

## LEVELS AND VARIATIONS IN FERTILITY IN SAO PAULO

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The city of São Paulo occupies an area of 325.06 square miles, and in 1965, its population was 4,545,862 with a crude birth rate of 29.2 and a crude death rate of 8.3 per 1,000 population and infant mortality of about 71.3 per 1,000 live births.

This city, in the past 100 years, underwent a change from a mere trading center into a large industrial one; from a town of public officials and merchants to a city predominantly of laborers; from a town with 31,385 inhabitants in 1872, to a city of 4.5 million inhabitants in 1965. It is in this area, therefore, that one can notice more intensely the dilemmas and the repercussions of the sociocultural change; the absorption of individuals who are natives of traditional rural social structures by an urban social structure that is based virtually on rational demands of behavior.

The choice of the district of São Paulo as the area for research on fertility would permit one to study, therefore, from the sociological point of view, the problem of human fertility from a richer sociocultural outlook, because it is in this area that some social processes related to themes such as the individualization, rationalization, secularization and urbanization of behavior have been developed more intensely. It would permit one, finally, to know the system of values and the adjustment to social roles, worked out in accordance with the demands of a society in the period of urbanization, and to convert a biological phenomenon such as fertility into a social phenomenon.

With this in mind, retrospective research on the reproductive history

of the population of the district of São Paulo was started in August, 1965. The present paper contains preliminary information on a few aspects of the first results available, and will concentrate in three areas as follows: the study and characterization of fecundability (defined as the monthly probability of conception in the absence of contraception) and fertility (the probability that a woman will have a live birth), and the possible description of these variables through a mathematical model; description and interpretation of the alterations in the family size; and preliminary analysis of the induced abortion problem.

### THE SAMPLE

The target population was defined as all women who, in 1965, were 15 to 49 years old, married and living in the district of São Paulo. A two-stage, stratified cluster sampling of 3,009 women (0.3 per cent of the estimated target population) was selected. The primary unit was the dwelling where one or more women of the target population lived. The unit of the second stage was a woman of the target population considered as "housewife" of the dwelling unit. Because the district of São Paulo is divided into 47 subdistricts, each one was taken as a stratum whose size, for sampling purposes, was taken as the number of primary units in it. The total number of primary units was estimated as 891,922 in the 1964 school census. The sample size of each stratum was proportional to the stratum size. The frame used was a collection of 47 maps, one for each subdistrict. Sampling in each stratum was by a procedure similar to a "square grid." By this procedure each primary unit in the stratum was given equal probability of selection. In 1.5 per cent of the dwelling units a subsampling of housewives was performed and at the second stage equal probability was given to the selection to each one. For selected women who were not at home by the time of the interview, but not away from São Paulo, two calls were made. For the dwelling units where nobody answered and about which no information could be obtained by the interviewer among neighbors, and for "hard core" women, no further calls were made.

The field work was performed by health educators specially trained and selected after a complete course on topics related to the investigation. Anyone revealing high prejudice toward sex problems was dismissed. The field work lasted from August, 1965, to February, 1966, and the success achieved became evident in the negligible number of refusals, that is, five out of 3,009.

RESULTS

All the results to be presented here concern the 2,857 women who had only one conjugal union. The remaining 152, who were responsible for 331 unions, will be the object of another study. Results were analyzed with the IBM 1620 computer at the University of São Paulo.

The percentage age distribution of the group studied was very close to that of the nonsingle population (aged 15 to 49) of the district of São Paulo, estimated for 1965.

Age	16 to 20	21 to 25	26 to 30	30 to 40	40 to 49
Sample	2.8	13.5	21.4	38.4	23.9
Population	2.7	15.1	19.9	35.1	27.2

*Fecundability and Fertility*

Potter and Parker,<sup>1</sup> starting from the assumption that was also present in Sheps<sup>2</sup> work, that the fecundability of each couple remains constant from month to month until pregnancy, suggest the application of a beta distribution to describe the fecundability among couples in a population. However, the adjustment to the model of the figures observed and employed by the first AA. was not satisfactory.

With the purpose of discovering the law that governs the phenomenon, the model suggested by Potter and Parker was tried first.

Therefore, the women were selected who stated that they had not used any contraceptive before their first pregnancy. This total of 2,313 was also stratified in a first stage according to the woman's age at marriage, thus forming five groups: 883 women of 19 or under; 1,010 between 20 and 24; 330 between 25 and 30; 90 of 30 or more, and the total group. Table 1 shows the distribution of the results of the first pregnancy among the groups.

The waiting time for the first pregnancy was measured by the difference, through the knowledge of the union starting date, the

TABLE 1. RESULTS OF FIRST PREGNANCIES

	Age at Marriage				All Ages
	19 or Less	20 to 24	25 to 29	30 or More	
	%	%	%	%	%
Induced abortion	0.5	1.4	2.1	1.1	1.1
Spontaneous abortion	6.8	11.1	12.7	17.8	9.9
Stillbirth	1.4	1.5	2.1	0.0	1.5
Live birth	91.4	86.0	83.0	81.1	87.5

