CHAPTER SEVEN
EXAMINING THE RELATIONSHIP BETWEEN SOCIOECONOMICSETTING, PROGRAM EFFORT, AND CONTRACEPTIVE PREVALENCE

In view of previous studies, it is hypothesized that the relationship between socieconomic setting and program effort on one hand, and contraceptive prevalence on the other, is positive. The relationship within the Egyptian context is examined in this chapter in two sections. Section 1 presents a descriptive analysis of the relationship mentioned above, while the statistical analysis using regression and path analysis techniques is presented in section 2.

1. DESCRIPTIVE ANALYSIS:

The impact of socioeconomic setting (SES) and family planning program effort (PE) on contraceptive prevalence by governorate is summarized in cross-tabulation form in Table 7.1. The grand mean of CPR is 45.4 for all the governorates, with the range from 34.2 to 58.2 percent between the low and high socioeconomic setting groups of the governorates, and from 34.6 to 56.7 percent between the weak and strong program effort groups. The calculation of these means is based on unit weights for each governorate. However, it is important to weigh the data by the size of the female population in reproductive age. In this case it must be recognized that the prevalence estimates for the governorates with large populations will dominate the resulting row and columns total means. The mean prevalence estimates for the 9 cells of Table 7.1 are compared in Table (7.2) against the values obtained with female population size weights.

With unit weights, prevalence increases in a regular manner as one moves from low to high socioeconomic setting with some exceptions. The mean prevalence increases from 34.2 with low SES to 50.7 with moderate SES, while it is 58.2 with high SES levels as shown in Table (7.1).

TABLE (7.1)

CONTRACEPTIVE PREVALENCE RATE BY SOCIOECONOMIC SETTING AND PROGRAM EFFORT INDICES BY GOVERNORATE

Socioeconomic Setting	Program Effort						Mean
	Strong		Moderate		Weak		
	Governorate	CPR	Governorate	CPR	Governorate	CPR	
High	Alexandria	62.1	Dakahlia	52.8	Cairo	58.1	
	Port-Said	60.5					
	Suez	57.3					
		(60.0)		(52.8)		(58.1)	58.2
Moderate	Damietta	53.4	Gharbia	55.9	Kalyoubia	57.9	
	Ismailia	50.2	Menoufia	55.7	Aswan	31.9	
			Giza	49.9			
		(51.8)		(53.8)		(44.9)	50.7
Low			Sharkia	49.2	Beni-Suef	29.2	
			Kafrel-Sheikh	47.2	Fayoum	33.3	
			Behera	54.7	Menya	21.9	
			Assuit	28.2	Souhag	19.8	
					Qena	24.7	
				(44.8)		(25.8)	34.2
Mean		56.7		49.2		34.6	45.4

Note: Mean Prevalence, at each level of program effort and socioeconomic setting, shown in parentheses.

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TABLE (7.2)

MEAN CONTRACEPTIVE PREVALENCE RATES (%) BY SOCIOECONOMIC SETTING AND PROGRAM EFFORT, WITH UNIT WEIGHTS AND FEMALE POPULATION SIZE WEIGHTS.

Socio-economic Setting	Program Effort			Total
	Strong	Moderate	Weak	
Unit Weights:*				
High	60.0	52.8	58.1	58.2
Moderate	51.8	53.8	44.9	50.7
Low	____	44.8	25.8	34.2
Total	56.7	49.2	34.6	45.4
Female Pop.Weights:				
High	61.4	52.8	58.1	57.1
Moderate	52.1	53.4	52.1	53.0
Low	____	42.9	24.7	32.8
Total	58.1	49.0	38.3	47.1

Note: A dash indicates that there were no governorates in
   the category.
* From Table (7.1)

Prevalence increases in a regular manner as one moves from weak to strong program effort. The mean prevalence increases from 34.6 with weak PE to 49.2 with moderate PE while it is 56.7 with strong PE level. In general, contraceptive prevalence increases with increased program effort within each SES category, and the same is true for the effect of SES within each program effort category. The principal conclusion from this tabulation is that increase of prevalence is associated with both SES and PE.

The effects of SES and PE are actually more complex than is suggested by this first look at Table (7.1), because an interaction effect exists between these two determinants of contraceptive prevalence. As a consequence of this interaction, contraceptive prevalence that can be achieved with a given program effort in a particular governorate depends on the level of SES in the governorate. Evidence of interaction is available in the table. For example, among the governorates with a high SES, a change in PE from "moderate" to "strong" would push prevalence up from 52.8 to 60. Among governorates with low SES, a change in PE from "weak" to "moderate" would push prevalence up from 25.8 to 44.8. Among governorates with strong PE, a change in SES from "moderate" to "high" would push prevalence up from 51.8 to 60. With a weak PE, a change in SES from "low" to "high" would push prevalence up from 25.8 to 58.1 (See Figure 7.1).

