Perspectives on Women's and Children's Health in Egypt

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Results of Further Analysis of the
2000 Egypt Demographic and Health Survey

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Fertility Preferences

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1 Introduction

Changes in fertility preferences are considered to be a key determinant of increased demand for family planning and, thus, ultimately of fertility levels in a society (Rutstein 1998). This study attempts to gain a better understanding of the patterns of change over time in key indicators of fertility preferences in Egypt. The study looks at trends in several indicators of women's fertility desires including: (1) the ideal family size; (2) the planning status of recent births; and (3) future fertility intentions. Trends in these various fertility preference indicators are examined for both the country as a whole and for key residential and socio-economic groups.

In addition to looking at the basic indicators of women's fertility desires, the study also considers how women's fertility attitudes and behavior may be shaped by preferences with respect to the sex of children. In a detailed study of gender preferences in developing countries, Arnold (1997) noted that Egypt was one of a number of countries in which there was evidence in the early 1990s of a preference for sons. The study explores whether there is continuing evidence of a distinct preference for sons among Egyptian women and, if so, the groups where son preference is most marked.

The results of this study are of special importance to policy makers as they seek to understand the impact that the fertility preferences of Egyptian women may be having on the pace of fertility change in the country. In particular, the study will address the question of whether preferences have "stabilized" and, if so, the factors that may be related to the stabilization of preferences. The study also addresses the role that son preference may be playing in shaping the reproductive intentions and behavior of Egyptian couples.

2 Data

2.1 Preference Questions in EDHS Surveys

The data used in this analysis come from the 2000 Egypt Demographic and Health Survey (EDHS) (El-Zanaty and Way 2001) and from earlier rounds of the surveys conducted in 1988, 1992, and 1995 (El-Zanaty et al. 1996, El-Zanaty et al. 1992, and Sayed et al. 1993). All four EDHS surveys explored a number of aspects of women's fertility preferences. The questions fall broadly into the following three categories.

- **Ideal (preferred) number of children.** To obtain information on the ideal number of children, women were asked: *If you could go back to the time you did not have any children and could choose exactly the number of children to have in your whole life, how many would that be?* In addition, women were asked about the number of boys and the number of girls they would prefer.

- **Planning status of recent births.** To obtain information on the extent of unintended childbearing, women were asked the following question about the planning status of each of the births during the five-year period before the survey: *At the time that you became pregnant [with (NAME)], did you want to have that child then, did you want to wait until later, or did you want no (more) children at all?*

- **Future childbearing intentions**. To obtain information on intentions about future childbearing, women were asked: *Now I have some questions about the future. [After the child you are expecting] would you like to have (a/another) child or would you prefer not to have any more children?*

The wording of these questions was virtually identical in the four surveys, facilitating an examination of trends across the period covered by the four surveys.

2.2 Measurement Issues

Each of the three sets of fertility preference questions described above provides a slightly different window from which to explore women's fertility desires. They also are all subject to some degree of response bias. For example, the question on the ideal family size is clearly abstract, requiring women to ignore the current number of children they have and to specify the number they would have if they were to begin childbearing over again. Women who have difficulty with the question may simply report that they prefer the number of children they have or they may give a non-numeric answer. These problems also may influence follow-up questions on the ideal number of sons and daughters.

Other DHS fertility preference questions also have some inherent problems. For example, the responses to the questions on the fertility planning status of recent births may be influenced by the tendency to consider a child as wanted once it is born no matter what the childbearing intention was at the time that the child was conceived. Thus, measures based on these questions may underestimate the level of unintended childbearing.

Questions on current fertility intentions (i.e., the desire for more children and the timing desired for the next birth) reflect a woman's expressed attitudes about future childbearing. However, the intensity of those expressed fertility preferences and, thus, a woman's motivation to act to control childbearing varies with the individual woman. As a result, measures based on current fertility intention questions may not be a totally accurate predicator of actual behavior.

Clearly, these issues must be kept in mind in considering the discussion of the levels and trends in the various fertility preference indicators that follows. Nevertheless, the examination of the fertility preference data is important both for understanding the current state of desired fertility among Egyptian women and the changes over time that have produced the current patterns.

2.3 Socio-economic Variables

In the following analysis, a number of socio-economic variables are used in exploring changes in the levels and trends in the various fertility preference indicators. These variables include characteristics of the woman herself (age and education status), of her spouse (education level), and of the household in which she was present on the day of the interview (household wealth index). With regard to the latter variable, following a methodology developed to assess household wealth with DHS data, information on housing conditions and household possessions are used to rank households into quintiles from lowest (Rank 1) to highest (Rank 5) (Rutstein 1999).

3 Ideal Number of Children

As noted above, the EDHS surveys included a question for women about the ideal number of children, i.e., the number they would prefer to have if they could begin childbearing again. In this section of the paper, the data on the ideal (preferred) number of children are used to explore the nature of family size preferences among all currently married women and then to specifically look at the prevalence of the two-child norm among women in the early stages of family formation. The question of the extent to which Egyptian women have experienced excess fertility, i.e., whether they have had more children than they consider ideal, is also examined. Finally, the implications of this excess fertility for the total fertility rate are addressed.

The following are definitions of the key indicators that are used in the analysis presented in this section:

- *Mean ideal (preferred) number of children among currently married women.* This indicator represents the average number of children that Egyptian women reported they would have if they could begin their reproductive lives over again.
- *Percentage of women who currently have two or fewer children who prefer a larger family.* This indicator looks to the future and addresses the issue of the extent to which small family size ideals are prevalent among low-parity women.
- *Percentage of women for whom actual family size exceeds ideal.* This indicator is based on a comparison of the actual number of living children to the ideal (preferred) number of children. It represents the proportion of women who actually have more children than they consider ideal.
- *Wanted fertility rate.* This indicator is a measure of what the fertility rate would be if all excess births had been avoided. Using the approach developed by Lightbourne (1985), the total wanted fertility rate is calculated in the same manner as the total fertility rate except that births exceeding the desired or ideal number of children are excluded.

The following discussion looks at levels and trends in these indicators both for Egypt as a whole and for key socio-economic subgroups.

3.1 Ideal Number of Children among All Married Women

Levels and Trends

Table 1 examines trends in the distribution of currently married women 15-49 interviewed in each of the four DHS surveys according to their responses to the question on the preferred (ideal) number of children. The table also shows the mean ideal number of children among women giving numeric responses and the proportion of women who gave non-numeric answers to the ideal family size question.

Women were somewhat more likely to have given a non-numeric answer in the 2000 EDHS than in earlier surveys (22 percent versus 15-18 percent). Among women who gave numeric responses, there is a considerable degree of uniformity across the four surveys in the number of children women preferred. Around 4 in 10 women preferred two children, and roughly 3 in 10 women considered three children to be ideal. Women were slightly more likely to report that they preferred 4 or more children in the 2000 DHS than in the earlier surveys (25 percent versus 21-23

percent). These family size preferences yield an average ideal family size of slightly under 3 children, which again is consistent across all of the surveys.

Table 1 Percent distribution of currently married women giving numeric responses to the question on preferred family size by the ideal number of children they reported, the mean ideal family size among women giving numeric answers, and the percentage of all currently married women giving non-numeric answers, Egypt 1988-2000

Ideal number of children	1988	1992	1995	2000
None	0	0	0	0
1	3	3	4	2
2	44	46	46	42
3	32	28	29	30
4	16	17	14	18
5	3	3	3	4
6 or more	3	3	3	3
Total percent	100	100	100	100
Total number of married women	8,221	9,153	13,710	14,382
Mean ideal family size	2.9	2.9	2.8	2.9
Percent of women giving numeric answer	17	18	15	22

Socio-economic Differentials

In all of the surveys, Table 2 shows that younger women preferred to have fewer children than older women. This pattern is least in part influenced by the fact that older women have had a greater number of children and at least some of these women may be reluctant to state that they wanted fewer children that they had. However, it also likely reflects a genuine shift in preferences to smaller families over successive generations of women.

Residential differentials in the ideal number of children were evident in the all of the surveys. For example in the 2000 EDHS, the mean ideal number of children among urban women (2.7 children) was slightly less than half a child lower than the mean for rural women (3.1 children), and the ideal family size in the Urban Governorates (2.6 children) was nearly one child lower than the ideal among women in rural Upper Egypt (3.5 children). The mean ideal number of children also decreased as the educational status of the woman and her husband and the household wealth index increased in all of the four surveys.

With respect to changes in the mean ideal number of children, Table 2 confirms that most groups shared in the pattern of stability in the ideal number of children observed at the national level. In general, trends in the mean ideal number of children within subgroups between 1988 and 2000 are relatively small and not always in the same direction. Interestingly among the most uniform pattern is that observed for women's educational status, where the mean ideal number of children actually increased slightly between the 1988 and 2000 surveys for all categories.

Table 2 Mean ideal number of children among all currently married women by selected background characteristics, Egypt 1988-2000

Background characteristic	Mean ideal number of children*			
	1988	1992	1995	2000
Age				
15-24	2.8	2.6	2.6	2.6
25-39	2.8	2.9	2.8	2.9
40-49	3.1	3.1	3.1	3.3
Urban-rural residence				
Urban	2.7	2.6	2.6	2.7
Rural	3.2	3.1	3.0	3.1
Place of residence				
Urban Governorates	2.6	2.6	2.6	2.6
Lower Egypt				
Total	2.7	2.7	2.6	2.8
Urban	2.5	2.6	2.6	2.7
Rural	2.8	2.8	2.6	2.9
Upper Egypt				
Total	3.3	3.3	3.3	3.3
Urban	2.9	2.8	2.8	2.9
Rural	3.6	3.5	3.6	3.5
Women's Education				
No education	3.1	3.1	3.1	3.3
Primary incomplete	2.8	2.9	2.9	3.1
Primary complete/some secondary	2.6	2.6	2.6	2.8
Secondary/higher	2.5	2.5	2.6	2.6
Husband's Education				
No education	3.2	3.1	3.1	3.2
Primary incomplete	2.9	3.0	2.9	3.1
Primary complete/some secondary	2.7	2.8	2.7	2.9
Secondary/higher	2.6	2.6	2.6	2.7
Wealth index quintiles				
1	NA	3.2	3.1	3.2
2	NA	3.0	2.9	3.0
3	NA	2.9	2.9	2.9
4	NA	2.9	2.8	2.9
5	NA	2.6	2.6	2.6
Total	2.9	2.9	2.8	2.9

NA = Not available

3.2 Ideal number of Children among Low-Parity Women

Levels and Trends

Measures based upon the family size preferences of all of the women surveyed may not provide a wholly accurate picture of the direction of future fertility in a society. This is because, as discussed above, the measures are affected by a reluctance that an unknown proportion of women have to report an ideal family size that is lower than the number of children they have. Table 3 attempts to address future fertility by looking at the fertility preferences of low parity women—women who have two or fewer children.

Table 3 shows that the majority of women interviewed in each of the four surveys wanted to have two children. The mean ideal number of children among low-parity women (2.4 children) in the 2000 DHS was nearly half a child less than the mean for all women (2.9 children). This suggests that fertility levels in Egypt will fall if these women achieve their preferred family size.

Nevertheless, Table 3 also shows that the two-child norm is not universal among low-parity women; more than a third of these women wanted at least one additional child at the time of the 2000 DHS, and around 10 percent want four or more children.

Table 3 Among currently married women with two or fewer children (including the current pregnancy), the percent distribution among those who gave numeric responses to the question on preferred family size by the ideal number of children they reported, the mean ideal family size among those giving numeric answers, and the percentage giving non-numeric answers, Egypt 1988-2000

Ideal number of children	1988	1992	1995	2000
None	0	0	0	0
1	4	5	5	4
2	53	60	60	61
3	29	24	25	25
4	10	9	7	8
5	2	1	1	1
6 or more	2	1	1	1
Total percent	100	100	100	100
Total number of married women	3,067	3,435	5,345	5,899
Mean ideal family size	2.7	2.5	2.4	2.4
Percent of women giving numeric answer	12	12	8	13

Socio-economic Differentials

Table 4 examines the variation in the extent to which low-parity women deviate from the two-child norm. The table shows that, typically in all four surveys, younger women, rural women, women living in Upper Egypt, and women who never attended school were more likely than other women to want more than two children. In the 2000 DHS, the highest percentage of low-parity women preferring more than two children was found in rural Upper Egypt (56 percent). The lowest percentages were found among women 40-49 and women living in the Urban Governorates.

