sub-headings for nations with more than 25 sub-headings were further scanned. Of 229 sub-headings for Taiwan, India, Korea, Nigeria, Philippines and Colombia, only two concerned knowledge. Nor were these unusual years: less systematic perusal of the journal's earlier indices revealed no specific references to knowledge, despite headings for attitudes, KAP surveys, etc.

¹¹ Since 1970 there has been some decline in preferred number of children, especially as measured by the Coombs number preference scale (Chang, Freedman and Sun 1981).

¹² The occasional use of more stringent measures of knowledge, eg whether or not the respondent says she knows how to use a method, would appear to produce higher correlations with dependent variables than mere recall or recognition of methods (see Chung *et al* 1972: 174-77).

¹³ WFS analysts are aware that the recognition approach may produce an overestimate of knowledge but state that 'the extent of this possible overestimate cannot be assessed' (Vaessen 1980: 12).

¹⁴ The Korean study shows that of the variance in use of contraception which can be explained by a large number of attitude and value measures (27 per cent), virtually all (25 per cent) is accounted for by one variable alone: knowing 'how to use' at least one contraceptive (Chung *et al* 1972: 262). This is very impressive until one realizes that using a contraceptive usually improves one's knowledge of how to use it. That the latter interpretation is correct seems evident from a table showing that of those women who named a contraceptive but did not know how to use it only four per cent had ever used a contraceptive, but of those who named a method and did know how to use it, 79 per cent had actually used a method (*ibid* 177).

¹⁵ Both knowledge and use of the condom are exceptional in Costa Rica. Among seven Latin American and eight Asian countries participating in World Fertility Surveys, only Korea comes close to Costa Rica's proportion of ever-users of the condom: 22 per cent, compared with 36 per cent in Costa Rica (Anonymous 1979: 87). For a discussion of possible causes for Costa Rican superiority in contraceptive knowledge, with particular reference to the condom, see Stycos 1978: 419-24. Although the general superiority of educational levels in Costa Rica is certainly a factor (high literacy levels have been typical for several generations and one-third of our sample have gone beyond primary school), contraceptive knowledge in Costa Rica has been superior to that in most other countries, even among the less educated classes in the population (Department of Social and Economic Affairs 1979: 65). For an historical analysis of the impact of education on fertility levels in Costa Rica see Stycos 1982.

¹⁶ With a maximum score of 33 (11 methods mentioned spontaneously), the weighted index has a mean of 22.3 and a median of 22.8 for women aged 30 and over. The distribution is fairly symmetrical.

Fifteen per cent scored 18 or lower, 30 per cent 19–22, 37 per cent 23–25, and 17 per cent 26 or more.

¹⁷ Knowledge was assessed in the first interview, modernity in the second. The measure of modernity was derived from a factor analysis of a large number of items clustering in four groups:

- 1 **MASSINFO.** The sum of three information questions concerning the identity of the North American President, a popular Costa Rican ex-Minister of Sports, and a Costa Rican southern city; and two communications items (extent of newspaper readership and television watching).
- 2 **SEXROLES.** The sum of six items from Rosen and Stinson's Female Role Attitude Scale (1971), four items from Goldberg's Sex Segregation Scale (1974), and three items concerning sexuality norms.
- 3 **HUSBPOWR.** The sum of nine items concerning who usually decides or resolves various domestic problems—the husband, the wife, or both. 'Both' received the highest score, ie most modern score; 'husband' the lowest score.
- 4 **INKELES.** The sum of 14 items stressing 'instrumental activism' drawn from Inkeles and Smith's (1974) OM Scale.

In this paper we use the sum of the standardized or z scores of these four component measures as our measure of modernity.

¹⁸ A multiple classification analysis controlling age at marriage, years married and education still leaves the largest group of women—those who learned after marriage and after age 24—with one child more than the grand mean. Those who learned after marriage but before age 20 have had 1.2 children less than the average.

¹⁹ Among younger women the differences are both larger and more systematic. For example, only 37 per cent started contraception use before a second child if they learned late, compared with 77 per cent of those who learned both before marriage and before age 20 (not shown).

²⁰ There are only 42 such women among the younger, but 224 among the older age group. Among younger women, the mean age of learning among women who started after three or four births (123 women) was 22.1 or three years later than those who started before having a child.

²¹ Other significant values were for consumer durables, age at first live birth, and desire for more children.