TABLE IA. NUMBER OF MONTHS REQUIRED FOR CONCEPTION

Months Required to Conceive	19 or Less (888 Women)		20 to 24 (1,010 Women)		Age at Marriage 25 to 30 (380 Women)		30 or More (90 Women)		All Ages (2313 Women)	
	Observed	Theoretical	Observed	Theoretical	Observed	Theoretical	Observed	Theoretical	Observed	Theoretical
1	26.16	27.93	22.97	28.48	25.45	27.92	17.78	33.87	24.34	28.69
2	16.19	17.11	18.42	17.25	20.30	17.19	11.11	18.11	17.55	17.29
3	9.74	11.34	11.19	11.35	10.00	11.42	12.22	11.04	10.51	11.34
4	7.70	7.96	10.20	7.92	10.61	8.08	12.22	7.32	9.38	7.90
5	5.66	5.84	6.14	5.78	6.67	5.88	12.22	5.16	6.27	5.76
6	4.08	4.42	4.75	4.37	3.64	4.45	5.56	3.80	4.37	4.34
7	3.62	3.44	2.47	3.39	2.12	3.46	4.44	2.90	2.94	3.37
8	3.40	2.74	2.28	2.70	1.21	2.75	0.00	2.67	2.59	2.68
9	1.47	2.22	2.47	2.18	2.12	2.23	3.33	1.82	1.95	2.17
10	1.92	1.83	1.58	1.80	1.51	1.83	2.22	1.48	1.73	1.78
11	1.47	1.53	1.39	1.50	1.51	1.53	3.33	1.23	1.51	1.49
12	1.02	1.29	0.99	1.26	1.51	1.29	1.11	1.03	1.08	1.26
13	2.38	1.10	1.78	1.08	2.12	1.10	2.22	0.88	2.07	1.07
14	1.81	0.95	0.59	0.93	1.51	0.95	1.11	0.75	1.21	0.92
15	1.25	0.83	1.48	0.81	0.30	0.82	2.22	0.65	1.25	0.80
16	0.45	0.72	0.99	0.71	1.51	0.72	2.22	0.57	0.90	0.70
17	1.02	0.64	0.40	0.62	0.00	0.63	0.00	0.50	0.73	0.62
18	0.45	0.56	0.89	0.55	0.30	0.56	1.11	0.44	0.65	0.55
19 to 24	3.40	2.35	2.87	2.22	1.21	2.33	1.11	1.86	2.77	2.28
25 to 30	2.49	1.35	1.98	1.33	2.12	1.33	2.22	1.07	2.20	1.30
31 to 36	0.79	0.85	0.79	0.82	0.91	0.82	0.00	0.68	0.65	0.83
37 to 48	1.59	0.99	0.79	0.98	0.61	0.96	0.00	0.80	1.08	0.96
49 to 60	0.45	0.56	0.69	0.53	0.30	0.52	0.00	0.45	0.61	0.52
61 to 72	0.34	0.33	0.49	0.32	0.61	0.31	1.11	0.28	0.48	0.32
73 to 84	0.45	0.24	0.24	0.24	0.61	0.30	0.00	0.22	0.35	0.21
85 or more	0.70	0.86	1.11	0.88	1.24	0.70	1.14	0.45	0.83	0.85
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 2. MEASURES OF FECUNDABILITY BY LENGTH OF PREVIOUS CONCEPTIVE DELAY AND AGE AT MARRIAGE

Months Without Pregnancy	19 or Less			20 to 24			25 to 29			30 or More			All Ages		
	Mean	Mode	Stand- ard Devia- tion	Mean	Mode	Stand- ard Devia- tion	Mean	Mode	Stand- ard Devia- tion	Mean	Mode	Stand- ard Devia- tion	Mean	Mode	Stand- ard Devia- tion
0	.279	.158	.173	.284	.162	.176	.279	.164	.171	.338	.193	.207	.286	.163	.178
1	.237	.124	.153	.241	.126	.155	.238	.130	.152	.273	.133	.178	.242	.126	.156
2	.206	.102	.137	.209	.103	.139	.208	.108	.136	.229	.101	.156	.209	.103	.140
3	.182	.087	.124	.184	.088	.125	.184	.092	.123	.198	.082	.138	.185	.087	.126
4	.163	.075	.113	.165	.076	.114	.165	.080	.112	.173	.069	.124	.165	.075	.114
5	.148	.067	.104	.149	.067	.105	.150	.071	.103	.155	.059	.113	.149	.066	.105
6	.135	.060	.096	.136	.060	.097	.137	.064	.096	.139	.052	.103	.136	.059	.097
7	.124	.054	.089	.125	.054	.090	.127	.058	.089	.127	.046	.085	.125	.054	.090
8	.115	.049	.083	.116	.049	.084	.118	.053	.083	.117	.042	.088	.116	.049	.084
9	.107	.045	.078	.108	.045	.078	.110	.049	.078	.108	.038	.082	.108	.045	.079
10	.100	.042	.073	.101	.042	.074	.103	.045	.074	.100	.035	.077	.101	.042	.074
11	.094	.039	.069	.095	.039	.070	.097	.042	.070	.093	.032	.072	.095	.039	.070
12	.089	.037	.066	.089	.037	.066	.091	.040	.066	.088	.030	.068	.089	.036	.066
18	.066	.026	.050	.066	.026	.050	.068	.029	.050	.064	.021	.050	.066	.026	.050
24	.053	.021	.040	.053	.020	.040	.054	.022	.040	.050	.016	.040	.053	.020	.040
30	.044	.017	.033	.044	.017	.034	.045	.018	.034	.041	.013	.033	.044	.016	.034
36	.037	.014	.029	.037	.014	.029	.039	.015	.029	.035	.011	.028	.037	.014	.029
42	.033	.012	.025	.033	.012	.025	.034	.013	.025	.030	.009	.025	.032	.012	.025
48	.029	.011	.022	.029	.011	.022	.030	.012	.023	.027	.008	.022	.029	.010	.022
60	.024	.009	.018	.024	.009	.018	.024	.009	.019	.022	.006	.018	.023	.008	.018
72	.020	.007	.015	.020	.007	.015	.021	.008	.016	.018	.005	.015	.020	.007	.015
84	.017	.006	.013	.017	.006	.013	.018	.007	.014	.016	.004	.013	.017	.006	.013