Two exceptions were found. CPR is higher (52.8) for the moderate PE and high SES than in the weak PE and SES (58.1), while it was expected to be lower. Also, CPR is higher for the strong PE and moderate SES (51.8) than with moderate program effort and moderate SES (53.8), while it was expected to be lower.

The trends with female population-size weighing - are shown in Table (7.2). These means are considered standardized means because the number of female population in each governorate was used as a factor to calculate the overall prevalence rate for each group. These standardized means

FIGURE (7.1)
CONTRACEPTIVE PREVALENCE RATES BY LEVEL OF SES AND PE
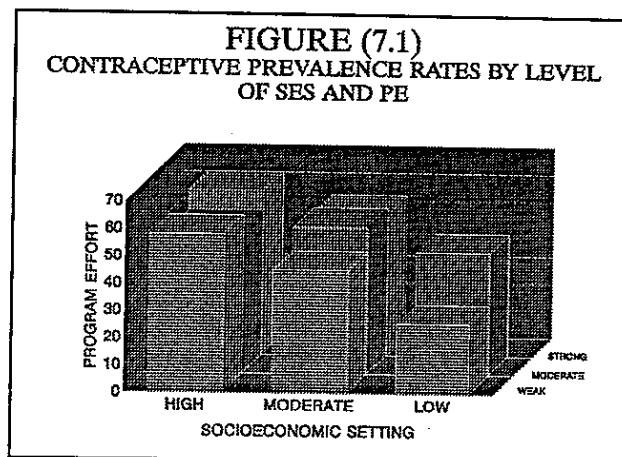
follow the same distribution as that of the unit weights. Governorates with small population size push the prevalence rates up, while governorates with large population size pull the prevalence rates down. One can say that the general picture on this population-weighted basis is not different from that with the unit weights: for all governorates, contraceptive prevalence rates increase as one moves from weak to strong program effort and from weak to high socioeconomic setting.

The key implication of the relationship between SES and PE can be summarized as follows:

1-   There is a strong positive relationship between SES and PE and contraceptive prevalence rates.

2-   The highest CPR is found with high SES and high PE, and the lowest one is found with low SES and low PE.

3-   CPR increases as one moves from weak to strong PE, but the importance of PE increases with low SES. This means that improving PE among populations with low SES has a more positive effect on prevalence than the case with high SES level.

4-   Within each PE category, contraceptive prevalence increases as one moves from low to high SES, but the importance of SES increases with low PE. That is, the effect of improving SES with low PE has more positive effect on prevalence than improving SES level with strong PE.

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2. STATISTICAL ANALYSIS:

2.1 Regression Analysis:

2.1.1 Gross Relationships:

Depending on equations number 2.1 and 2.2, Chapter 2, two regression lines were fitted using contraceptive prevalence rate as a dependent variable and socioeconomic setting and program effort as explanatory variables to measure the gross impact of each variable on the contraceptive prevalence rate in the Egyptian governorates. The results are given in Table (7.3). It is evident from these results that both socioeconomic setting and program effort have a significant effect on contraceptive prevalence rate, but SES have an explanatory power about twice that of PE. The coefficient of determination (R^2) which refer to the amount of variations in the dependent variable that explained by the independent variable, is .56 for the SES while it is only .30 for the PE. This means that SES explains 56% of the variations in CPR while PE explains only 30% of the variations in the dependent variable (CPR).

TABLE (7.3)

GROSS RELATIONSHIPS BETWEEN CONTRACEPTIVE PREVALENCE RATE (DEPENDENT VARIABLE) AND SOCIOECONOMIC SETTING AND PROGRAM EFFORT (INDEPENDENT VARIABLES)

INDEPENDENT VARIABLE	CONSTANT	UNSTANDARDIZED REGRESSION COEFFICIENT	COEFFICIENT OF DETERMINATION R^2
Socioeconomic Setting Index	45.42	26.47*** (5.34)	.56
Program Effort Index	3.33	2.56*** (0.91)	.30

*** Significant at P ≤ .01

Note: Numbers between parentheses are the standard errors.