²² For example, the correlation between age at marriage and education is .20.

²³ Few older women completed high school, so that the apparent rise in age of learning among this group should not be taken too seriously.

²⁴ The correlation between these two measures is .51.

4 Are Attitudes Meaningful?

²⁵ The only Latin American countries with lower proportions wanting no more children are Paraguay, Haiti, Jamaica and Trinidad.

²⁶ Question wording was slightly different in the two surveys, but both emphasized the long-range intent of the question. The S_1 form was 'Do you ever want another child?' and the S_2 wording was 'Do you want to have a child in the future?'

²⁷ Among those women who wanted more children at the time of the first interview and did not get pregnant by the time of the second, there was a slight drift toward wanting no more—14 per cent shifted. But if a pregnancy occurred after the first interview, just under one-third shifted to wanting no more in the second interview. Such a shift does suggest the meaningfulness of the question on desire for more children.

²⁸ Those consistent on both preferred size and desire for more children had a mean reliability score on the five factual items of 3.8; those consistent on neither scored 3.6. The absence of relation was characteristic both of fertile and non-fertile women. For the very small group of women (53) who were inconsistent on all five factual items, the correlation between interviews on preferred family size was only .22; but there was little variation among the other reliability categories from an overall correlation of .54.

²⁹ The numerical preference in relation to the achieved number is much more critical than actual family size itself in determining the

desire for more children. If the preferred number had been achieved then parity made no difference in proportions desiring more children. Among women under 45 who were not sterilized, if the preferred number had not yet been reached, the proportions wanting more declined from 95 per cent of those with one child to 57 per cent of those with five or more. (Even the latter figure is almost five times the proportion found among high parity women who had reached or exceeded their preferred number.)

³⁰ Responses were scored from 1 to 8, for those who initially answered that their first preference was either 0 or 6, respectively. If the respondent initially answered that her first preference was two but would prefer none to four children if she had to choose, her score was 2; had she picked four in response to this forced choice she would again be asked to choose between 0 and 6: if 0 were chosen she was scored 3, if 6 she was scored 4, etc.

³¹ The sequence of questions was more specifically as follows: the projected questions using photographs of Costa Rican families were, as discussed previously, introduced early in the questionnaire in order to avoid biasing the open-ended responses. About one-third of the way through the questionnaire, and following a series of non-family (modernization) related knowledge and attitudes, respondents were asked whether they had ever thought about desired family size and whether they had ever discussed their preference with their husbands. These items were followed by the traditional family size preference items and the set of Coombs questions, after which Value of Children and semantic differential items on small families were introduced. After another 21 short questions on sex roles, respondents were asked whether and how having another child in the next two years would affect their lives (Questions 7a–c). These items were followed by the following questions: 'Do you intend to have a/another child in the next two years? Are you very sure, more or less sure or not very sure about this decision? What do you think your husband would think about having a child in the next two years? Would he be strongly in favour, in favour, against, or strongly against it?' Questions on the attitudes of other reference persons toward her having a child in the next two years followed. Finally the respondent was asked: 'Do you want to have another child in the future? (If yes) How many more? And your husband, does he want more or not? (If more) How many?'

³² Number of living children is used rather than number of live births on the assumption that the former weighs more than the latter in decision making about future childbearing. Whether this assumption is sound in all countries is not known, but in Costa Rica the difference between the two measures is small: a mean of 3.8 living and 4.2 live births for all women, 6.2 and 7.2 for women over 45.

³³ Using the same independent variables as mentioned above, less variance can be explained for IUWISCLE (29 per cent for those with less than four children, 16 per cent for those with more, and 23 per cent for all fertile women under 45 years of age), but the pattern of betas is similar.

³⁴ Computed from data in MacDonald *et al* 1978: 68.

³⁵ While the overall shifting of attitudes in Costa Rica does not appear unusual, the *direction* of shifting on desire for more children may be. Unlike the 11 per cent in our study who changed from not wanting to wanting more, less than three per cent changed in Taiwan, though the time interval was much less (Hermalin *et al* 1979: 81).

5 Concluding Case for the KAP

³⁶ These refer to SEMEXH, ARNIMP and ERGSMIL. Correlations with the numerical indices COOMBS and FOTOPREF were lower (.19 and .12); but the partials relating them with modernity were still highly significant, while those relating to education were not, controlling for modernity.