TABLE 3. MEASURES OF FECUNDABILITY OF WOMEN CONCEIVING AFTER SPECIFIED CONCEPTIVE DELAYS, BY AGE AT MARRIAGE

Length of Conceptive Delay (Months)	19 or Less			20 to 24			25 to 29			30 or More			All Ages		
	Mean	Mode	Stand- ard Devia- tion	Mean	Mode	Stand- ard Devia- tion	Mean	Mode	Stand- ard Devia- tion	Mean	Mode	Stand- ard Devia- tion	Mean	Mode	Stand- ard Devia- tion
0	.455	.431	.192	.465	.446	.195	.449	.424	.189	.575	.643	.216	.470	.452	.196
1	.387	.339	.176	.394	.347	.178	.384	.336	.173	.465	.443	.199	.397	.351	.179
2	.336	.279	.160	.341	.284	.162	.335	.279	.158	.390	.338	.181	.344	.286	.163
3	.298	.237	.147	.301	.241	.148	.297	.238	.145	.336	.273	.164	.303	.242	.149
4	.267	.206	.135	.270	.209	.136	.267	.208	.134	.295	.229	.150	.271	.209	.137
5	.242	.182	.125	.244	.184	.126	.242	.184	.124	.263	.198	.137	.245	.185	.127
6	.221	.163	.116	.223	.165	.117	.222	.165	.115	.237	.173	.127	.223	.165	.118
7	.203	.148	.108	.205	.149	.109	.204	.150	.108	.216	.155	.117	.205	.149	.110
8	.188	.135	.102	.190	.136	.102	.190	.137	.101	.198	.139	.109	.190	.136	.103
9	.176	.124	.096	.177	.125	.096	.177	.127	.095	.183	.127	.102	.177	.125	.097
10	.164	.115	.090	.165	.116	.091	.166	.118	.090	.170	.117	.096	.165	.116	.091
11	.154	.107	.086	.155	.108	.086	.156	.110	.085	.159	.108	.090	.155	.108	.086
12	.146	.100	.081	.146	.101	.082	.147	.103	.081	.149	.100	.085	.146	.101	.082
18	.109	.073	.062	.109	.073	.063	.110	.074	.062	.109	.070	.064	.109	.072	.063
24	.087	.057	.050	.087	.057	.051	.088	.058	.051	.086	.064	.051	.087	.057	.051
20	.072	.046	.042	.072	.046	.042	.073	.048	.042	.071	.044	.043	.072	.046	.042
36	.061	.039	.036	.062	.039	.036	.062	.041	.037	.060	.037	.037	.061	.039	.036
24	.054	.034	.032	.054	.034	.032	.055	.035	.032	.052	.032	.032	.054	.034	.032
48	.048	.030	.028	.048	.030	.028	.048	.031	.029	.046	.028	.028	.047	.030	.028
60	.039	.024	.023	.039	.024	.023	.040	.025	.037	.037	.022	.037	.039	.024	.023
72	.033	.020	.020	.033	.020	.020	.033	.021	.020	.031	.019	.019	.033	.020	.020
84	.028	.018	.017	.028	.017	.017	.029	.018	.017	.027	.016	.017	.028	.017	.017

occurrence of the event (live birth, fetal loss or abortion) and the pregnancy duration. Therefore, no systematic error was made in measuring the waiting time for the pregnancy.

The proportions of women according to the age at marriage who required  $j$  months to become pregnant ( $j = 0$  (1) 18 (6) 36 (12) 84), are found in Table 1A. The theoretical values corresponding to these were obtained from the beta distribution with parameters estimated from the mean and the variance of the distribution observed; that is:  $m = 8.02$ ,  $S^2 = 237.15$ ;  $m = 7.88$ ,  $S^2 = 259.12$ ;  $m = 7.64$ ,  $S^2 = 296.25$ ;  $m = 7.49$ ,  $S^2 = 159.69$ ;  $m = 7.88$ ,  $S^2 = 252.18$ ; for the groups up to 19, 20 to 24, 25 to 29, 30 and more, and total, respectively.

The analysis of Table 1A reveals at first sight an excellent adherence between the corresponding observed and theoretical distributions. The Kolmogorov-Smirnov adherence test was performed for each group and the values found show that, except the group of age 30 or more, the adherence can be accepted at a level of significance of one per cent. In the group of age 30 or more, the general tendency is similar to the theoretical one, when the small number of women in this group is taken into consideration.

One aspect that is noteworthy is the proportion of conceptions, which is higher than the tendency observed so far, during the twelfth month after the beginning of the union and in some subsequent months. A possible explanation would be the change of the couples' sexual behavior during their first year of marriage, which although less distinct, became manifest during the second year of marriage.