Reflecting the pattern observed at the national level, the proportion of low-parity women who expressed a preference for a larger family declined significantly in all subgroups during the period between the 1988 and 1992 surveys. In contrast, there were small increases in the proportions of low-parity women expressing a preference for at least three children in many subgroups between the 1995 and 2000 surveys.

Table 4 Among currently married women with two or fewer children (including the current pregnancy), percentage who prefer three or more children, by selected background characteristics, Egypt 1988-2000

Background characteristic	Percentage preferring three or more children			
	1988	1992	1995	2000
Age				
15-24	49	41	39	41
25-39	39	31	33	32
40-49	37	29	18	19
Urban-rural residence				
Urban	35	28	28	27
Rural	54	44	42	43
Place of residence				
Urban Governorates	30	24	26	22
Lower Egypt				
Total	38	30	29	32
Urban	33	25	29	28
Rural	40	33	29	34
Upper Egypt				
Total	62	52	48	48
Urban	49	39	30	36
Rural	69	60	58	56
Women's Education				
No education	52	44	39	42
Primary incomplete	43	35	35	38
Primary complete/some secondary	36	30	32	35
Secondary/higher	33	30	32	31
Husband's Education[1]				
No education	48	40	37	37
Primary incomplete	48	40	38	36
Primary complete/some secondary	40	32	33	35
Secondary/higher	36	32	33	34
Wealth index quintiles				
1	NA	45	45	45
2	NA	42	34	40
3	NA	38	36	43
4	NA	37	35	38
5	NA	26	29	24
Total	44	35	34	35

NA = Not available

[1] Excludes cases where information on husband's education level is missing

3.3 Excess Fertility

Levels and Trends

Information on women's ideal number of children can be used to look at the magnitude of excess fertility, i.e., the extent to which the level of actual fertility exceeds what women consider ideal. Table 5 presents two measures of excess fertility: (1) the proportion of currently married women who have already had more children than they consider ideal and (2) the extent to which the observed total fertility rate for the period immediately preceding the survey exceeds the wanted fertility rate, i.e., the rate that would have occurred if women had had only their ideal number of births. Both measures are derived from data on the ideal number of children.

Table 5 Percentage of currently married women whose actual number of children exceeded by the number of excess births and a comparison of the total fertility rate and wanted fertility rate, Egypt 1988-2000

Comparison of actual and ideal number of children	1988	1992	1995	2000
Percentage in which the actual number exceeds the ideal number by:				
One child	14	13	13	12
Two children	12	12	11	8
Three or more children	16	15	12	9
Percentage reporting excess fertility	42	39	36	28
Total number of married women	8,221	9,153	13,710	14,382
Total Fertility Rate (TFR)	4.5	3.9	3.6	3.5
Wanted Total Fertility Rate (WTFR)[1]	3.0	2.7	2.6	2.9
Excess childbearing[2]	1.5	1.2	1.0	0.6
Percentage of actual TFR representing excess births	35	31	29	19

Note: Fertility rates are based on births in the three-year period before the survey
[1] The fertility rate excluding births that exceeded the woman's ideal number.
[2] The difference between the actual and wanted TFRs

The results in Table 5 indicate that substantial proportions of the women interviewed in each of the four DHS surveys would have preferred smaller families than they actually had. However, the proportions experiencing excess fertility declined substantially over the time covered by the surveys. More than 4 in 10 women at the time of the 1988 DHS had more children than they preferred. By the time of the 2000 survey, the actual number of children exceeded the ideal for only 28 percent of women. The reduction in "excess" childbearing is clearly related to the rise in contraceptive use over the period. The contraceptive prevalence rate rose from 38 percent at the time of the 1988 DHS to 56 percent in 2000.

The impact of "excess" childbearing on fertility levels can be assessed by comparing the total fertility rate to the wanted fertility rate; the latter rate is derived from the information on women's ideal numbers of children. Table 5 shows that, if women had been able to implement their family size preferences, the TFR would have been substantially lower at the time of each of the DHS surveys. For example, in the case of the 1988 EDHS, the total fertility rate (4.5) exceeded the wanted fertility rate (3.0) by 1.5 births or almost 50 percent. The gap between the actual and wanted TFRs narrowed between the 1988 and 2000 surveys in response to that fact the actual fertility rate fell by one child while the wanted TFR fluctuated between 2.6 and 3.0 births. The narrowing of the gap between the actual and wanted TFRs is again due in large measure to the increased use of contraception during the period.

Socio-economic Differentials

Table 6 compares the actual TFR at the time of each of the DHS surveys with the wanted TFR for key subgroups of the population. In general, the trends in the wanted TFR parallel the changes in family size preferences from which the measure is derived. The wanted TFR fell among all subgroups between the 1988 and 1992 DHS surveys. At that point, the trend reverses, with the wanted TFR rising during the period between the 1992 and 2000 DHS, particularly among urban and educated women. Despite this rise in the wanted TFR, there continued to be a substantial gap

between the wanted and actual TFR at the time of the 2000 Egypt DHS in all groups. Notably, the 2000 EDHS results indicate that women in rural Upper Egypt are having one birth more than they actually want.

Table 6 Levels of excess fertility in relation to the total fertility rate for the three-year period before the survey by selected background characteristics, Egypt 1988-2000

	1988		1992		1995		2000	
Background characteristic	TFR	WTFR	TFR	WTFR	TFR	WTFR	TFR	WTFR
Urban-rural residence								
Urban	3.6	2.3	2.9	2.0	3.0	2.2	3.1	2.6
Rural	5.6	3.7	4.9	3.4	4.2	2.9	3.9	3.1
Place of residence								
Urban Governorates	3.1	2.0	2.7	1.8	2.8	2.1	2.9	2.5
Lower Egypt								
Total	4.7	2.9	3.7	2.5	3.2	2.2	3.2	2.6
Urban	3.9	2.5	2.8	1.9	2.7	1.9	3.0	2.5
Rural	5.0	3.0	4.1	2.7	3.5	2.3	3.3	2.6
Upper Egypt								
Total	5.6	3.9	5.2	3.7	4.7	3.4	4.2	3.4
Urban	4.3	2.8	3.6	2.4	3.8	2.8	3.4	2.7
Rural	6.3	4.5	6.0	4.3	5.2	3.8	4.7	3.7
Women's Education								
No education	5.5	3.7	5.0	3.5	4.6	3.2	4.1	3.3
Primary incomplete	4.3	2.5	4.0	2.5	3.7	2.5	3.8	2.9
Primary complete/ some secondary	3.4	2.3	3.0	2.0	3.1	2.1	3.4	2.6
Secondary/higher	3.6	2.9	2.9	2.3	3.0	2.5	3.2	2.8
Total	4.5	3.0	3.9	2.7	3.6	2.6	3.5	2.9

4 Unintended Childbearing

The DHS questions on the planning status of recent births provide another perspective from which to explore the extent to which women in Egypt are experiencing unintended fertility. The indicators of unintended childbearing derived from the responses to these questions include:

- *Percentage of recent births that were unintended.* This indicator is based on births during the three-year period before the survey and provides a measure of the proportion of women experiencing unintended childbearing. Unintended births are of two types: (1) those that were mistimed, i.e., wanted but at a later time, and (2) those that were not wanted at all.
- *Intended fertility rate.* It represents what the fertility rate would be if births in the three-year period before the survey that were reported as unintended, i.e., unwanted or mistimed, had been avoided.

Table 7 shows the level of unintended births declined from more than one-third of births in the late 1980s to mid-1990s to one-fifth of births at the time of the 2000 DHS. The impact of unintended childbearing on fertility levels is also examined in Table 7. The TFR in Egypt would have been substantially lower at the time of each of the DHS surveys if women had been able to avoid births they reported as unwanted. The gap between the intended fertility rate and the actual fertility was greatest at the time of the 1988 EDHS survey (1.9 births). By the time of the 2000 survey, the gap had narrowed to 0.7 births.

Obviously, the decline in the level of unintended childbearing over time reflects the fact that women were increasingly able to avoid mistimed or unwanted births by using contraception. However, the very substantial decline in the level of unintended childbearing at the time of the 2000 DHS likely also reflects the effect of the slight upward trend in fertility desires evident in the other preference measures.

Table 7 Percentage of births in the three-year period before the survey reported as unintended by the mother, and a comparison of the total fertility with the rate excluding unintended births

Unintended fertility	1988	1992	1995	2000
Percent of recent births reported as:				
Mistimed	12	10	12	6
Not wanted	21	26	20	13
All unintended	33	36	33	19
Total number of births	6,271	6,061	8,419	8,550
Total Fertility Rate (TFR)	4.5	3.9	3.6	3.5
Total Fertility Rate if:				
Only mistimed births excluded	3.9	3.6	3.3	3.4
Only unwanted births excluded	3.3	2.7	2.8	3.0
All unintended births excluded	2.6	2.4	2.4	2.8
Percentage of TFR representing unintended births	42	38	33	20

Note: Fertility rates are based on births in the three-year period before the survey

Table 8 shows that all groups have shared in the decline in unintended childbearing. For example, in urban Egypt, the level of unintended childbearing, i.e., the percentage of births reported as mistimed or unwanted, declined from 44 percent in 1988 to 17 percent in 2000. In rural areas, the percentage of mistimed or unwanted births declined from 41 percent to 22 percent during the same period.

Despite the general decline in unintended childbearing, it is important to note that the level of unintended childbearing continued to vary substantially across subgroups at the time of the 2000 DHS. As expected, levels of unintended childbearing were highest among the oldest women (58 percent) and lowest among women 15-24 who are at the beginning of the childbearing period. Looking at the other differentials, the highest levels of unintended childbearing was found among women in households in the lowest quintile on the wealth index and women who had never attended school or were married to men who had never attended school or who had less than a primary education (23-26 percent). Unintended childbearing levels were lowest for women with a secondary or higher education (14 percent) and for women married to highly educated men (13 percent) or living in households ranking at the top of the wealth index (14 percent).

Table 8 Percentage of births in the three-year period before the survey reported as unintended (mistimed or unwanted) and the total unintended fertility rate, Egypt, 1988-2000

Background characteristic	Percentage of recent births mistimed or unwanted			
	1988	1992	1995	2000
Age				
15-24	18	20	18	8
25-39	38	42	37	22
40-49	62	68	63	58
Urban-rural residence				
Urban	44	39	32	17
Rural	41	39	37	22
Place of residence				
Urban Governorates	45	38	33	17
Lower Egypt				
Total	32	36	37	15
Urban	43	34	33	15
Rural	42	39	41	17
Upper Egypt				
Total	32	37	29	23
Urban	45	46	28	20
Rural	39	39	32	27
Women's Education				
No education	40	38	35	23
Primary incomplete	46	43	38	21
Primary complete/some secondary	42	39	33	21
Secondary/higher	32	29	25	14
Husband's Education				
No education	34	41	37	25
Primary incomplete	34	40	37	26
Primary complete/some secondary	32	38	35	18
Secondary/higher	28	27	25	13
Wealth index quintiles				
1	NA	36	33	24
2	NA	40	37	21
3	NA	37	33	18
4	NA	39	34	16
5	NA	30	26	14
Total	33	36	21	19

NA = Not available

5 Future Childbearing Intentions

Information was also collected in the EDHS surveys on future childbearing intentions. The data on women's future fertility intentions are used to construct the following indicator of childbearing intentions:

- *Proportion of women wanting to control their childbearing.* Two aspects of fertility control are assessed through the indicator: (1) the level of interest in limiting future births and (2) the level of interest in spacing future births.

Table 9 shows that the vast majority of Egyptian women were interested in controlling their future childbearing at the time of the 2000 DHS; 64 percent wanted no more children and 15 percent wanted to delay the next birth for at least two years. The table shows that the proportion of women

wanting either to space or limit future births has fluctuated around 80 percent since the 1988 DHS survey.