³⁷ We also added an index of time of initiating birth control use. It added several percentage points to the variance explained by all the previous variables and had betas inferior only to marital duration. Its introduction to the regression most markedly reduced the influence of household possessions. However, since it was partially calibrated in terms of live births (after which birth control was initiated) its relation to fertility ($r = .50$) is somewhat redundant.

References

- Anonymous (1979). The World Fertility Survey: Current Status and Findings. *Population Reports*, Series M. Washington, DC: George Washington University.
- Arnold, Fred *et al* (1975). *The Value of Children: a Cross-National Study*, vol 1. Honolulu: University of Hawaii Press.
- Back, Kurt W. and J. Mayone Stycos (1960). The Survey under Unusual Conditions: the Jamaican Human Fertility Investigation. *Human Organization Monographs* 1. Ithaca, NY.
- Baldwin, Wendy H. and Thomas R. Ford (1976). Modernism and Contraceptive Use in Colombia. *Studies in Family Planning* 7 (3).
- Blake, Judith. (1974). Can We Believe Recent Data on Birth Expectations in the United States? *Demography* 11.
- Brackett, James W., R. T. Pavenholt and John C. Chao (1978). The Role of Family Planning in Recent Fertility Declines in Developing Countries. *Studies in Family Planning* 9 (12).
- CELADE and CFSC (1972). *Fertility and Family Planning in Metropolitan Latin America*. Chicago: University of Chicago.
- Chang, Ming-Cheng, Ronald Freedman and Te-Hsiung Sun (1981). Trends in Fertility, Family Size Preferences, and Family Planning Practice: Taiwan, 1961-80. *Studies in Family Planning* 12 (5): 211-28.
- Chidambaram, V.C., J.G. Cleland and Vijay Verma (1980). Some Aspects of WFS Data Quality: a Preliminary Assessment. *WFS Comparative Studies* no 16.
- Chung, Bom Mo, James H. Palmore, Sang Joo Lee and Sung Jin Lee (1972). *Psychological Perspectives: Family Planning in Korea*. Seoul, Korea: Hollym Corporation.
- Conning, Arthur and Johanna N. deJong (1976). The Validity of Family Size Preference Measurements in Rural Latin America. Mimeograph. Santiago, Chile: CELADE.
- Coombs, Clyde H., Lolagene C. Coombs and Gary H. McClelland (1975). Preference Scales for Number and Sex of Children. *Population Studies* 29 (2).
- Coombs, Lolagene (1977). Levels of Reliability in Survey Data. *Studies in Family Planning* 8 (9).
- Coombs, Lolagene (1979). Underlying Family Size Preferences and Reproductive Behavior. *Studies in Family Planning* 10 (1).
- Coombs, Lolagene C. and Te-Hsiung Sun (1978). Family Composition Preferences in a Developing Culture: The Case of Taiwan, 1973. *Population Studies* 32 (1).
- Culagovski, Mauricio Jacobo (1982). Childbearing Intentions: a Test of a Social Psychological Model in Costa Rica. PhD dissertation. Cornell University.
- Cumulative Index (1978). *Studies in Family Planning* 7-9.
- Department of International Economic and Social Affairs (1979). *Factors Affecting the Use and Non-Use of Contraception*. Population Studies 69. New York: United Nations.
- Department of Economic and Social Affairs (1976). *Fertility and Family Planning in Europe Around 1970*. Population Studies 58. New York: United Nations.
- Dirección General de Estadística y Censos (1978). *Encuesta Nacional de Fecundidad 1976*. San José, Costa Rica.
- Elam, Edgar (1971). Opinion Profiles in Seven Cities. In J. Mayone Stycos, ed *Ideology, Faith and Family Planning in Latin America*. New York: McGraw Hill.
- Farooq, Ghazi and Lawrence S. Adekun (1976). Impact of a Rural Family Planning Program in Ishan, Nigeria, 1969-72. *Studies in Family Planning* 7 (6).
- Freedman, Ronald and Lolagene Coombs (1974). Cross Cultural Comparisons: Data on Two Factors in Fertility Behavior. Occasional Paper of the Population Council. New York.
- Goldberg, David (1974). Modernism: the Extensiveness of Women's Roles and Attitudes. *WFS Occasional Papers* no 14.
- Hermalin, Albert I., Ronald Freedman, Te-Hsiung Sun and Ming-Cheng Chang (1979). Do Intentions Predict Fertility? The Experience in Taiwan, 1967-74. *Studies in Family Planning* 10 (3).
- Hill, Reuben, J. Mayone Stycos and Kurt W. Back (1959). *The Family and Population Control*. Chapel Hill: University of North Carolina Press.
- Inkeles, Alex and David H. Smith (1974). *Becoming Modern: Individual Change in Six Developing Countries*. Cambridge: Harvard University Press.
- Kar, Snehendru (1978). Consistency Between Fertility Attitudes and Behavior. *Population Studies* 32 (1).
- Kar, Snehendru B. and Ramon Gonzalez-Currutti (1978). *Psychological Determinants of Fertility and Contraception in Venezuela*. Washington, DC: Pan American Health Organization.
- Kar, Snehendru B. and John M. Talbot (1980). Attitudinal