In view of the adherence obtained, the necessary element is available to validate the model presented by Potter and Parker and, therefore, conditions to use the theoretical results that derive from this fact. For instance, the proportion of women who get married at ages between 20 and 24 and who, having waited five months without becoming pregnant (although exposed to it), will become pregnant in the following month, is, on the average, 14.9 per cent (Table 2). The value observed corresponding to the reported proportion (of which the table is not shown here for lack of space) is 15.3 per cent, close enough to 14.9 per cent expected by the above reasons. With the exception of the group married at age 30 or more, the results show a similar behavior as far as this variable is concerned.

The fecundability according to the age by the time of marriage, conditioned to the existence of a pregnancy that happened in a fixed month, could also be characterized (Table 3). Thus, for instance

a woman in the 20 to 24 year group (age at the time of marriage) who became pregnant after five months of waiting, would have an average fecundability of 27 per cent, a value obviously higher than the 14.9 per cent mentioned above.

When studying the additional time of waiting necessary for the conception, according to the time that has elapsed without it, the age at marriage is seen to have practically no influence, except with the group of women who get married at age 30 or more. In fact, the average time for this group is, except for zero months without pregnancy, always longer than for the others (Table 4).

The expected number of months for the second conception (assuming again the constancy of fecundability of each couple) for given waiting time for the first pregnancy was similar for all the groups, except for the women married at 30 or more. Even this exception disappears if one starts from a waiting time of 30 months for the first conception (Table 5).

Table 6 shows the fertility rates, specific by age, for married women for seven cohorts, taking into account whether the woman was brought

TABLE 4. EXPECTED ADDITIONAL MONTHS REQUIRED FOR CONCEPTION, BY LENGTH OF PREVIOUS CONCEPTION DELAY AND AGE AT MARRIAGE

<i>Months Without Pregnancy</i>	<i>Additional Months Required (Mean)*</i>				<i>All Ages</i>
	<i>19 or Less</i>	<i>20 to 24</i>	<i>25 to 30</i>	<i>30 or More</i>	
0	8.01	7.87	7.64	7.49	7.88
1	9.73	9.61	9.21	9.81	9.65
2	11.45	11.35	10.79	12.13	11.42
3	13.17	13.09	12.36	14.46	13.19
4	14.89	14.83	13.94	16.78	14.95
5	16.61	16.57	15.51	19.10	16.72
6	18.33	18.31	17.09	21.43	18.49
7	20.05	20.05	18.66	23.75	20.26
8	21.77	21.79	20.23	26.07	22.03
9	23.49	23.53	21.81	28.04	23.80
10	25.21	25.27	23.38	30.72	25.57
11	26.93	27.01	24.96	33.04	27.34
12	28.65	28.75	26.53	35.37	29.11
18	38.97	39.19	35.98	49.31	39.72
24	49.29	49.63	45.42	63.25	50.33
30	59.61	60.07	54.87	77.19	60.95
36	69.93	70.50	64.32	91.13	71.56
42	80.25	80.94	73.76	105.07	82.18
48	90.57	91.38	83.21	119.01	92.79
60	111.21	112.26	102.10	146.89	114.02
72	131.85	133.14	120.99	174.77	135.24
84	152.49	154.01	139.88	202.65	156.47

\* Standard Deviation could not be computed because a <2



TABLE 5. EXPECTED MONTHS OF SECOND CONCEPTION, BY LENGTH OF FIRST CONCEPTIVE DELAY AND AGE AT MARRIAGE

Length of First Conceptive Delay (Months)	19 or Less		20 to 24		25 to 29		30 or More		All Ages	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
0	2.94	2.22	2.87	2.16	2.96	2.21	2.25	1.66	2.84	2.14
1	3.58	2.82	3.51	2.76	3.58	2.78	2.95	2.37	3.48	2.75
2	4.21	3.42	4.14	3.36	4.19	3.35	3.65	3.08	4.12	3.35
3	4.84	4.01	4.78	3.96	4.80	3.91	4.35	3.78	4.76	3.96
4	5.47	4.60	5.41	4.55	5.41	4.48	5.05	4.48	5.40	4.56
5	6.10	5.19	6.05	5.15	6.02	5.04	5.74	5.17	6.04	5.16
6	6.74	5.78	6.68	5.74	6.63	5.60	6.44	5.87	6.68	5.76
7	7.37	6.37	7.32	6.34	7.25	6.16	7.14	6.56	7.31	6.36
8	8.00	6.96	7.95	6.93	7.86	6.72	7.84	7.26	7.95	6.95
9	8.63	7.55	8.59	7.52	8.47	7.29	8.54	7.95	8.59	7.55
10	9.27	8.14	9.22	8.12	9.08	7.85	9.24	8.65	9.23	8.15
11	9.90	8.73	9.86	8.71	9.69	8.41	9.94	9.34	9.87	8.75
12	10.53	9.32	10.49	9.30	10.30	8.97	10.64	10.03	10.51	9.35
18	14.33	12.85	14.30	12.86	13.97	12.33	14.83	14.19	14.34	12.94
24	18.12	16.39	18.11	16.41	17.64	15.70	19.03	18.35	18.17	16.52
30	21.91	19.92	21.92	19.97	21.31	19.06	23.22	22.51	22.01	20.11
36	25.71	23.45	25.73	23.52	24.98	22.42	27.42	26.67	25.84	23.70
42	29.50	26.98	29.54	27.07	28.65	25.79	31.61	30.82	29.67	27.28
48	33.30	30.51	33.35	30.63	32.32	29.15	35.81	34.98	33.51	30.87
60	40.88	37.57	40.97	37.73	39.66	35.87	44.20	43.29	41.17	38.04
72	48.47	44.63	48.59	44.84	47.00	42.60	52.58	51.61	48.84	45.21
84	56.06	51.69	56.21	51.94	54.33	49.32	60.97	59.92	56.51	52.38