Table 9 Percentage of currently married women wanting to space the next birth or wanting no more children by number of living children, Egypt, 1988-2000

Number of living children and current fertility intention	1988	1992	1995	2000
< 3 children				
Total wanting to control childbearing	55	65	64	73
Want to space[1]	29	31	32	38
Want to limit	26	34	32	35
3 or more children				
Total wanting to control childbearing	84	93	91	91
Want to space[1]	81	88	87	88
Want to limit	3	5	4	3
All women				
Total wanting to control childbearing	80	82	80	79
Want to space[1]	19	17	16	15
Want to limit	61	66	64	64

[1] Wants to delay next birth 2 or more years

Table 9 also controls for the number of living children in looking at the trends in the desire to control childbearing. The results indicate that, among women with less than three children, the desire to control childbearing rose from 55 percent in 1988 to 73 percent in 2000. The increase reflected greater interest in both spacing and limiting. Among women with three or more children, the desire to control childbearing rose early in the period (from 84 percent in 1988 to 93 percent in 1992) and then remained stable at over 90 percent throughout the remainder of the 1990s.

Table 10 presents trends in the percentages of currently married women wanting to control current childbearing according to other background characteristics. There are some fluctuations over time both in the overall level of interest in controlling fertility and in the extent of interest in spacing or limiting within specific subgroups. However, the changes in these measures within subgroups are generally consistent with the overall trends in the indicators.

Looking at differentials at the time of the 2000 EDHS, as expected, the largest variations in the proportions interested in controlling future childbearing are evident across age categories. The most noteworthy other differentials are by place of residence, with women in Upper Egypt, especially rural areas, somewhat less likely to express interest in controlling future childbearing than women living in Upper Egypt or the Urban Governorates.

Table 10 Percentage of currently married women wanting to space the next birth or wanting no more children by selected background characteristics, Egypt, 1988-2000

Background characteristics	Want to space[1]				Want no more				Want to space or limit			
	1988	1992	1995	2000	1988	1992	1995	2000	1988	1992	1995	2000
Age												
15-24	47	46	46	46	26	27	25	22	73	73	71	68
25-39	15	13	12	11	69	71	71	70	84	85	83	81
40-49	3	1	1	0	72	83	82	82	75	84	82	83
Urban-rural												
Urban	17	15	14	14	65	69	66	65	82	84	80	80
Rural	22	18	18	16	56	63	63	63	78	81	80	78
Place of residence												
Urban Governorates	17	14	14	13	66	69	67	68	83	83	81	81
Lower Egypt	18	15	15	14	68	69	68	68	86	85	83	82
Urban	17	15	12	15	70	70	68	68	88	85	81	82
Rural	18	15	16	14	67	69	68	68	85	85	84	81
Upper Egypt	23	20	19	17	49	59	58	58	72	79	77	75
Urban	16	17	16	16	59	68	63	60	75	85	80	75
Rural	26	21	20	18	44	55	56	57	69	77	76	75
Woman's Education												
No education	17	14	12	10	60	68	67	70	77	81	80	80
Primary incomplete	18	11	11	10	65	73	72	71	83	83	83	81
Primary complete/ some secondary	24	20	21	20	58	66	61	57	83	84	81	77
Secondary/higher	28	28	23	22	54	53	55	56	82	82	78	78
Husband's Education												
No education	15	12	10	8	61	69	71	71	76	81	81	80
Primary incomplete	18	14	14	12	62	69	67	69	81	83	81	81
Primary complete/some secondary	24	16	16	16	57	68	65	63	81	84	81	79
Secondary/higher	25	25	22	21	58	58	57	57	83	82	79	78
Wealth index quintiles												
1	NA	17	15	12	NA	62	64	67	NA	78	80	78
2	NA	16	16	14	NA	66	63	65	NA	82	80	79
3	NA	19	18	17	NA	64	63	62	NA	83	81	79
4	NA	17	16	17	NA	68	66	61	NA	84	82	78
5	NA	16	15	14	NA	67	65	65	NA	83	79	79
Total	19	17	16	15	61	66	64	64	80	82	80	79

NA – Not applicable

6 Son Preference

Strong preferences for children of one sex over another (usually sons) can affect decisions about childbearing, regardless of the overall fertility preferences. This section of the study considers the question of whether there have been changes in the prevalence and intensity of son preference over time. The following measures are used in exploring the issue of son preference:

- *Percentage of currently married women indicating that they prefer more sons than daughters:* Women giving a numeric answer to the question on the preferred family size were asked to specify the ideal number of boys and girls. This indicator is based on those women expressing a preference to have more sons than daughters.
- *Percentage of currently married nonpregnant women who want another child according to the number and sex of living children:* This indicator looks at the extent to which gender preferences appear to be influencing future fertility intentions. In general, son preference will be more strongly manifested at lower parities so that the focus in looking at differentials in the indicator is on the childbearing intentions of women who currently have two children.

The first measure relies on the woman's willingness to directly admit a preference and is potentially subject to bias if some women are reluctant to state a preference for one sex over the other. The second measure is less direct, assessing whether the desire for another child appears to be influenced by number of sons and daughters a woman currently has.

6.1 Preferred Sex Distribution

Levels and Trends

Table 11 presents the distribution of currently married women who expressed a numeric preference with regard to the ideal number of children according to the sex distribution for these children that they prefer. The results indicate that Egyptian women were most likely to express a preference for an equal number of sons and daughters in all four surveys. However, there was a consistent tendency among those who did not share the preference for a balanced sex distribution to express a desire to have a greater number of sons than daughters.

The level of son preference as assessed by this indicator has decreased over time. The proportion expressing the preference for more sons than daughters declined by around ten percentage points, from just under 25 percent at the time of both the 1988 and 1992 surveys to 14 percent at the time of the 1995 survey. However, the level of son preference in the 2000 survey (18 percent) was somewhat higher than the 1995 level, suggesting some stabilization in the measure.

Table 11 Percent distribution of currently married women who expressed a numeric preference with regard to the ideal number of children according to the sex distribution for these children that they prefer, Egypt 1988-2000

Gender preference for ideal number of children	1988	1992	1995	2000
More sons than daughters	24	23	14	18
Equal number of sons and daughters	49	52	80	75
More daughters than sons	8	8	5	5
Up to God/Doesn't matter/Not sure	19	17	<1	2
Total percent	100	100	100	100
Total number of married women	6,865	7,447	11,694	11,267

Socio-economic Differentials

Table 12 presents the distribution of ever-married women indicating that they prefer a greater number of sons than daughters among women giving numeric answers with regard to the ideal number of sons and daughters by background characteristics. At the time of the 2000 EDHS, the percentage of women expressing a preference for more sons than daughters ranged from a low of 8 percent among women in the Urban Governorates to a high of almost 30 percent among women in rural Upper Egypt.

The table shows that, in virtually all groups, the expression of a preference for sons rose slightly between the 1995 and 2000 surveys after declining markedly between the 1992 and 1995 surveys. For example, during the period 1995-2000, around one-fifth of women with no education who had a numeric preference (17 percent in 1995 and 22 percent in 2000) indicated that they wanted more sons than daughters; this represented a substantial decline from the levels of son preference reported in the 1988 and 1992 surveys when roughly three in ten women said they preferred to have a greater number of sons than daughters.

Table 12 Percentage of ever-married women indicating that they prefer a greater number of sons than daughters among women giving numeric answers with regard to the ideal number of sons and daughters according to selected background characteristics, Egypt 1988-2000

Background characteristic	1988	1992	1995	2000
Age				
15-24	25	27	13	17
25-39	25	28	14	18
40-49	28	28	15	19
Urban-rural				
Urban	21	26	10	14
Rural	31	33	18	22
Place of residence				
Urban Governorates	22	20	7	8
Lower Egypt	22	28	11	16
Urban	21	22	10	15
Rural	23	31	12	17
Upper Egypt	35	34	22	27
Urban	33	30	16	22
Rural	42	36	25	29
Woman's Education				
No education	30	33	17	22
Primary incomplete	24	25	14	21
Primary complete/ some secondary	22	23	13	15
Secondary/higher	17	23	10	14
Husband's Education				
No education	30	33	17	22
Primary incomplete	25	27	15	20
Primary complete/some secondary	24	25	12	17
Secondary/higher	21	24	12	15
Wealth index quintiles				
1	NA	36	18	21
2	NA	31	15	22
3	NA	29	14	22
4	NA	25	14	18
5	NA	22	10	12
Total	26	28	14	18

NA- Not available

6.2 Desire for Another Child and the Sex Distribution of Living Children

Levels and Trends

Table 13 looks at the variation in the percentage of women indicating that they want another child according to the sex distribution of the woman's living children. The reverse J-shaped pattern evident in the table except at the highest parities indicates a mixture of strong son preference and moderate balance preference. Depending on the parity, women with no sons are two to three times as likely to indicate that they want another child as women with no daughters. For example, at the time of the 2000 EDHS, among women with two children, 46 percent of those with no sons and two daughters indicate they want another child compared to 25 percent of those with a balanced sex distribution (i.e., one son and one daughter), and 29 percent of those with two sons and no daughters.

Table 13 Percentage of currently married nonpregnant women who want another child by the number and sex of living children, Egypt 1988-2000

Number and sex of living children	1988	1992	1995	2000
One child				
No sons	90	90	89	89
1 son	90	88	89	89
Two children				
No sons	57	49	52	46
1 son	36	31	26	25
2 sons	41	39	39	29
Three children				
No sons	28	28	26	18
1 son	18	16	13	11
2 sons	14	10	9	6
3 sons	19	18	14	9
Four children				
No sons	21	27	23	22
1 son	12	11	13	6
2 sons	8	4	4	4
3 sons	6	3	4	3
4 sons	8	8	5	7
Five+ children				
Sons<daughters	5	3	4	2
Sons=daughters	2	1	1	<1
Sons>daughters	1	1	2	1
Total	30	28	28	26

The trend across the four surveys suggests that, regardless of the sex composition, the proportion of women indicating that they want another child has gone down. However, among those women who do want additional children, the relative preference for sons appears to have strengthened over time. For example, at the time of the 1988 EDHS, women with two children were 40 percent more likely to want another child if they had no sons than women with no daughters. At the time of the 2000 EDHS, women with no sons were 60 percent more likely than women with no daughters to want another child.

Socio-economic Differentials

Table 14 explores the issue of whether the level of son preference varies across background characteristics by contrasting the percentages who want to go on to have another child among women with two sons and no daughters and among women with two daughters and no sons. The decisions couples at this parity make about future childbearing are crucial in determining the pace of Egypt's progress toward replacement-level fertility. In looking at the table, it should be kept in mind that the number of cases on which the results are based is small and, thus, random fluctuations in patterns may be expected.

As expected, the results generally indicate that evidence of son preference is especially marked among women living in rural areas, particularly in Upper Egypt, and women who have never attended school. For example, at the time of the 2000 DHS, rural women with no sons and two daughters were almost twice as likely as women with two daughters and no sons to report wanting another child (66 percent and 37 percent, respectively). A preference for sons was also evident among urban women but the level was not as strong as that observed among rural women.

Table 14 Among currently married nonpregnant women with two children where the children are of the same sex, percentage who want another child, Egypt 1988-2000

Background characteristic	No sons, two daughters				No daughters, two sons			
	1988	1992	1995	2000	1988	1992	1995	2000
Urban-rural								
Urban	44	38	43	31	33	33	32	22
Rural	74	64	69	66	54	47	48	37
Place of residence								
Urban Governorates	36	25	35	30	31	36	30	18
Lower Egypt	63	47	56	44	41	33	33	30
Urban	65	46	52	23	35	30	25	28
Rural	63	48	60	56	46	35	39	31
Upper Egypt	74	72	66	65	52	50	54	35
Urban	49	60	48	41	35	26	43	20
Rural	90	79	80	80	64	64	62	48
Woman's Education								
No education	69	63	70	55	50	45	46	33
Primary incomplete	54	44	54	51	43	44	35	40
Primary complete/ some secondary	56	36	47	57	33	34	39	34
Secondary/higher	35	41	44	37	26	33	34	23
Husband's Education								
No education	60	62	60	45	45	41	42	29
Primary incomplete	59	62	59	59	34	32	55	25
Primary complete/some secondary	60	35	44	40	58	55	36	38
Secondary/higher	46	44	50	45	25	36	33	27
Wealth index quintiles								
1	NA	74	71	56	NA	51	39	35
2	NA	61	61	63	NA	49	41	28
3	NA	64	60	64	NA	38	47	43
4	NA	56	57	53	NA	40	52	36
5	NA	30	40	28	NA	31	28	17
Total	57	49	52	46	41	39	39	29

NA = Not available

In general, the trends in fertility preferences among subgroups parallel the national trend, i.e., overall, the percentage of women with two children who expressed a desire for another child declined over time between the 1988 and 2000 surveys regardless of the sex composition of the living children, but son preference strengthened as a factor motivating women to continue childbearing.