- and Non-Attitudinal Determinants of Contraception: A Cross-Cultural Study. *Studies in Family Planning* vol II.
- Knodel, John, and Nibhon Debavalya (1978). Thailand's Reproductive Revolution. *International Family Planning Perspectives and Digest* 4 (2).
- Knodel, John and S. Piampiti (1977). Response Reliability in a Longitudinal Survey in Thailand. *Studies in Family Planning* 8 (3).
- Kothandapani, Virupatsnka (1971). A Psychological Approach to the Prediction of Contraceptive Behavior. *Carolina Population Center Monograph* no 15. Chapel Hill: University of North Carolina.
- Lightbourne, Robert and Susheela Singh (1982). Charting Global Childbearing. *Population Bulletin* 37 (1).
- MacDonald, A.L., P.M. Simpson and A.M. Whitfield (1978). An Assessment of the Reliability of the Indonesia Fertility Survey Data. *WFS Scientific Reports* no 3.
- Mamlouk, Maria (1982). *Knowledge and Use of Contraception in Twenty-Three Developing Countries*. Population Reference Bureau, World Fertility Survey Reports no 3.
- Mauldin, W. Parker (1965). Application of Survey Techniques to Fertility Studies. In Mendel C. Sheps and Jeanne C. Ridley, eds *Public Health and Population Change*. Pittsburgh: University of Pittsburgh Press.
- Morris, Leo *et al* (1981). Contraceptive Prevalence Surveys: a New Source of Family Planning Data. *Population Reports*, Series M no 5. Washington DC: George Washington University.
- Mukherjee, B.N. (1975). Reliability Estimates of Some Survey Data on Family Planning. *Population Studies* 29 (1).
- O'Muirheartaigh, C.A. and A.M. Marekwardt (1980). An Assessment of the Reliability of WFS Data. In *World Fertility Survey Conference 1980: Record of Proceedings* vol 3. Voorburg, Netherlands: International Statistical Institute.
- Palmore, James and Mercedes B. Concepción (1981). Desired Family Size and Contraceptive Use: an Eleven Country Comparison. *International Family Planning Perspective* 7 (1).
- Pebley, Anne Ruth (1980). The Age at First Birth and the Timing of Second Birth in Costa Rica and Guatemala. PhD dissertation. Cornell University.
- Poti, S.J., B. Chakraborti and C.R. Maleker (1962). Reliability of Data Relating to Contraceptive Practices. In C.V. Kiser, ed *Research in Family Planning*. Princeton: Princeton University Press.
- Potter, Joseph G. (1977). Methods of Detecting Errors in World Fertility Survey Data: an Application to the Fiji Fertility Survey. *IUSSP International Population Conference/Congrès International de la Population, Mexico 1977* vol 1. Liège, 1977.
- Presser, Harriet (1981). Guessing and Misinformation about Pregnancy Risk Among Urban Mothers. In Frank F. Furstenberg, R. Lincoln and Jane Menken, eds *Teenage Sexuality, Pregnancy and Childbearing*. Philadelphia: University of Pennsylvania Press.
- Pullum, Thomas W. (1980). Illustrative Analysis: Fertility Preferences in Sri Lanka. *WFS Scientific Reports* no 9.
- Ramirez, N., P. Tactuk, E. Hardy and M. Vaessen (1976). The Dominican Republic Fertility Survey: an Assessment. *WFS Occasional Papers* no 18.
- Rosen, Bernard, C. and Alan B. Simmons (1971). Industrialization, Family and Fertility: a Structural-Psychological Analysis of the Brazilian Case. *Demography* 8 (1).
- Ryder, N. and C.F. Westoff (1971). *Reproduction in the United States, 1965*. Princeton: Princeton University Press.
- Sahib, M.A., N.B. Navunisaravi, R. Chandra and J.G. Cleland (1975). The Fiji Fertility Survey: a Critical Commentary. *WFS Occasional Papers* no 15.
- Scott, Chris and Susheela Singh (1980). Problems of Data Collection in the World Fertility Survey. In *World Fertility Survey Conference 1980: Record of Proceedings* vol 3.
- Seeley, Odile Frank and J. Mayone Stycos (1978). A Pre-test of Psychological Items Related to Family Planning and Fertility. In J. Mayone Stycos *et al*, *Patterns of Fertility Decline in Costa Rica*. Ithaca: International Population Program, Cornell University.
- Shah, Nasra M. and James Palmore (1979). Desired Family Size and Contraceptive Use in Pakistan. *International Family Planning Perspectives* 5 (4).
- Simmons, Alan B. (1971). Projective Testing for Ideal Family Size. In J. Mayone Stycos, ed *Idcology: Faith and Family Planning in Latin America*. New York: McGraw Hill.
- Simmons, Alan B. (1974). Ambivalence toward Small Families in Rural Latin America. *Social Biology* 21.
- Simmons, Alan B. and Ramiro Cardona (1973). Family Planning in Colombia: Changes in Attitude and Acceptance 1964-69. Ottawa: IDRC pamphlet.
- Simmons, Alan B. and Mauricio Czulagowski (1975). If They Know, Why Don't They Use? Selected Factors Influencing Contraceptive Adoption in Rural Latin America. Santiago, Chile: CELADE mimeo.
- Simmons, Alan B. and Johanna Noordam (1977). Education and Contraceptive Knowledge in Rural Areas of Four Latin American Nations. *Canadian Studies in Population* 4.
- Srikantan, K.S. (1979). An Evaluation of the Fiji Fertility Survey Based on the Post-Enumeration Survey. *WFS Occasional Papers* no 21.
- Srinivasan, K., P.H. Reddy, and K.N.M. Raju (1978). From One Generation to the Next. Changes in Fertility, Family Size Preferences, and Family Planning in an Indian State Between 1951 and 1975. *Studies in Family Planning* 9.
- Stoeckel, John and Moqbul A. Choudhury (1973). *Fertility, Infant Mortality, and Family Planning in Rural Bangladesh*. Bangladesh: Oxford University Press.
- Stycos, J. Mayone (1975). Can Patients be Educated?: Colombia. In J. Mayone Stycos, ed *The Clinic and Information Flow*. Lexington, MA: Lexington Books.
- Stycos, J. Mayone (1978a). Recent Trends in Latin American Fertility. *Population Studies* 32 (3).