TABLE 6. AGE-SPECIFIC FERTILITY RATES PER MARRIED WOMAN

Cohort (Age in 1965)	Area Where Woman was Reared	N*	Fertility Rate at Ages Assumed by Different Cohorts Through the Years						
			15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49
1 (15 to 19)	U	27	0.4731						
	R	14	0.4889						
	Total	41	0.4776						
	C	12	0.4923						
2 (20 to 24)	U	209	0.4493	0.4265					
	R	89	0.4436	0.4086					
	Total	298	0.4474	0.4209					
	C	99	0.4555	0.4276					
3 (25 to 29)	U	352	0.4225	0.3607	0.2332				
	R	186	0.4317	0.3703	0.2542				
	Total	538	0.4263	0.3642	0.2405				
	C	173	0.4292	0.3489	0.2558				
4 (30 to 34)	U	400	0.3605	0.3388	0.2308	0.1265			
	R	205	0.3609	0.3795	0.2565	0.1634			
	Total	605	0.3606	0.3525	0.2394	0.1398			
	C	173	0.3450	0.3184	0.2103	0.0905			
5 (35 to 39)	U	339	0.3907	0.3366	0.2243	0.1190	0.0645		
	R	155	0.3964	0.3496	0.2399	0.1510	0.0928		
	Total	494	0.3930	0.3412	0.2292	0.1290	0.0735		
	C	155	0.3825	0.3358	0.2255	0.1088	0.0625		
6 (40 to 44)	U	262	0.3663	0.3190	0.2057	0.1430	0.0524	0.0202	
	R	154	0.2691	0.3506	0.2690	0.1786	0.1011	0.0545	
	Total	416	0.3206	0.3324	0.2298	0.1562	0.0704	0.0336	
	C	100	0.3326	0.2983	0.2099	0.1147	0.0486	0.0276	
7 (45 to 49)	U	206	0.3811	0.2746	0.2042	0.1398	0.0621	0.0126	0.0023
	R	122	0.3655	0.4019	0.3079	0.2240	0.1198	0.0477	0.0036
	Total	328	0.3747	0.3256	0.2434	0.1714	0.0836	0.0256	0.0028
	C	85	0.3288	0.2784	0.2003	0.1364	0.0545	0.0070	0.0000

\* The calculations in this table were based upon 2,720 women because the remaining 137 had questionable times of exposure after marriage.

up in the rural zone or rural and urban zone (R), only in the city (U), or whether she was born and has always lived in the capital of São Paulo (C). The fertility rates were calculated as the ratio of the number of live births in each age interval to the number of women-years of married life in the same age interval. Therefore, the reproductive performance of women of different cohorts may be compared at the same age interval.

Observing "total" fertility rates, Table 6 shows that, at age 15-19, the level of fertility was oscillating between 0.3206 and 0.3930 for the last four cohorts, but begins to climb afterwards and reaches 0.4776 for cohort 1. Fertility between 20 and 24 years seems to grow

steadily from 0.3256 (cohort 7) to 0.4209 (cohort 2). This apparent increase in fertility is not present at later age intervals. Fertility at 25 to 29 years is almost constant, fluctuating only between 0.2292 (cohort 5) and 0.2434 (cohort 7). Fertility at 30 to 34 years decreases systematically from 0.1714 (cohort 7) to 0.1290 (cohort 5), but then grows somewhat to 0.1398 (cohort 4). The same movement can be seen at the remaining age intervals.

The data presented in Table 6 could be construed as an approximate index of the evolution of marital fertility during the last 30 years in the city of São Paulo. But this proposition must be qualified. First of all, a large number of the surveyed women were not born in São Paulo and some of them had their children before coming there. But this distortion seems not to have greatly affected the final results. This can be seen by comparing the fertility rates of all women (Total) with those born and brought up in São Paulo (C). At the younger age groups (cohorts 1, 2 and 3) the differences in fertility are rather small; the differences between C and Total are larger, however, at the older age groups (cohorts 4, 5, 6 and 7). As could be expected, marital fertility rates are generally lower for women born in the capital than for all women (this is particularly true for the oldest cohorts). Because migration increases almost all fertility levels, however, the general trends depicted above are not altered. In fact, they are accentuated: the growth of fertility at 15 to 19 years, considering only C rates, is even steeper than if Total rates are considered. At age 30 to 35, C fertility decreases systematically from cohort 7 to cohort 3.

Another qualification is that the sample contains only survivors of those cohorts that were responsible for the fertility in São Paulo 20 to 30 years ago. Some of the women of those cohorts were dead in 1965, and others had left the city. It is not known whether mortality or emigration was selective with respect to prolificacy or not.