7 Conclusions and Policy Implications

This analysis of the trends and differentials in fertility preferences among Egyptian women shows that fertility preferences for many subgroups have stabilized at levels above replacement. The study also documents the strong role that son preference appears to continue to play in shaping women's future childbearing intentions.

From both the policy and program perspectives, these results indicate that there is a continuing need to emphasize the desirability of a two-child family and to support information and education programs that will encourage the substantial proportion of Egyptian couples who want three or more children to consider having smaller families. The strong preference for sons underscores the need for programs promoting gender equality throughout Egyptian society since the preference

reflects strongly held cultural values that are not likely to change without concentrated and long-term commitments to efforts to improve the status of women in Egyptian society.

The nature of the impact that such efforts will have on fertility levels is, however, difficult to predict. Lee (1980) was among the first to argue that, in societies undergoing fertility transition, period fertility falls faster than desired fertility. Casterline (2001) concludes that this pattern is related to the fact that couples rapidly adjust their childbearing behavior in response to factors that shape the demand for children while the fertility desires they express remain static. There is a growing body of research that supports this hypothesis. For instance, after looking at trends in actual and desired fertility in 54 countries (both developing and developed), Bongaarts (2001) concludes that, while fertility levels generally exceed desired fertility in the initial stages of the fertility transition, the pattern is reversed—desired fertility exceeds actual fertility—in countries in which the transition is in or nearly in the final stages.

Research also suggests that son preference does not appear to have as strong an impact on fertility as might be expected. In looking at the effect of son preference on reproductive behavior in Egypt and a number of other Asian and Near East countries, for example, Arnold (1997) concluded that the son preference is not a major barrier to the fertility transition in these societies.

Thus, although efforts to change fertility preferences are likely to influence the achievement of Egypt's goal of attaining replacement-level fertility in the long-term, policy and program initiatives aimed at helping couples to avoid unwanted childbearing may be equally important in the near term. This study shows that Egyptian women are currently having roughly 20 percent more children than they would prefer. Curtis (2003) found that nearly two-thirds of the unwanted births reported by Egyptian women followed a period of contraceptive use ending in a contraceptive failure or discontinuation. Increasing access to permanent contraceptive methods and improving the counselling available to women seeking contraceptive services are among the steps that should be considered in efforts to reduce unwanted childbearing.

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Patterns of Reliance on Public and Private Providers for Reproductive Health Services in Egypt

Hassan Zaky

1 Introduction

The reproductive health status of women is arguably one of the most important indicators of overall well being of a nation. An inadequate supply of reproductive health preventive and curative services are thought to be an important factor contributing to women's poor health status and high maternal mortality rates in developing countries.

Ideally, the availability of reproductive health services should not be a constraint to accessing reproductive health care. However, beyond basic availability, other issues relating to supply may be important in determining access, including factors that affect provider choice in cases where multiple outlets offering the same or similar services co-exist. In looking at provider choice, a common dichotomy is between public and private providers. Where public and private sector outlets offer the same services, they generally differ in terms of price, convenience, etc., leading the user to select an outlet on the basis of income, opportunity costs, and personal preferences. In some instances, the public sector may distort the market by extending subsidies to clients willing and able to pay higher prices for goods and services.

The objective of this study is to obtain more detailed insight into the factors that influence the choice of provider for family planning and maternal health services in Egypt. An understanding of the patterns of provider choice and their determinants will be of use to policy makers and program managers as they seek ways in which to both improve the coverage and increase the sustainability of reproductive health services. While the need for such investigation has been recognized, research relating to the choice of reproductive health provider in Egypt is limited. Literature addressing aspects of the issue within the Egyptian context include Heilman and Martinkowsky (1993), Kemprecos and Boutros (1993), Khalifa (1995), and Ravenholt and Russell (1993).

This study will add to the understanding of provider choice by addressing in detail the following topics:

- Current patterns of reliance on public and private providers among family planning users;
- Current patterns of reliance on public and private providers for maternity care services;
- Consistency in provider choice among clients utilizing both kinds of services; and
- Determinants of the choice of public and private providers.

2 Data and Methods

The data on the sources from which women obtained family planning and maternity care services used in this study is drawn from information collected in the 2000 Egypt Demographic and Health Survey (EDHS). In the 2000 EDHS, family planning source information was collected for all episodes of contraceptive use during the five-year period before the survey. With regard to the current segment of use, information was obtained from all users on the source from which the method was obtained at the beginning of the current segment of use and, for users of methods requiring periodic resupply (pills, injectables, condoms, and vaginal methods), on the source to

which user had gone most recently to obtain the method. For episodes other than the current segment, the source is the outlet at which the method was obtained at the beginning of the segment. For purposes of the analysis that follows, the family planning source is generally grouped by sector (public or private).[1] In looking at the sources for methods requiring resupply (e.g., the pill), the source is also examined from the point of view of the type of provider (clinical and pharmacy/other nonclinical).

For births, information was collected in the 2000 EDHS survey on the sources from which the mother received the following services: antenatal care, a tetanus toxoid injection(s), or delivery care. With regard to antenatal or tetanus toxoid services, multiple sources were coded in those cases where the mother had gone to more than one type of provider. For deliveries, the source information refers to the place of delivery.[2] For purposes of the analysis of maternity care services, source data is grouped by sector (public or private).

The analysis undertaken in this study focuses first on providing a descriptive profile of the patterns of reliance on sources of family planning and maternity care services. Logistic regression is then used to obtain a more indepth understanding of the determinants of the choice of reproductive health care providers in Egypt.

3 Source for Family Planning Services

This section addresses basic questions relating to the choice of provider for family planning services including:

- How are current family planning users distributed by source?
- How does the source relied on by current users vary according to key background characteristics?
- Do clients appear to be consistent over time in the choice of provider where family planning services are obtained?

3.1 Source at Beginning of Current Segment of Use

Table 1 shows the distribution of current users of modern methods by type of source from which the method was obtained at the beginning of the current segment of use. Overall, at the time they began using their method, one in every two of these users went to a public sector source for the method, around one in three obtained the method from a private clinic (including private hospital/clinic/doctors and mosque/church clinics), 5 percent relied on NGO/PVO providers, and 11 percent went to pharmacies. The source from which users obtained services at the beginning of the current segment varies markedly by method. Table 1 shows that the majority of IUD insertions occurred at a public sector source (54 percent) while 40 percent of the insertions were performed at private clinics. Four out of five users obtained the injectable at a public sector source at the

[1] For purposes of the analysis, sources are grouped as follows. Public sector providers include all government-operated facilities (MOHP facilities including urban hospitals, urban health units, rural hospitals, rural health units, MCH centers, mobile units and teaching hospitals; Health Insurance Organization facilities; and other governmental facilities). Private sector providers include: (1) facilities operated by nongovernmental (NGO) or private voluntary organization (PVO) (Egyptian Family Planning Association (EFPA) facilities; Clinical Services Improvement Project (CSI) facilities; and other NGO/PVO clinics); (2) private clinical (private hospitals, clinics or doctors and medical facilities run by mosques or churches); and (3) pharmacies.

[2] A small proportion of respondents received assistance from a medical provider for home deliveries. Because no information is available on the type of provider (i.e., public or private), these respondents are not included in the analysis.

beginning of the current segment of use, and almost all Norplant insertions took place at public facilities. The comparatively few respondents who reported use of female sterilization were evenly split between those obtaining the method at a public sector provider and those relying on a private provider.

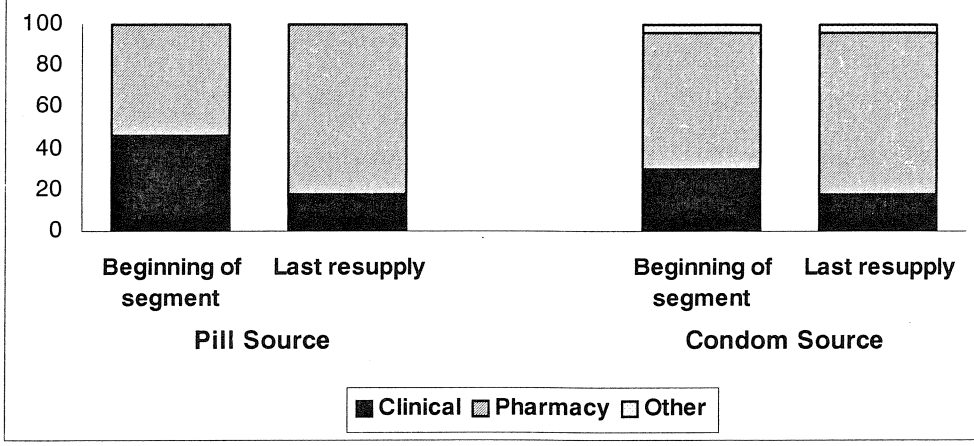
Table 1 Percent distribution of users of modern methods by type of source from which the method was obtained at the beginning of the current segment of use according to the method used, Egypt 2000

Type of source	Pill	Condom	IUD	Inject-ables	Nor-plant	Female sterili-zation	Vaginal methods	All modern methods
Public	18.3	16.9	54.0	80.0	95.2	46.5	13.0	49.8
Private								
NGO/PVO	0.7	1.7	6.9	2.8	0.0	1.5	0.0	5.1
Private clinical*	27.6	11.8	39.1	14.7	4.8	51.9	40.5	34.1
Pharmacy	53.1	65.9	0.0	2.0	0.0	0.0	46.5	10.9
Other**	0.3	3.7	0.0	0.6	0.0	0.0	0.0	0.2
Total percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of users	1,362	140	5,112	876	32	217	23	7,760

NGO=nongovernmental organization
PVO=private voluntary organization
* Includes private hospital/clinic/doctor and mosques/church clinic
** Includes friends/relatives and other

At the beginning of the current segment, pill, condom and vaginal method users were more likely to report getting the method at a pharmacy (53 percent, 66 percent, and 47 percent, respectively) than from either public or private clinical providers. Figure 1 compares the source at the beginning of the current segment with the source where the last supply of the method was obtained for current users of the pill and condoms. The results indicate that, as expected, many of the users who obtain these methods from a clinical provider switch to a pharmacy for resupply.

Figure 1
Type of Source at Beginning of Current Segment of Use and at Last Resupply by Method



3.2 Differentials in Family Planning Source by Background Characteristics

Tables 2-4 present the distributions of current users by the type of source at the beginning of the segment according to selected demographic and socio-economic characteristics for the IUD, injectable, and pill—the three most popular methods in Egypt. The tables offer insights into how patterns of reliance on public and private sector providers vary among users of these methods. In the case of pill users, the results also permit an exploration of the question of how users who consulted a clinical provider when they began using the method differ from users who got the method from a pharmacy without consulting a clinical provider.

For both IUD and injectable users, the tendency to go to public sector sources decreases and reliance on private clinics increases somewhat in importance as the respondent gets older. For instance, 88 percent of injectable users 15-24 obtained the method from public sources compared to around 74 percent of those 40-49 years. In the case of the pill, in contrast, age is not strongly related to whether a user went to a clinical source or the pharmacy at the beginning of a segment of use. In addition, among pill users who obtained the method from a clinical source, age differentials in the likelihood of going to a public or private outlet are not marked.

Higher parity women are somewhat more likely to get the IUD and injectable at a public sector source than women with three children or fewer. They are also somewhat more likely to get the pill at a pharmacy.

Urban-rural residence and place of residence are clearly related to the type of source from which Egyptian women seek contraceptive services. Rural users are more likely to get the IUD or the injectable from a public source than urban women. For example, 59 percent of current IUD users in rural areas got the method from a public source compared to 49 percent of urban IUD users (Table 3). Rural users were somewhat more likely than urban users get the pill from pharmacies without consulting a clinical source. Moreover, urban users who got the pill from a clinical source were much more likely to obtain it at private than at public outlets while rural pill users were more evenly divided between using public and private clinics.