2.1.2 Net Relationship:

A more precise qualification of the separate roles of SES and Family planning program effort requires a multiple regression analysis rather than simple regression (one independent variable in the regression model). The dependent variable is the CPR and the independent variables are SES index, PE index, and the interaction of program effort with SES index. The interaction variable is the product of PE and SES. The relationship which was described in equation no. 2.3, chapter 2, is examined now.

The results of these regression are presented in Table (7.4). The unstandardized regression coefficient for the index of SES is 89.1556 (standard error = 30.44), which is statistically significant at $P \leq .01$. The corresponding coefficient for the index of PE is 1.8576 (standard error = 1.01), which is statistically significant at $P \leq .10$. The interaction between SES and PE also statistically significant at $P \leq .05$, with a coefficient equal to -4.0350 (standard error = 1.83). The variables in the model explain 67% of the variations in the CPR among governorates. The significance of the whole model is measured by F statistics, it is statistically significant at $P \leq .01$. The regression equation can be written as follows:

$$\text{CPR} = 17.67 + 89.16 \text{ SES} + 1.86 \text{ PE} - 4.04 \text{ SES*PE} \qquad (7.1)$$

Apparently, when program effort and socioeconomic setting effects are considered jointly, the role of program effort as a determinant of CPR can be substantial. Consider, for example, the case of a governorate with a low level of SES (eg. SES = -.58), and a very large change in program effort (eg. from PE = 14 to PE = 24). Using the parameters in Table (7.4), the estimated CPR effects of improving program effort in a low SES is 42.0, the difference between the predicted CPR at PE = 14 which is 24.7 and the predicted CPR at PE = 24 which is 66.7. Using equation no. (7.1), the predicted CPRs are calculated for the nine categories of table (7.1) using the mean PE scores and mean SES scores versus the observed CPR. The results are given in Table 7.5. the difference between the observed and predicted CPR is somewhat small for all categories.

TABLE (7.4)

REGRESSION ANALYSIS OF THE FAMILY PLANNING PROGRAM EFFORT AND SOCIOECONOMIC SETTING ON CONTRACEPTIVE PREVALENCE RATE

EXPLANATORY VARIABLES	UNSTANDARDIZED REGRESSION COEFFICIENT
Socioeconomic Setting Index	89.1556***
	(30.4392)
Program Effort Index	1.8576*
	(1.0052)
Interaction Term	-4.0350**
	(1.8341)
Constant	17.6646
R^2	.67
F Ratio	11.4296***

*** Significant at $P \leq .01$
 ** Significant at $P \leq .05$
  * Significant at $P \leq .10$
Note: Numbers between parentheses are the standard errors.

TABLE (7.5)
OBSERVED AND PREDICTED CONTRACEPTIVE PREVALENCE RATES BY GROUPS OF SOCIOECONOMIC SETTING AND PROGRAM EFFORT

SES-PE	Observed CPR (1)	Predicted* CPR (2)	O-P (1)-(2) (3)
High-Strong	60.0	58.8	1.2
High-Moderate	52.8	53.8	-1.0
High-Weak	58.1	63.6	-5.5
Moderate-Strong	51.8	55.3	-3.5
Moderate-Moderate	53.8	49.4	4.4
Moderate-Weak	44.9	44.4	0.5
Low-Strong	NA	NA	NA
Low-Moderate	44.8	42.2	2.6
Low-Weak	25.8	29.5	-3.7

* Calculated by equation no. (7.1).

2.2 Path Analysis:

Path model is a set of simultaneous linear regression equations, which specify the relations between the variables in the experiment. It specifies quantitative relations and gives direct and indirect effects. Each equation of the Path model represents a causal link rather than a more empirical association, that is in contrast to a regression model where each equation represents the conditional mean of the dependent variable in that equation as a function of the explanatory variables (Abdel-Ati, 1993; Asher, 1983).

The Path equations are given in Chapter 2 (equations No. 2.4 & 2.5). The Path diagram is given in Figure (7.2). As shown in this figure, the arrows indicate the assumed direction of effect, with the vertical arrows indicating unexplained or residual effects. According to this model, socioeconomic setting has slightly more <u>direct</u> effect on contraceptive prevalence (0.6694) as compared with the effect of program effort (0.3365). But this understates the total effect of socioeconomic setting inasmuch as it also operate through program effort. The indirect effect of the socioeconomic setting on CPR - which is the effect of SES through PE - is estimated by multiplying the path value from socioeconomic setting to program effort (0.6152) by (0.3365), which is equal to 0.2070. Thus, the combined direct and indirect effect of SES is 0.6694 + 0.2070 which equal to 0.8764. The direct and indirect effect of SES and PE on CPR are given in Table (7.6).