Even with all these restrictions, it is possible to see, through the data of Table 6, some of the trends that have been affecting marital fertility in São Paulo in the past decades. The reduction of marital fertility at 30 to 34 and at higher age intervals could be the result of the spreading of birth control. Most couples that practice contraception have their desired number of children in the first years after marriage, so that birth control is expected to affect fertility mostly at higher age intervals. The fall of fertility at 30 to 34 and higher age intervals is possibly larger than that shown by the figures in

Table 6, because it is probable that the older women underreported the number of live births they had. This is a common feature of fertility surveys and it may be present, to some degree, in this study, although the questionnaire used here contains many retrospective questions concerning each live birth, such as name, sex, is the child alive?, how old is he (she)? how old when he (or she) died?

Faulty memory seems also to be the most likely explanation of the puzzling increase of fertility at the first two age intervals. It is at least very probable that many women of cohorts 7, 6, 5 and 4 did not mention all the live births they had 20 or 30 years ago. Even so, a clear increase is seen in marital fertility, in Sao Paulo, at 15 to 19 and 20 to 24 years, even if one compares cohorts 1, 2 and 3 only.

Another hypothesis suggested by the fertility rates in Table 6 is that of a time displacement in reproduction behavior: more children are born to younger women, less when the woman grows older. This, in fact, seems so if one considers that total fertility of a woman (married at 15) at age 30 to 34, could be 5.58 if she belongs to cohort 7, 5.19 if she belongs to cohort 6 and 5.46 if she belongs to cohorts 5 or 4. Since about 90 per cent of all live births are born from women until they are 30 to 35 year old, it may be accepted that total fertility did not increase nor decrease, but that the younger cohorts are having a larger proportion of their children at younger ages than did the women of the older cohorts.

These and other hypotheses will be further investigated with other data from this research.

### *Family Size: Changes and Implications*

The most significant fact about the modifications in the family size is shown by the comparison between the ideal number of children for the interviewed and the number of children that their mothers had. In the first case, 70.4 per cent said they would like to have as many as three children, and in the second one, 20.0 per cent of their mothers had up to three children. The arithmetic mean of the number of pregnancies (3.41) confirms the ideal of a small family, expressed by the interviewed generation in relation to the preceding ones. The more frequently indicated reasons for not having more children than the "ideal" number—whichever it is—are predominantly economic (76.9 per cent of 2,763) in the classification done by the interviewers. A reason of second importance is "more attention to the children" (17.9 per cent). On the other hand, 39.5 per cent said they did not

TABLE 7. COMPARISON OF "PRESENT IDEAL" NUMBER OF CHILDREN WITH "RETROSPECTIVE IDEAL," BY AREA OF ORIGIN AND LEVEL OF INSTRUCTION.

Origin* Level of Instruction**	Capital				Rural				Any			
	A	B	C	Total	A	B	C	Total	A	B	C	Total
N	22	421	286	729	273	290	11	574	419	1471	673	2563
Per cent of cases with:												
Present ideal smaller than retrospective ideal	13.6	26.4	28.3	26.7	21.6	26.2	36.4	24.2	21.9	27.1	30.3	27.1
Present ideal equal to retrospective ideal	50.0	55.8	65.4	59.4	38.8	45.9	54.5	42.7	36.8	48.9	60.8	50.0
Present ideal greater than retrospective ideal	36.4	17.8	6.3	13.9	39.6	27.9	9.1	33.1	41.3	24.0	8.9	22.9

\* Origin means the place where the woman was reared; i.e., where she lived during infancy and adolescence.

\*\* Level of instruction: A: illiterate and semi-illiterate who never went to school; B: primary school, complete or not; C: other levels, complete or incomplete.

TABLE 8. COMPARISON OF "PRESENT IDEAL NUMBER" OF CHILDREN DECLARED BY WOMEN AND NUMBER OF CHILDREN HAD BY THEIR MOTHERS, BY AREA OF ORIGIN AND LEVEL OF INSTRUCTION

Origin Level of Instruction*	Capital				Rural				Any			
	A	B	C	Total	A	B	C	Total	A	B	C	Total
N	23	473	331	827	298	310	13	621	461	1613	778	2852
Per cent of cases with:												
Present ideal smaller than mother's family	95.7	71.5	44.1	61.2	78.9	85.2	76.9	82.0	79.0	78.6	56.0	72.5
Present ideal equal to mother's family	4.3	25.1	51.7	35.2	14.1	11.3	23.1	12.9	13.2	17.9	39.6	23.0
Present ideal greater than mother's family	0.0	3.4	4.2	3.6	7.0	3.5	0.0	5.1	7.8	3.5	4.4	4.5

\* Level of instruction: see Table 7.

want to have fewer children than the indicated ideal "because children are the happiness of a family;" 16.7 per cent "because some may die;" and 1.3 per cent "because of religious and moral reasons." In other words, 94.8 per cent of the women gave rational reasons to limit the number of children, but 57.5 per cent gave traditional reasons not to have fewer than the indicated "ideal."<sup>3</sup> This suggests that the encouragements to the fixation of the family size are "exterior" to the cultural characteristics of the personality structures. Only 8.7 per cent defined clearly the role of the children in the family institutional group,<sup>4</sup> stating that they would not like to have a smaller number "because the parents need their children's help."