Looking at the differentials by place of residence, reliance on public sources for the IUD and injectable is most common in rural Upper Egypt, followed rural Lower Egypt. Interestingly, there is somewhat greater variability in the level of reliance of IUD users on NGO/PVO providers by place of residence than exists for other characteristics. Pill users were least likely to get the method from a pharmacy at the beginning of the segment of use in urban Upper Egypt (46 percent) and most likely to get it there in rural Lower Egypt (57 percent). Among urban pill users who did seek services from a clinical provider, private outlets were markedly more popular than public outlets, whether the user lived in the Urban Governorates, urban Lower Egypt, or urban Upper Egypt. In contrast, among rural pill users who obtained the method from a clinical provider, the division between private and public outlets is more balanced.

A respondent's education and work status, her husband's occupation and the household's position on the wealth index tend to markedly affect the choice of the source among IUD users and, to a somewhat lesser extent, injectable users. Users of these methods who are more educated, working for cash, married to men in professional, technical or managerial occupations, and/or living in a household at the top of the wealth index are less inclined to obtain the method from public sources and more inclined to rely on private clinics than other users.

Among pill users, these characteristics also are associated with the type of source, particularly with the likelihood of consulting at a clinic rather than getting the method from a pharmacy. For

example, among users at the bottom of the wealth index, 61 percent got the method from pharmacies at the beginning of the current segment of use. In contrast, among users from households at the other end of the household wealth scale, around half consulted a clinical provider (public, NGO/PVO, or private clinical) at the beginning of the segment.

Table 2 Percent distribution of users of the IUD by the type of source at the beginning of the segment according to selected background characteristics, Egypt 2000

	Source at the beginning of segment				
Characteristics	Public	NGO/PVO	Private clinical	Total	Number
Age					
15-24	59.4	6.4	34.2	100.0	738
25-39	54.2	7.2	38.6	100.0	3,222
40-49	49.8	6.5	43.6	100.0	1,152
Number of living children					
0-3	51.9	7.4	40.7	100.0	3,280
4+	57.6	6.2	36.1	100.0	1,832
Urban-rural residence					
Urban	48.7	6.6	44.7	100.0	2,593
Rural	59.4	7.2	33.3	100.0	2,518
Place of residence					
Urban Governorates	48.8	4.3	46.9	100.0	1,218
Lower Egypt	54.9	8.0	37.1	100.0	2,584
Urban	47.5	10.4	42.0	100.0	755
Rural	58.0	7.0	35.0	100.0	1,829
Upper Egypt	57.3	7.2	35.6	100.0	1,271
Urban	50.1	6.4	43.4	100.0	593
Rural	63.5	7.8	28.7	100.0	678
Frontier Governorates	44.9	12.1	43.0	100.0	38
Woman's education					
No education	62.6	6.1	31.4	100.0	1,795
Primary incomplete	61.8	6.8	31.4	100.0	629
Primary complete/some secondary	57.5	6.3	36.3	100.0	678
Secondary complete/higher	42.7	8.0	49.4	100.0	2,009
Husband's education					
No education	63.2	5.4	31.4	100.0	1,159
Primary incomplete	61.0	7.9	31.0	100.0	724
Primary complete/some secondary	62.7	5.2	32.0	100.0	921
Secondary complete/higher	43.6	8.1	48.3	100.0	2,308
Woman's work status					
Currently working for cash	46.6	9.6	43.8	100.0	917
Not working for cash	55.6	6.4	38.1	100.0	4,195
Husband's occupation					
Professional/technical/managerial	41.2	7.8	51.0	100.0	1,500
Other/ not working	59.2	6.6	34.2	100.0	3,612
Wealth index quintiles					
1	67.0	4.7	28.3	100.0	655
2	64.8	6.8	28.5	100.0	804
3	60.8	6.7	32.5	100.0	811
4	58.2	7.3	34.5	100.0	983
5	39.5	7.7	52.8	100.0	1,858
Total	54.0	6.9	39.1	100.0	5,112

Table 3 Percent distribution of users of injectables by the type of source at the beginning of the segment according to selected background characteristics, Egypt 2000

	Source at the beginning of segment						
Characteristics	Public	NGO/PVO	Private clinical	Pharmacy	Other	Total	Number
Age							
15-24	87.8	0.0	10.8	0.3	1.1	100.0	100
25-39	81.0	2.2	14.2	2.1	0.5	100.0	554
40-49	74.0	5.5	17.5	2.5	0.5	100.0	222
Number of living children							
0-3	77.6	2.8	16.9	1.8	0.9	100.0	338
4+	81.5	2.8	13.2	2.1	0.3	100.0	538
Urban-rural residence							
Urban	73.9	3.6	18.3	4.2	0.0	100.0	253
Rural	82.5	2.5	13.2	1.1	0.8	100.0	622
Place of residence							
Urban Governorates	73.2	2.4	18.8	5.6	0.0	100.0	107
Lower Egypt	82.2	3.1	13.0	1.0	0.7	100.0	437
Urban	77.4	6.1	15.3	1.2	0.0	100.0	82
Rural	83.3	2.4	12.4	1.0	0.9	100.0	354
Upper Egypt	79.3	2.5	15.7	1.9	0.6	100.0	321
Urban	69.9	2.2	23.0	5.0	0.0	100.0	57
Rural	81.4	2.6	14.1	1.3	0.7	100.0	264
Frontier Governorates	*	*	*	*	0.0	100.0	11
Woman's education							
No education	84.7	2.0	12.1	1.0	0.2	100.0	501
Primary incomplete	76.7	3.8	16.5	2.4	0.7	100.0	148
Primary complete/some secondary	76.3	4.2	16.4	1.9	1.2	100.0	82
Secondary complete/higher	69.1	3.7	20.6	5.2	1.5	100.0	145
Husband's education							
No education	87.1	2.3	8.8	1.5	0.2	100.0	352
Primary incomplete	80.6	1.3	16.4	1.1	0.6	100.0	177
Primary complete/some secondary	80.6	1.7	15.9	1.1	0.7	100.0	142
Secondary complete/higher	66.7	5.7	22.4	4.2	1.0	100.0	205
Woman's work status							
Currently working for cash	76.4	2.0	14.7	4.5	2.5	100.0	85
Not working for cash	80.4	2.9	14.6	1.7	0.4	100.0	790
Husband's occupation							
Professional/technical/managerial	63.1	2.9	26.5	5.8	1.7	100.0	124
Other/ not working	82.8	2.8	12.7	1.4	0.4	100.0	752
Wealth index quintiles							
1	91.1	1.1	7.7	0.0	0.0	100.0	215
2	81.1	1.7	13.1	2.8	1.4	100.0	209
3	77.5	4.4	17.1	0.5	0.5	100.0	191
4	83.3	0.0	14.6	1.4	0.7	100.0	146
5	56.9	8.9	26.6	7.6	0.0	100.0	114
Total	80.0	2.8	14.7	2.0	0.6	100.0	876

Note: An asterisk indicates figure is based on fewer than 25 cases and has been suppressed.

Table 4 Percent distribution of users of the pill by the type of source at the beginning of the segment according to selected background characteristics, Egypt 2000

Characteristics	Source at the beginning of segment						
	Public	NGO/PVO	Private clinical	Pharmacy	Other	Total	Number
Age							
15-24	19.3	0.2	30.0	50.3	0.2	100.0	171
25-39	18.6	0.6	26.7	53.6	0.5	100.0	855
40-49	16.9	1.2	28.6	53.2	0.0	100.0	336
Number of living children							
0-3	17.4	0.5	30.8	50.8	0.3	100.0	728
4+	19.2	0.9	23.9	55.7	0.3	100.0	634
Urban-rural residence							
Urban	14.5	0.8	33.8	50.6	0.4	100.0	654
Rural	21.7	0.7	21.9	55.5	0.2	100.0	707
Place of residence							
Urban Governorates	15.2	0.8	33.4	49.5	1.1	100.0	223
Lower Egypt	19.3	0.4	24.0	56.4	0.0	100.0	645
Urban	13.1	0.6	31.1	55.1	0.0	100.0	227
Rural	22.6	0.3	20.1	57.1	0.0	100.0	419
Upper Egypt	18.0	1.0	30.5	50.2	0.4	100.0	469
Urban	15.0	0.6	38.6	45.8	0.0	100.0	188
Rural	20.0	1.3	25.0	53.1	0.6	100.0	281
Frontier Governorates	24.9	2.9	16.0	56.2	0.0	100.0	25
Woman's education							
No education	18.4	0.4	21.8	58.7	0.7	100.0	543
Primary incomplete	19.6	0.5	24.8	55.2	0.0	100.0	191
Primary complete/some secondary	16.9	2.1	32.5	48.5	0.0	100.0	222
Secondary complete/higher	18.1	0.5	34.0	47.2	0.1	100.0	406
Husband's education							
No education	17.2	0.7	22.0	59.3	0.8	100.0	346
Primary incomplete	21.9	0.5	21.6	56.1	0.0	100.0	202
Primary complete/some secondary	17.8	0.5	26.7	54.6	0.4	100.0	299
Secondary complete/higher	17.8	0.9	34.2	47.0	0.1	100.0	515
Woman's work status							
Currently working for cash	18.3	1.6	28.0	52.1	0.0	100.0	189
Not working for cash	18.3	0.6	27.5	53.3	0.4	100.0	1,173
Husband's occupation							
Professional/technical/managerial	16.9	1.0	37.4	44.8	0.0	100.0	328
Other/ not working	18.7	0.6	24.5	55.8	0.4	100.0	1,034
Wealth index quintiles							
1	26.5	0.0	12.6	60.6	0.3	100.0	177
2	19.1	0.2	16.3	64.0	0.4	100.0	192
3	21.7	1.3	24.1	52.3	0.6	100.0	278
4	19.1	0.8	28.5	51.3	0.4	100.0	301
5	11.4	0.8	41.0	46.7	0.1	100.0	414
Total	18.3	0.7	27.6	53.1	0.3	100.0	1,362

Finally, despite the close association between the user's socio-economic level and the likelihood of reliance on a private clinical provider for contraceptive services, the results in Tables 2-4 also indicate that many users belonging to relatively wealthy households obtain services from public providers. For example, 40 percent of the current IUD users living in households ranked at the top of the household wealth index obtained the method from a public provider.

3.3 Consistency in Choice of Public and Private Sources among Family Planning Users

The 2000 EDHS collected information on the source from which a user obtained her method for all segments of use of family planning methods during the five-year period before the survey. These data can be used to answer questions about whether family planning users tend to remain 'loyal' to a particular type of source in accessing services or whether they 'switch' public and private sources for services. Since injectables are for the most part only obtained from public sources, the analysis of patterns of consistency will be limited to IUD and pill users who reported two or more segments of use of the method during the five-year period before the survey.

Table 5 shows the percent distribution of women reporting multiple segments of IUD use during the five-year period prior to the survey by type of source from which method was obtained during segments of use. The results clearly suggest there is a high degree of consistency in the type of provider. Four in five of the women who reported multiple segments of IUD use relied on the same type of provider across all of the segments of use. Forty-five percent were consistent in the choice of a public provider, 31 percent always went to private source, while 5 percent consistently got the IUD from a NGO/PVO clinic.

Table 5 Percent distribution of IUD users reporting multiple segments of use during the five-year period prior to the survey by the type of source from which method was obtained during the segments of use

Source	Total reporting multiple segments of IUD use
Always same type	81.0
Public	44.7
NGO/PVO	5.3
Private clinical	31.0
Different types of sources	19.0
Total percent	100.0
Number of women	797

NGO=nongovernmental organization
PVO=private voluntary organization

Table 6 and 7 describe the consistency of source choice among pill users reporting multiple segments of use. In looking at information for pill users, two questions will be addressed:

- How consistent are women in consulting a clinical provider at the beginning of a segment of use?
- If a clinical source is consulted, is it always a public or always a private provider?

Table 6 indicates that, like IUD users, pill users tend to be consistent in the choice of provider across multiple segments of use. Only around 20 percent of pill users switched between a clinical source and the pharmacy.