The Path coefficients of unexplained variance for contraceptive prevalence is modest (0.4019), but it is relatively large for program effort (0.7884). That is , the unexplained variations on CPR by SES and PE are less than the unexplained variations on PE explained by SES.

The results of statistical regression and path analysis are consistent with the descriptive one. The conclusion to be drawn is that socioeconomic setting is associated with much of the variance in contraceptive prevalence in the Egyptian governorates, and that the socioeconomic setting and program effort combined are associated with a greater amount of the variance in prevalence.

FIGURE (7.2)

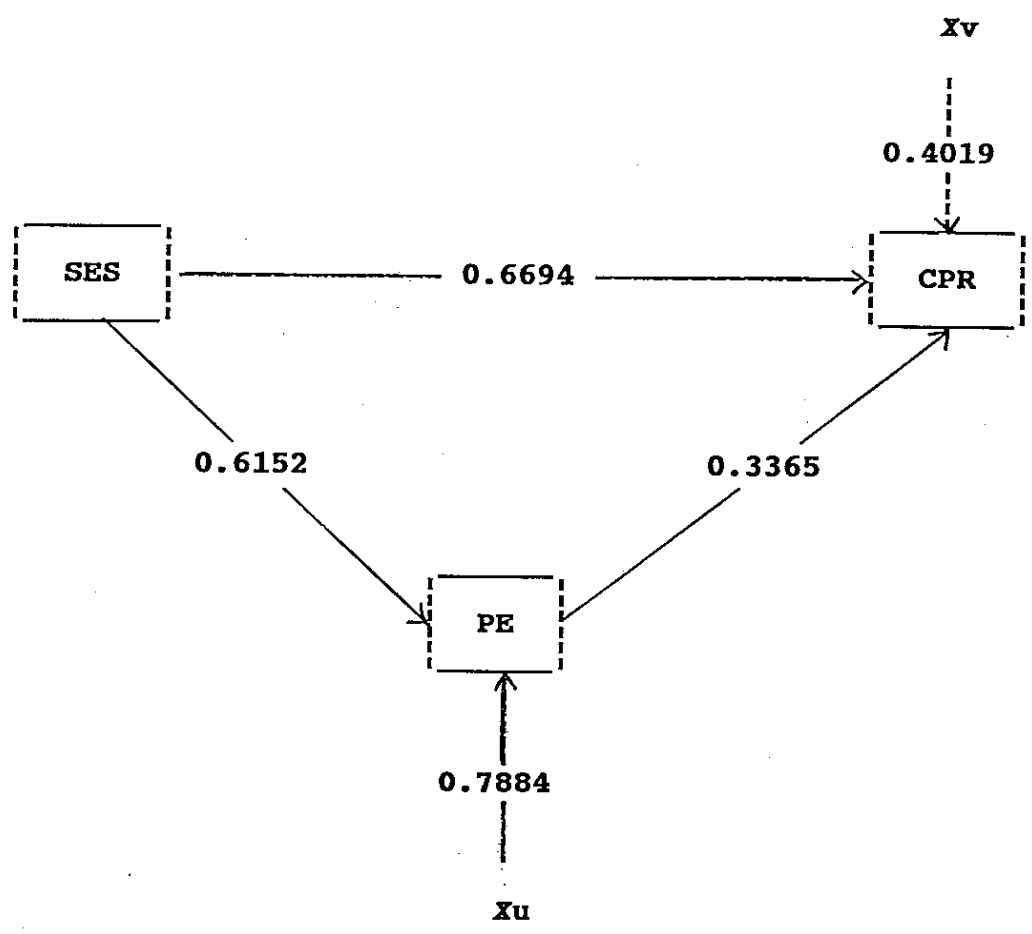**THE STRUCTURE AND THE RESULTS OF PATH ANALYSIS MODEL**

TABLE (7.6)

DECOMPOSITION OF TOTAL EFFECT FOR SOCIOECONOMIC SETTING AND PROGRAM EFFORT ON CONTRACEPTIVE PREVALENCE IN THE PATH MODEL

VARIABLE	DIRECT EFFECT	INDIRECT EFFECT	TOTAL EFFECT
SOCIOECONOMIC SETTING	0.6694	0.2070	0.8764
PROGRAM EFFORT	0.3365	NA	0.3365

Note: NA = Not applicable.