With the purpose of verifying the coherence of attitudes toward the changes in the individuals' situation, the comparison between the "present ideal" and the "retrospective ideal" of those interviewed is shown in Table 7. The expression "present ideal" means the number of live children already had plus the number of children that the interviewed still intends to have; "retrospective ideal" is the number of children that the women would like to have "if they could go back to the time when they got married and then start having a family." The present ideal expresses a project in execution, and the retrospective ideal represents the project reelaborated in view of the sociocultural stimuli confronted with the system of values inserted into the structure of personality.

On the whole one can notice that among only half of the women was the "present ideal equal to the retrospective ideal" size of the family. This coherence was larger among the women who were in the capital of São Paulo than among those who were in the rural zone. It was also larger among those who have a higher educational level than those who are illiterate and semiliterate. It is higher among educated women who grew up in the capital than in the rural zone.

On the other hand, the proportion of women with "present ideal greater than retrospective ideal" size of family was more accentuated among the women of rural origin than those of the capital. Little difference was found between the women reared in the rural areas and those reared in the capital with respect to proportions with "present ideal smaller than retrospective ideal."

To some extent similar tendencies were observed in the comparison between the women's "present ideal" and the number of children that their mothers have had (Table 8). On the whole, the women intend to have a final number of children smaller than the number

had by their mothers. This is more intense for those of rural origin. In the same way, the equalization with the number of children that their mothers had is more intense for women reared in the capital. Among women who advanced above grammar school, the proportion with "present ideal equal to mother's family" was higher for those reared in the capital than for those reared in rural areas.

Regardless of the other variables underlying the changes of attitudes toward family size, the women who were socialized according to the requisites of traditional ideas—phenomena indirectly verified according to the type of the place of upbringing—received more intensely the absorption impact of the urban society and a consequent reformulation of ideals as far as the family size is concerned. At the same time, the reformulation demands are smaller in relation to those who were socialized in the capital. In both cases, however, an enlarged proportion of women did not conciliate in value the demands of the attitude-value system of their personality<sup>5</sup> with the demands of the real situation in which they found themselves.

The phenomenon can be verified by other means, such as religion. Of those interviewed, 87.2 per cent stated that they are Roman Catholics. Taking all the religions into consideration, 43.3 per cent said they were cultists. If all the cultists were Roman Catholics they would correspond to 49.2 per cent of this religious group. However, only 9.1 per cent of the interviewed do not accept birth control under any circumstances, 23.9 per cent had used the *ogino* (calendar) method after the last pregnancy<sup>6</sup> and 1.3 per cent said that the ideal number of children could not be smaller because of "religious and moral reasons."

The incoherence of the ideals and of the religious practice with contraception indicate that the female population of the district of São Paulo is undergoing a profound sociocultural transition period. At the same time, they indicate that the social system has not developed efficient mechanisms of resocialization that would permit the redefinition of the values by the individuals. The traditional ideas concerning a large family emphasize the feminine attitudes toward the number of children. However, they conflict with the exterior demands that raise the cost of socialization of the new generations and simultaneously impose a wider and more diversified standard of expenditures than those that overlay the traditional social structures. At the same time, the women are not integrally absorbed by social roles with requisites of the urban-industrial society. They

limit themselves to the loss of a parcel of their domestic social roles in behalf of other institutional groups or of other roles performed by other people, which were produced by the division of the work in an urban setting.

Of the 27.2 per cent who studied beyond grammar school—that is, in principle, were trained to execute professional roles—only 19.3 per cent are working effectively. Considering all the women who work, with any level of instruction, 45.9 per cent work at home and 55.1 per cent on their “own account.” Therefore, the conceptions of feminine roles, even among those who work, are deeply marked by the domestic “fate” of the woman.<sup>7</sup>

In short, the central problem, from the sociological point of view, is not so much the adoption of family planning practices, but instead is the one represented by the sociocultural repercussions of these practices. In other words, it is necessary to understand the changes that several institutional groups, the family in particular, are undergoing and the significances and results of these changes in the social structure.

### *The Problem of Induced Abortion*

Of the 9,709 pregnancies of 2,857 women with only one union, 243 were current pregnancies; 7,597 (78.2 per cent) resulted in live births and 1,872 (19.3 per cent) in fetal loss,<sup>8</sup> of which 139 (7.4 per cent) were stillborn, 40 (2.1 per cent) were abortions under medical advice, 1,139 (60.9 per cent) were spontaneous abortions and 554 (29.6 per cent) were abortions stated as induced.

Of the terminated pregnancies, 17.8 per cent ended in abortion—12.0 per cent spontaneous and 5.8 per cent induced. This last value is well below those found by Armijo and Monreal and by Requena,<sup>9</sup> who found 16.6 per cent and 23.2 per cent, respectively, induced abortions among the pregnancies

Of 2,857 women, 307 (10.7 per cent) stated that they had induced at least one abortion. Hutchinson<sup>10</sup> found a very similar value of 9.2 per cent and Armijo and Monreal found 23 per cent.<sup>11</sup>

Among the 307 women who reported at least one induced abortion, 185 reported one abortion; 66 reported two abortions; 28 reported three abortions and 28 declared four or more abortions. Thus, 90.0 per cent had between one and three induced abortions. For Armijo and Monreal this percentage was 76.5 per cent.

Until the time of the first induced abortion, 13.35 per cent of the women had not had any live birth; 27.7 per cent had one child;



30.9 per cent had two; 15.3 per cent had three; 6.8 per cent had four and 5.9 per cent had five or more live births.