Table 6 Percent distribution of pill users reporting multiple segments of use during the five-year period by consistency in the kind of provider (clinical versus pharmacy/other) from which the pill was obtained according to the number of segments of use

Source	Two	Three	Four/ more	Total reporting multiple segments of pill use
Always clinical source	25.3	20.5	*	24.7
Always pharmacy	54.0	59.7	*	55.6
Clinical and pharmacy	20.6	19.8	*	19.7
Total percent	100.0	100.0	100.0	100.0
Number of users	274	58	18	350

Note: An asterisk indicates figure is based on fewer than 25 cases and has been suppressed.

Table 7 shows that pill users who got the method from a clinical source also tended to be consistent in the choice of the type of clinical provider. Only 9 percent used different types of providers. Among consistent users, 80 percent always used private sources while 11 percent used public sources.

Table 7 Percent distribution of pill users reporting obtaining the method from a clinical source in two or more segments of use during the five-year period by consistency in the type of source

Source	Total reporting multiple segments of pill use
Always same type	91.3
Public	11.0
NGO/PVO/Private clinical	80.3
Different types of sources	8.7
Total Percent	100.0
Number of users	86

NGO=nongovernmental organization
PVO=private voluntary organization
Private clinical includes private doctor/clinic and mosque/church.

4 Source for Maternity Care Services

In addition to the information on contraceptive sources, the 2000 EDHS collected information on the providers from which women received three types of maternity care services, namely antenatal care, tetanus toxoid immunization, and delivery care. These data help to expand the understanding of the choices women make in obtaining reproductive health services. Using these data, this section attempts to answer three questions:

- How are clients for maternity care services distributed by source?
- How does the source distribution among maternity care clients vary according to key background characteristics?
- Do clients appear to be consistent over time in the choice of provider for maternity care services?

4.1 Source by Type of Maternity Care Service

Table 8 shows the percentage of births during the five-year period before the survey for which mothers received various types of maternity care by the source of care according to the type of care received. The results clearly show that the type of source is strongly related to the type of care sought. Thus, while mothers of three in every four births seek antenatal care at private clinics, mothers of more than nine in every ten births get their tetanus toxoid vaccinations at public sources. In turn, delivery care is split almost evenly between public and private sources.

Table 8 Percentage of all births during the five-year period before the survey for which the mothers received various types of maternity care by the source for the care according to the type of care received, Egypt 2000

Type of source	Antenatal care	Tetanus toxoid	Medically-assisted delivery
Public	23.1	93.0	46.1
Private clinical	72.8	6.1	53.9
Public and private	4.1	0.9	NA
Total percent	100.0	100.0	100.0
Number of births	5,999	8,263	5,475

4.2 Differentials in Maternity Care Sources by Background Characteristics

Tables 9-11 present differentials in the distributions of births according to the type of source at which antenatal care, tetanus toxoid injections, and delivery care were received by selected background characteristics. Looking first at the information regarding the source of antenatal care shown in Table 9, there is little or no variation in the patterns of reliance on public or private sources by the age of the mother at birth, number of living children, or urban-rural residence. The likelihood of obtaining antenatal care from public rather than private sources is somewhat greater in the Urban Governorates and the Frontier Governorates than in other areas. Differentials by education are not great except for the secondary or higher level. Private clinical providers are cited as providing antenatal care somewhat more often for births to women who work for cash than other births. Husband's employment in professional/technical/managerial is strongly related to the likelihood of obtaining antenatal care from private providers. Looking at the wealth index, antenatal care from private providers is much more common among births to women in households in the highest wealth category than births to women in households at other levels of the scale.

Table 9 Percentage of births in which the mother received any antenatal care by the type(s) of sources form which the care was received according to selected background characteristics, Egypt 2000

Characteristics	Source of antenatal care			Number
	Public	Private clinical	Other	
Age				
15-24	28.1	74.0	0.0	1,633
25-39	24.8	76.8	0.1	4,095
40-49	25.1	76.6	0.1	271
Number of living children				
0-3	24.9	76.9	0.1	4,675
4+	28.4	73.1	0.1	1,324
Urban-rural residence				
Urban	26.1	76.0	0.1	3,077
Rural	25.3	76.1	0.0	2,922
Place of residence				
Urban Governorates	31.0	71.8	0.1	1,342
Lower Egypt	22.5	79.0	0.0	2,502
Urban	19.9	81.8	0.0	876
Rural	23.9	77.4	0.0	1,625
Upper Egypt	25.8	75.6	0.1	2,075
Urban	24.4	77.0	0.4	797
Rural	26.7	74.7	0.0	1,278
Frontier Governorates	34.5	66.1	0.2	80
Woman's education				
No education	34.8	66.7	0.0	1,543
Primary incomplete	32.6	70.0	0.0	591
Primary complete/some secondary	28.7	72.7	0.0	925
Secondary complete/higher	18.6	83.2	0.2	2,940
Husband's education				
No education	34.7	67.0	0.0	905
Primary incomplete	32.3	69.5	0.0	748
Primary complete/some secondary	33.6	68.1	0.1	1,074
Secondary complete/higher	19.1	82.6	0.1	3,271
Woman's work status				
Currently working for cash	21.7	79.2	0.5	943
Not working for cash	26.4	75.4	0.0	5,056
Husband's occupation				
Professional/technical/managerial	17.0	84.6	0.2	1,887
Other/ not working	29.7	72.1	0.0	4,113
Wealth index quintiles				
1	34.2	67.2	0.0	625
2	34.6	67.3	0.0	800
3	29.9	71.6	0.0	1,089
4	27.4	74.2	0.0	1,265
5	17.0	84.8	0.2	2,220
Total	25.7	76.0	0.1	5,999

Note: Women may have seen more than one type of provider so percentages do not add to 100.

Table 10 Percentage of births in which the mother received at least one tetanus toxoid injection by the type(s) of sources form which the care was received according to selected background characteristics, Egypt 2000

Characteristics	Source of tetanus toxoid injection(s)			Number
	Public	Private clinical	Other	
Age				
15-24	94.0	5.4	1.0	2,420
25-39	92.6	6.9	0.9	5,461
40-49	91.5	6.8	2.1	382
Number of living children				
0-3	92.1	7.6	0.7	5,967
4+	95.1	3.5	1.7	2,295
Urban-rural residence				
Urban	87.7	12.6	0.2	3,070
Rural	96.0	2.8	1.4	5,193
Place of residence				
Urban Governorates	83.6	16.7	0.0	1,132
Lower Egypt	94.8	5.2	0.2	3,711
Urban	89.6	10.6	0.1	927
Rural	96.5	3.4	0.3	2,784
Upper Egypt	94.0	4.4	2.1	3,304
Urban	90.2	10.2	0.6	930
Rural	95.4	2.2	2.7	2,375
Frontier Governorates	97.0	3.0	0.4	115
Woman's education				
No education	96.6	2.5	1.2	3,074
Primary incomplete	94.3	4.9	1.1	965
Primary complete/some secondary	93.0	6.4	1.1	1,237
Secondary complete/higher	88.7	11.1	0.6	2,987
Husband's education				
No education	95.6	3.4	1.0	1,842
Primary incomplete	95.0	4.1	1.2	1,207
Primary complete/some secondary	94.4	5.4	0.6	1,597
Secondary complete/higher	90.3	9.2	1.0	3,632
Woman's work status				
Currently working for cash	89.8	10.1	0.7	934
Not working for cash	93.3	6.0	1.0	7,329
Husband's occupation				
Professional/technical/managerial	89.3	10.1	1.0	1,918
Other/ not working	94.0	5.3	0.9	6,345
Wealth index quintiles				
1	98.9	1.1	0.3	1,403
2	96.7	2.2	1.3	1,587
3	95.6	2.9	1.8	1,758
4	93.1	6.7	0.8	1,644
5	82.6	17.2	0.5	1,871
Total	93.0	6.5	1.0	8,263

Note: Women may have seen more than one type of provider so percentages do not add to 100.

Table 11 Percent distribution of births in which the mother delivered in a health facility by the type(s) of facility where the birth took place, according to selected background characteristics, Egypt 2000

Characteristics	Source of delivery care				Number
	Public	Private clinical	Other	Total	
Age					
15-24	51.3	48.7	0.0	100.0	1455
25-39	43.8	56.2	0.1	100.0	3726
40-49	49.5	50.5	0.0	100.0	293
Number of living children					
0-3	45.6	54.3	0.1	100.0	4302
4+	47.7	52.3	0.0	100.0	1173
Urban-rural residence					
Urban	47.8	52.1	0.1	100.0	3,056
Rural	43.9	56.1	0.0	100.0	2,419
Place of residence					
Urban Governorates	52.4	47.4	0.2	100.0	1,386
Lower Egypt	35.5	64.5	0.0	100.0	2,411
Urban	34.6	65.4	0.0	100.0	892
Rural	36.0	64.0	0.0	100.0	1,519
Upper Egypt	55.8	44.2	0.0	100.0	1,605
Urban	54.1	45.9	0.0	100.0	724
Rural	57.1	42.9	0.0	100.0	881
Frontier Governorates	62.7	37.3	0.0	100.0	72
Woman's education					
No education	56.9	43.1	0.0	100.0	1,336
Primary incomplete	55.1	44.9	0.0	100.0	506
Primary complete/some secondary	55.1	44.9	0.0	100.0	877
Secondary complete/higher	36.3	63.6	0.1	100.0	2,756
Husband's education					
No education	53.4	46.6	0.0	100.0	814
Primary incomplete	55.8	44.2	0.0	100.0	653
Primary complete/some secondary	58.8	41.2	0.0	100.0	985
Secondary complete/higher	37.8	62.1	0.1	100.0	3,020
Woman's work status					
Currently working for cash	40.5	59.2	0.3	100.0	949
Not working for cash	47.2	52.8	0.0	100.0	4,525
Husband's occupation					
Professional/technical/managerial	31.6	68.2	0.2	100.0	1,721
Other/ not working	52.7	47.3	0.0	100.0	3,753
Wealth index quintiles					
1	55.7	44.3	0.0	100.0	549
2	54.5	45.5	0.0	100.0	667
3	50.7	49.3	0.0	100.0	918
4	50.6	49.4	0.0	100.0	1,142
5	36.8	63.0	0.1	100.0	2,198
Total	46.1	53.9	0.1	100.0	5,475

Public outlets generally are the source for tetanus toxoid in the case of the majority of births regardless of the mother's socio-demographic characteristics (Table 10). However, there is clearly a somewhat greater tendency for private outlets to provide tetanus toxoid in the case of births to women at the upper end of the socio-economic scale (i.e., urban, having a secondary or higher educational level and in households at the highest level of the wealth index).
The differentials in delivery care providers generally parallel those observed for antenatal care (Table 11). There are especially marked variations by education, husband's occupation, and the wealth index. For example, 63 percent of the births that occurred in health facilities to women residing in households at the top end of the wealth index were delivered at private clinics, compared to less than 50 percent of the births in any other wealth index quintile.

4.3 Consistency in Choice of Public and Private Providers for Delivery Care

The EDHS collected information on the health provider for all deliveries resulting in a live birth during the five-year period before the survey. The information on the delivery care provider can be used to explore the question of whether women who had more than one medically assisted delivery during the five-year period prior to the survey received this care from the same type of provider or whether they made different choices for different births.

Table 12 presents the percent distribution of women having two or more births during the five-year period before the survey in which child was delivered at a health facility according to consistency of the provider of care at delivery. The results clearly show that the consistency in type of provider is relatively high. Only one in every five women delivered at different facility types. Among consistent women, the majority consistently delivered at private facilities.

Table 12 Percent distribution of women having two or more births during the five-year period before the survey in which child was delivered at a facility according to the consistency of the provider of care at delivery, Egypt 2000

Type of source	
Always same type of facility	78.8
Public only	36.3
Private only	42.5
Delivered different facility types	21.2
Total	100.0
Number	2,935

5 Determinants of Choice of Reproductive Health Care Providers

In this final section, multivariate techniques are used to further examine the determinants of the type of provider on which Egyptian women rely for various reproductive health services. The basic model used for exploring this question is a standard utility maximizing model which assumes that provider choice is a function of the age of individual client, her educational status, work status, husband's occupation, number of living children, future desire for children, place of residence, and household wealth. Results are presented separately for the choice of provider for family planning, antenatal care, and delivery services.