Stycos, J. Mayone (1978b). *Patterns of Fertility Decline in Costa Rica*. Ithaca: International Population Program, Cornell University.

Stycos, J. Mayone (1980). *Education, Modernity and Fertility in Costa Rica*. Ithaca: International Population Program, Cornell University.

Stycos, J. Mayone (1982). The Decline of Fertility in Costa Rica: Literacy, Modernity and Family Planning. *Population Studies* 36 (1).

Stycos, J. Mayone and Kurt W. Back (1964). *The Control of Human Fertility in Jamaica*. Ithaca: Cornell University Press.

Thein, T.M., and J. Reynolds (1972). *Contracepción en Costa Rica, el Papel en el Sector Privado, 1959-1969*. Asociación Demográfica Costarricense, San José, Costa Rica, May, 1973.

Vaessen, Martin (1980). Knowledge of Contraceptive Methods. *WFS Comparative Studies* no 8.

Vaessen, M. (1981). Knowledge of Contraceptives: an Assessment of World Fertility Survey Data Collection Procedures. *Population Studies* 35 (3).

Ware, Helen (1974). Ideal Family Size. *WFS Occasional Papers* no 13.

Werner, Paul (1977). Implications of Attitude-Behavior Studies for Population Research and Action. *Studies in Family Planning* 8 (11).

Westoff, Potter, Sagi and Mishler (1961). *Family Growth in Metropolitan America*. Princeton: Princeton University Press.

Yaukey, David, Beryl J. Roberts and William Griffiths (1975). *Population Studies* 19 (1).