Of the abortions reported as induced, 90 per cent were performed up to the second month of pregnancy and 98 per cent up to the third month; among the spontaneous abortions these percentages were 50 per cent and 80 per cent, respectively. The average duration of the pregnancy in the induced abortions was 1.6 months with  $S = 0.78$  months and for the spontaneous ones it was 2.7 months with  $S = 1.23$  months. One can see, therefore, that the woman takes the initiative of interrupting the pregnancy as soon as it is discovered.

As to the person who induced the abortion, in 45.7 per cent of the cases it was a licensed midwife, in 36.8 per cent a physician, in 10.6 per cent the patient herself, in 5.6 per cent a quack midwife and in 1.3 per cent a nurse. As to the place, 57.8 per cent were performed in consultation offices, 27.6 per cent at home, 13.9 per cent in hospitals and 0.7 per cent in other places. The means were curettage in 59.2 per cent of the cases, oral medication in 20.2 per cent, other mechanical devices in 15.3 per cent and other means in 5.2 per cent. The high proportions involving physicians and licensed midwives (82.5 per cent) and consultation rooms and hospitals (71.1 per cent) indicate the high rate of institutionalization of the abortion by specialized professions and services. The proportion of women who reported induced abortion among those with free union (16.3 per cent) did not differ significantly (at the five per cent level) from the proportion in the group with only legal union (17.8 per cent), and both were significantly higher than the proportion of abortions in the group of the other unions; i.e., legal and religious, and only religious (10.1 per cent). When the individuals with a more secularized behavior adopt a birth control solution through an apparently traditional way, such as the abortion, they do it by a highly rationalized manner through professional and specialized services.

The proportion of women who reported induced abortions in the group of women brought up in the rural zone (ten per cent) did not differ significantly (at the five per cent level) from the proportion in the group brought up in the city (10.5 per cent) and of the group brought up in the rural zone and in the city (13.2 per cent).

Of the women who declared that they had induced an abortion (at least one), 22.1 per cent were cultist Catholics; 63.5 per cent noncultist Catholics; 7.8 per cent non-Catholic cultists (Protestants, Orthodoxes, Israelites, spiritualists, voodooers); 5.5 per cent non-

Catholics, noncultists, and one per cent others. Although a full secularization was not observed, it is noteworthy that the religious values do not necessarily interfere in the utilization of this technique. It is worthy of notice, however, that the investigation was not designed to emphasize the distinction between sacred and secular as a sense experienced by the individuals. What is important is the observed fact that the abortion is not necessarily associated with the social origin.

## SUMMARY

A retrospective study on human reproduction was conducted in 1965, for women 15 to 49 years old, based on a two-stage stratified cluster sampling of 3,009 women. A mathematical model for describing the fecundability among couples in the population was fitted and the fit was satisfactory. This result allowed the study of measures of fecundability both by length of previous conceptive delay and after specified conceptive delays, according to the age at marriage. Expected additional months required for conception by length of previous delay of conception, as well as expected month of second conception, by length of first delay, were studied according to the age at marriage. These variables did not differ substantially for four groups concerning the age at marriage, except for women marrying at age 30 or over.

The fertility for contemporary women was studied and age-specific fertility rates were also calculated for different cohorts, showing a behavior that could be explained by the changes in the Brazilian economy, particularly in the area of São Paulo, after World War II, the effects of which culminated in 1955.

A sociological discussion is made on the family size trying to focus the secularization, individualization and urbanization phenomena.

The paper also includes a preliminary analysis of the induced abortion problem.

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<sup>3</sup> Due to a defect in the questionnaire related to the alternatives, indicative for a number of children which is not smaller, the category labeled as "other reasons" comprises 27.1 per cent of the women. The reasons are considered here as fundamentals of the social action in accordance with the Weberian typology of rational/traditional action. Weber, M., *ECONOMIA Y SOCIEDAD*, Second edition, México, Fondo de Cultura Económica, 1964, Volume I, pp. 18-21.

<sup>4</sup> According to Znaniecki, F., *Organisation Sociale et Institutions*, in Gurvitch, G. and Moore, W. E., *LA SOCIOLOGIE AU XXe. SIECLE*, Paris, Presses Universitaires de France, 1947, pp. 174-222.

<sup>5</sup> Linton, R., *CULTURA Y PERSONALIDAD*, Third edition, México, Fondo de Cultura Económica, 1960, pp. 117-118.

<sup>6</sup> Unfortunately, it could not be verified which measures, other methods that were not sanctioned by the Roman Catholic Church, are considered licit and not sinful by the interviewed, such as coitus interruptus, which is performed by 35.15 per cent.

<sup>7</sup> Pereira, L., *O Magistério Primario na Sociedade de Classes*, Boletim No. 277 da Faculdade de Filosofia, Ciencias e Letras da Universidade de São Paulo, cap. II, 1963.

<sup>8</sup> Stillbirth is the fetal loss after seven or more months of pregnancy. Abortion refers to the loss within six or less months of pregnancy. Abortion by medical advice includes ectopic pregnancy.

<sup>9</sup> Requena, M., *El problema del aborto inducido en una población obrera de Santiago. Uso y actitudes frente al empleo de anticonceptivos*, Trabalho apresentado na Sociedade Chilena de Salubridad, em 19 de julio de 1965.

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