5.1 Choice of Family Planning Provider

The results of the multivariate analysis of the determinants of the choice of provider for contraceptive services among all current pill, IUD and injectable users are presented in Table 13. Model 1 includes all users of the pill, IUD, and injectables who obtained their method from either a public sector provider or from a private doctor or clinic; users getting the method from other types of sources are excluded from the analysis. Model 2 is limited to users who also had a birth in the five-year period before the survey. In addition to the basic socio-demographic variables, a variable on the use of antenatal care services is introduced into this model. The third model, which is limited to users who had a birth and obtained antenatal care services, includes a variable on the type of provider from which the antenatal care for the last birth was obtained.

The results of Model 1 indicate that older women (40-49) are more inclined to choose private family planning providers while younger women have no preference. Increased education is associated with reliance on private providers. Somewhat surprisingly, controlling for other variables in the model, employed women are more likely to go to public providers. Women married to men working in managerial/technical/professional jobs are more likely to get their contraceptive methods from private providers than others. Rural Upper Egypt residents tend to go to public sector providers. Controlling for other factors, household wealth is not significantly associated with the type of provider from which the user obtained her method.

The addition of use of antenatal care in the second model provides some additional insight into the patterns of provider choice. Users who had given birth in the period and received antenatal care were significantly more likely to have obtained a method from a private provider. It is worth noting that age is no longer important in determining type of provider, which may be related to the fact that older users who had a recent child are a select subset of all users in those age groups. Confining the analysis to those who received antenatal care (Model 3), the consistency of provider choice is clear; women going to public providers for antenatal care tend to go public providers for their family planning method.

The determinants of provider choice were also considered separately for pill and IUD users. Table 14 presents the results of this analysis. For IUD users, the dependent variable takes the value zero for private source and the value one for public source.

The results parallel the findings for all users in Table 13. Older and more educated IUD users and those married to men in managerial/technical/professional occupations are more likely to obtain the method from private providers. Employed women are more likely to go to public providers. Rural Upper Egypt users are significantly more likely to rely on public sources. Wealth apparently has no bearing on women's choice of one type of provider over the other.

With respect to the pill, the model in Table 14 considers the determinants of the likelihood of getting the method from a pharmacy versus a clinical provider. None of the variables are significantly related to type of provider with the exception of residence in rural Lower Egypt, where users have lower odds of getting the pill from a pharmacy. It was hypothesized that the lack of fit for other determinants might be due to the very high prevalence of use of pharmacies since 84 percent of users obtain the pill at a pharmacy. However, when a model was run in which the group of pill users was limited to those who consulted a clinical source at the beginning of the segment of use, none the socioeconomic determinants of interest were related to the type of clinical provider (not shown in table).

Table 13 Results of logistic regression models for choice of type of family planning provider, Egypt 2000

Explanatory Variables	Dependent Variable: Type of family planning provider (Private=0; Public=1)		
	Model 1	Model 2	Model 3
Age			
15-24	Rc	Rc	Rc
25-39	0.854*	0.954	0.915
40-49	0.591***	0.764	0.573
Number of living children			
0-3 children	Rc	Rc	Rc
4 or more children	1.108	0.970	1.047
Type of contraceptive method			
Pill	Rc	Rc	Rc
IUD	13.475***	13.417***	10.493***
Injectables	43.118***	42.857***	31.019***
Place of residence			
Urban Governorates	Rc	Rc	Rc
Urban Lower Egypt	1.017	1.096	1.158*
Rural Lower Egypt	1.099	1.257*	1.272
Urban Upper Egypt	1.011	1.101	1.059
Rural Upper Egypt	1.297**	1.453***	1.367*
Frontier Governorates	1.144	1.169	0.954
Women's education			
No education	Rc	Rc	Rc
Primary complete	1.061	1.267**	1.259
Primary complete/some secondary	0.640***	0.757***	0.758**
Secondary/higher	0.268***	0.360***	0.415***
Women's work status			
Not working for cash	Rc	Rc	Rc
Working for cash	1.325***	1.332***	1.356**
Husband's occupation			
Other/Not working	Rc	Rc	Rc
Professional/technical/managerial	0.695***	0.715***	0.698***
Wealth index quintiles			
1	Rc	Rc	Rc
2-4	1.001	1.059	1.136
5	0.847	0.956	1.020
Received antenatal care			
No	Rc	Rc	Rc
Yes		0.691***	
Source for antenatal care			
Private	Rc	Rc	Rc
Public			4.374***
Constant	0.176***	0.166***	0.098***
N (number of women)	6,647	4,063	2,336
Df	17	18	18
-2 Log Likelihood	7340.010	4401.632	2544.701

Rc = reference category for the variable.
***p<0.01; **p<0.05; *p<0.10

Table 14 Results of logistic regression models for choice of type of family planning provider among IUD and pill users, Egypt 2000

Explanatory Variables	Dependent Variable: Type of family planning provider	
	IUD Users (Private=0; Public=1)	Pill Users (Clinical=0; Pharmacy=1)
Age		
15-24	Rc	Rc
25-39	0.859	0.811
40-49	0.592***	0.916
Number of living children		
0-3 children	Rc	Rc
4 or more children	0.989	1.000
Place of residence		
Urban Governorates	Rc	Rc
Urban Lower Egypt	1.008	0.988
Rural Lower Egypt	1.009	0.619*
Urban Upper Egypt	1.051	1.266
Rural Upper Egypt	1.332**	0.725
Frontier Governorates	0.888	0.653
Women's education		
No education	Rc	Rc
Primary complete	1.094	1.113
Primary complete/some secondary	0.600***	0.722
Secondary/higher	0.253***	0.583
Women's work status		
Not working for cash	Rc	Rc
Working for cash	1.393***	1.290
Husband's occupation		
Other/Not working	Rc	Rc
Professional/technical/managerial	0.701***	0.967
Wealth index quintiles		
1	Rc	Rc
2-4	1.000	0.889
5	0.858	0.934
Constant	2.484***	8.884***
Number of users	4,440	1,390
Df	15	15
-2 Log Likelihood	5725.827	1230.557

Rc = reference category for the variable.
***p<0.01; **p<0.05; *p<0.10

5.2 Choice of Antenatal and Delivery Care Providers

Table 15 shows the results of the logistic regression analysis of the determinants of the type of antenatal care provider. Education, especially attainment of the secondary level or higher, is important in determining the type of provider from which women receive antenatal care services. As the woman gets older, she also is more likely to seek antenatal care at private sources. Similarly, wives who are married to husbands working in managerial/technical/professional jobs are more inclined to private sources than other women. Surprisingly, Upper and Lower Egypt

residents tend to go more to private sources when compared to Urban Governorates. As was the case with contraceptive services, working women are more likely to seek services from public sector providers. Wealth has no significant impact on type of provider from which care is received.

Table 15 Results of logistic regression models for choice of antenatal care provider, Egypt 2000

Explanatory Variables	Dependent Variable Type of antenatal care provider (Private=0; Public=1)
Age	
15-24	Rc
25-39	0.924
40-49	0.710*
Number of living children	
0-3 children	Rc
4 or more children	0.968
Place of residence	
Urban Governorates	Rc
Urban Lower Egypt	0.802***
Rural Lower Egypt	0.518***
Urban Upper Egypt	0.711***
Rural Upper Egypt	0.508***
Frontier Governorates	1.468**
Women's education	
No education	Rc
Primary complete	0.844
Primary complete/some secondary	0.457***
Secondary/higher	0.195***
Women's work status	
Not working for cash	Rc
Working for cash	1.459***
Husband's occupation	
Other/ Not working	Rc
Professional/technical/managerial	0.685***
Wealth index quintiles	
1	Rc
2-4	1.122
5	0.900
Constant	0.176
Number of births	4,343
Df	15
-2 Log Likelihood	4478.546

Rc = reference category for the variable.
***p<0.01; **p<0.05; *p<0.10

Table 16 presents the regression results for the type of provider for delivery care. Age is not significantly related to the type of place of delivery. The number of births a woman has increases the odds she will deliver at a private provider. Births to women with at least secondary education or to women married to husbands working in managerial/technical/professional have a higher chance to be delivered at private providers than other births. Births in urban and rural Lower Egypt have greater odds of being delivered at private facility while births in the Frontier

Governorates have higher odds of being delivered in public facilities. Again, employed women are more likely seek services at public facilities than other women.

Table 16 Results of logistic regression models for choice of type of delivery care provider, Egypt 2000

Explanatory Variables	Dependent Variable Type of delivery care provider (Private=0; Public=1)
Age	
15-24	Rc
25-39	0.849
40-49	0.805
Number of living children	
0-3 children	Rc
4 or more children	0.856**
Place of residence	
Urban Governorates	Rc
Urban Lower Egypt	0.695***
Rural Lower Egypt	0.361***
Urban Upper Egypt	1.094
Rural Upper Egypt	0.848
Frontier Governorates	1.495***
Women's education	
No education	Rc
Primary complete	0.973
Primary complete/some secondary	0.589
Secondary/higher	0.260***
Women's work status	
Not working for cash	Rc
Working for cash	1.271***
Husband's occupation	
Other/Not working	Rc
Professional/technical/managerial	0.565***
Wealth index quintiles	
1	Rc
2-4	1.000
5	0.868
Constant	2.721
Number of births delivered in a facility	5,466
Df	15
-2 Log Likelihood	6947.359

Rc = reference category for the variable.
***p<0.01; **p<0.05; *p<0.10

6 Conclusions and Policy Implications

A number of conclusions can be drawn from this examination of the determinants of provider choice. First of all, the study confirms the fact there are marked differences in the extent to which Egyptian women rely on public or private providers for reproductive care depending on the type of services they are seeking. This is perhaps most clearly illustrated in the well-known association between the type of method used and the source from which women seek contraceptive services. Pharmacies supply the vast majority of pill users, public facilities serve the vast majority of injectable users, while IUD users are more equally divided between those seeking services from public sector providers and those obtaining the method from private providers.

The study shows that there also are marked differences in the type of provider according to the type of maternity care services a woman receives. The majority of antenatal care services are provided at private sector facilities, public sector facilities are the source for almost all tetanus toxoid injections, while the provision of delivery services is more evenly divided between public and private facilities.

The study offers insights into a number of other aspects of reproductive health care service provision about which there has been less previous investigation. Among the more important findings is the consistency women display in the choice of provider. The majority of women reporting multiple segments of use of the same family planning method in the five-year period before the survey reported obtaining the method from the same type of source at each segment of use. Many of the women who used both contraceptive and maternity care services also tended to be consistent in the type of source from which they obtained care, e.g., if they obtained delivery care from a public provider, they were also likely to have gotten the family planning method(s) they used during the period from public facilities. There was greater inconsistency in the choice of provider for antenatal and delivery care; this may simply reflect the tendency for private providers offering maternity care services to provide delivery care services at public sector facilities.

With regard to the determinants of the choice of provider for both family planning and reproductive care services, perhaps the most interesting finding of the multivariate analysis is that household wealth was not a significant determinant of the choice of provider. This reflects the fact that private sources meet the demand for reproductive health services of significant proportions of women in rural areas and among those in the low income groups. Also, significant numbers among those in the high income groups are paying nothing to get their methods. This finding has important policy implications since it suggests that public subsidies are supporting services for those able to afford private services. More in-depth analysis is needed to identify causes of such distortions in the service delivery system and to provide the basis for policies designed to increase reliance on private sector providers among those who have the resources to pay for these services.

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Contraceptive Use Dynamics in Egypt: An In-depth Analysis

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The level of current use of contraception in any society is the outcome of numerous individual decisions made by couples to continue or discontinue use of contraceptive methods. Thus, an improved understanding of use dynamics is crucial in developing interventions to increase the level of contraceptive practice in a society. Using data from the 2000 Egypt Demographic and Health Survey (EDHS), this paper addresses a number of issues relating to current patterns of contraceptive discontinuation in Egypt. The study looks separately at the patterns of discontinuation by method for the major methods used in Egypt (IUD, injectables, and the pill). The study controls for key socio-economic determinants in looking at discontinuation. In addition, the study considers the relationship between discontinuation levels and the source from which the method was obtained. The study also examines the user's status after the termination of use and the impact that discontinuation has on fertility levels.

1 Background

Several prior studies of contraceptive use dynamics in Egypt have contributed to an understanding of the patterns of contraceptive discontinuation. Using data from the 1984 Egypt Contraceptive Prevalence Survey, Entwhistle and Sayed (1991) found higher failure rates for the pill than the IUD, a pattern also found in subsequent studies undertaken with data from the 1992 and 1995 DHS surveys. Although the IUD exhibited lower failure and discontinuation rates than the pill, El-Tawila (1995) concluded in a study employing 1992 DHS data that the potential of the IUD for protecting women from unintended pregnancies had not yet been fully realized. She emphasized the need for improved counseling, noting that only one-third of IUD users discontinuing because of side effects switched immediately to another method despite the fact that they had to have been in contact with a health care provider to have the IUD removed. In a study of postpartum contraceptive behavior using data from the 1995 Egypt DHS, Mohamed (1998) also pointed to the need for improved counseling to address the causes of the high levels of discontinuation. Amin (1995) stressed the need to focus interventions on rural and less educated women, who exhibited the highest levels of discontinuation.

2 Data and Methods

This study employs data collected in the 2000 Egypt DHS to look at current patterns of discontinuation and switching among key groups in the population. The study also considers the impact of discontinuation on fertility levels.

2.1 Calendar Data

The data on contraceptive adoption and discontinuation were obtained through a calendar included in the questionnaires for the 2000 EDHS survey (El-Zanaty and Way 2001). Interviewers used the calendar to enter a monthly record of the marital, fertility and contraceptive use status of respondents beginning in January 1995 and ending with the month of interview. For each interval of use, information was recorded on the contraceptive method used, the date use started, the source from which the method was obtained, and, if applicable, the date used stopped and the reason for stopping. If a woman reported she was using a method in January 1995, she was also asked for the date when that segment of use began.

Information available from the calendar on the reason for discontinuation and on the woman's status immediately after discontinuation is useful for formulating programmatic responses to discontinuation (Curtis 1995). For these purposes, the reasons are grouped into the following categories: method failure; side effects/health concerns; other method/service-related reasons (including husband's disapproval, desire to use a more effective method, method inconvenient to use, access/availability, cost, etc.); desire for pregnancy; and lack of exposure to the risk of pregnancy.

Information on the status of woman immediately after discontinuation is also used in the analysis of discontinuation rates. The status categories include:

1) *pregnant due to contraceptive failure:* the woman reported that she became pregnant while using a method;
2) *switched to another method*: the woman adopted another method in the month following the discontinuation;
3) *abandoned use although still in need of contraception*: the woman is considered to have abandoned use while need of contraception if she discontinued because of dissatisfaction with the method (side effects/health concerns/desire for more effective method/method regarded as inconvenient to use); difficulties in obtaining the method (access/availability/cost); opposition to use from husband; fatalism; other unspecified reasons or she was unsure of the reason;
4) *abandoned and no longer in need of contraception*: the woman stopped using because she wanted to become pregnant or considered herself as no longer at risk of pregnancy due to marital dissolution, infrequent sex, menopause, or infecundity.

Information on the source from which the woman obtained the method at the beginning of the segment of use was also collected in the calendar.[1] These data are included in the analysis to explore the questions of whether there is a relationship between types of sources (clinical/ pharmacy and public/private) and contraceptive discontinuation.

2.2 Background Variables

A number of the characteristics of the woman and of the household in which she resides that are expected to have an effect on discontinuation are considered in the analysis. These include:

- Woman's age at the beginning of the segment
- Woman's number of living children at the beginning of the segment
- Woman's urban-rural residence at the time of the survey
- Woman's place of residence at the time of the survey
- Woman's level of education at the time of the survey
- Household's wealth status at the time of the survey

[1] For purposes of the analysis, sources are grouped as follows: (1) public sector providers: urban hospitals, urban health units, rural hospitals, rural health units, MCH centers, mobile units, teaching hospitals, Health Insurance Organization facilities and other governmental facilities; (2) NGO providers: clinics operated by the Egyptian Family Planning Association, the Clinical Services Improvement Project, or other nongovernmental or private voluntary organizations; (3) private sector providers: private hospitals, clinics or doctors and medical facilities run by mosques or churches; (4) pharmacies; and (5) other sources: shops and friends or relatives.

Finally, information on women's ideal family size is used to address the question of the impact of discontinuation on fertility levels in Egypt. The data on ideal family size was obtained by asking a woman the number of children she would prefer to have.

2.3 Statistical Methods

The calendar for the 2000 EHS covered a 66-month period prior to the interview date. For purposes of the analyses included in this study, however, only segments beginning within 3-62 months of the survey interview date are considered. The period 0-2 months prior to the interview are excluded from the analyses to eliminate any bias that might be introduced by an unrealized pregnancy. For purposes of exploring patterns of contraceptive adoption and discontinuation, the calendar data obtained for each woman is divided into one or more segments based on the fertility and contraceptive behavior of the woman. A segment ends with a change in the woman's status between use, nonuse, and pregnancy.

Life-table methods are used to calculate discontinuation rates in the study separately for various time periods, e.g., 3 months, 6 months, and 12 months. The discontinuation rates represent the proportion of users who stop using contraception within the specified number of months after they began a segment of use. The discontinuation rates presented in the study are cumulative, i.e., they are obtained by dividing the number of discontinuations at each duration by the number of months of exposure at that duration. They are net rates, i.e., they represent the likelihood of discontinuing for a particular reason (or the likelihood of being in a particular status after discontinuation) in the presence of all other possible reasons (statuses).

3 Levels and Differentials in Discontinuation Rates

3.1 Levels of Discontinuation

Slightly more than one in ten Egyptian women who adopt a contraceptive method discontinue use of that method within 3 months of the time they start using, around three in ten stop using within 12 months of starting use, and less than four in ten women are still using a method three years after they first adopt it (Table 1).

Table 1 Life-table discontinuation rates during the five-year period prior to the survey by method, Egypt 2000

Period	Pill	IUD	Injectables	Any method[1]
3 months	22.1	3.7	23.0	11.3
6 months	32.2	6.6	32.9	17.4
12 months	48.4	14.2	48.4	29.5
18 months	59.3	23.5	55.6	40.2
24 months	67.4	34.9	62.4	50.5
36 months	76.5	51.5	72.9	63.4
Total segments	2,480	5,451	1,456	10,556

[1]Total includes segments of use of other methods as well as the pill, IUD and injectables.

The likelihood that a woman will discontinue use varies markedly with the specific method the woman adopts, with hormonal methods having much higher discontinuation rates than the IUD. For example, more than a fifth of pill and injectable users stop using the method within three months—five times the three-month discontinuation rate observed for IUD users—and nearly half of pill and IUD users will discontinue use within 12 months after adopting the method, compared to 14 percent of IUD users. By three years after adoption of a method, more than seven in ten pill and injectable users have discontinued use of the method compared to around half of IUD users.

3.2 Differentials in Discontinuation Levels by User's Background Characteristics

Table 2 examines variations in twelve-month discontinuation rates according to selected background characteristics of the users. There were not sufficient segments of use to allow calculation of subgroup discontinuation rates separately for the pill and injectables; as a result, the discontinuation rates shown in the table are the combined rates for these hormonal methods.

Table 2 shows that, in general, discontinuation rates decline as the age of the user increases. This is expected, since both the motivation to use and experience with contraception are likely to increase with age. Rates are slightly higher among women with one child and among women with four or more children than among women with two or three children.

Table 2 Twelve-month contraceptive discontinuation rates according to method, by selected background characteristics, Egypt 2000

Background characteristics	Pill/ injectables	IUD	All methods[1]
Age			
15-24	61.2	19.6	35.0
25-34	49.3	13.6	29.1
35-49	42.1	11.3	27.2
Number of living children			
None	*	*	*
One	56.4	15.2	29.3
Two	51.3	14.6	28.4
Three	47.9	10.8	26.8
Four or more	45.6	16.0	31.9
Urban-rural residence			
Urban	46.4	13.0	27.2
Rural	49.6	15.3	31.4
Place of residence			
Urban Governorates	47.2	11.9	25.8
Lower Egypt	44.6	13.0	26.7
Urban	44.0	11.7	25.8
Rural	44.8	13.6	27.1
Upper Egypt	53.5	17.5	35.1
Urban	48.0	15.7	30.0
Rural	55.7	18.7	37.8
Frontier Governorates	46.0	22.1	36.7
Level of education			
No education	46.4	15.1	30.9
Less than primary	46.7	13.3	29.5
Primary complete, some secondary	49.2	15.5	30.3
Secondary/higher	52.0	13.2	27.7
Wealth index quintiles			
1	47.7	17.7	33.3
2	48.6	14.8	31.8
3	48.3	16.4	30.1
4	50.5	12.8	29.2
5	45.7	11.7	24.8
Total	48.4	14.2	29.5

[1]Total includes segments of use of other modern and traditional methods as well as the pill, IUD and injectables.
*Omitted due to small number of segments of use

Urban users discontinue at a somewhat slower rate than rural users. Users in Upper Egypt are markedly more likely to discontinue than users in the Urban Governorates and Lower Egypt. The

pattern of higher discontinuation in Upper Egypt is found for both urban and rural users. The 12-month discontinuation rate among users in urban Upper Egypt is 30 percent, compared to 26 percent among users in both the Urban Governorates and urban Lower Egypt. Among rural users, discontinuation rates are nearly 40 percent higher in Upper Egypt than Lower Egypt (38 percent versus 27 percent, respectively). Rates for users in the Frontier Governorates are similar to those found for users in rural Upper Egypt.

As expected, highly educated women are the least likely to discontinue; however, the level of discontinuation among users with at least a secondary education (28 percent) is only slightly lower than the level observed among users who never attended school (31 percent).

Household wealth is inversely associated with discontinuation levels. The 12-month discontinuation decreases from a level of 33 percent among users living in households ranking in the bottom quintile on the wealth index to 25 percent among users living in households ranking in the highest quintile.

Finally, an examination of the method-specific rates in Table 2 indicates that the pattern of the variation in discontinuation rates across subgroups is generally similar regardless of the method in question. However, as noted above, the levels of discontinuation for the hormonal methods are substantially higher in all subgroups than the levels among IUD users.

3.3 Differentials in Discontinuation Levels by Source

In addition to looking at how user's socioeconomic characteristics relate to discontinuation, data from the 2000 EDHS on the source from which a user initially obtained the method allows an exploration of the relationship between the method source and discontinuation levels. Table 3 presents 12-month discontinuation rates from the 2000 EDHS for the pill, the IUD, and injectables by the type of source from which the method was obtained at the beginning of a segment of use. Similar to the pattern found in a study of pill users in Morocco (Steele et al. 1999), discontinuation rates among pill users in Egypt vary markedly according to the type of source. Rates are lower among women who obtained the method from a nongovernmental (NGO) or private medical provider than among those obtaining the method from a public clinical provider. Women obtaining the pill from a pharmacy—who constitute the vast majority of pill users—have the highest discontinuation rates.

Table 3 Twelve-month contraceptive discontinuation rates according to the method used, by type of source from which the method was obtained at the beginning of the segment of use, Egypt 2000

Period	Pill	Injectables	IUD
Public sector	51.4	45.8	14.7
NGO/private medical	42.8	53.8	13.5
Pharmacy/other	61.5	*	NA
Number of segments	2,480	1,456	5,451

*Omitted due to small number of segments of use
NA – Not applicable

The type of source from which the method is obtained is not as strongly related to the discontinuation levels for injectables as for the pill. Discontinuation rates are, however, somewhat lower when the injectable is obtained from public clinical providers, which serve the majority of injectable users, than from NGO or private medical providers. Interestingly, IUD discontinuation rates are virtually identical for users obtaining the method at a public sector source and users getting it from a NGO or private provider.

4 Reasons for Discontinuation

Programmatic responses to discontinuation need to take into account the reasons for discontinuation. Women who are in the early stages of the family-building process and are using contraception to space wanted births may be expected to discontinue use when they are ready to add another child to their family. Similarly, women may be expected to discontinue use when their exposure to the risk of pregnancy is reduced or eliminated (e.g., because they reach menopause). However, it has been argued that discontinuation due to other reasons, especially discontinuation due to side effects, health concerns, and dissatisfaction with the method might be prevented if users receive appropriate support at the time they are considering stopping use (Curtis 1995 and Curtis and Blanc 1997).

Table 4 shows the distribution of 12-month discontinuation rates according to the reason for discontinuation and by the method used. Side effects and health concerns are the principal reasons for discontinuation among users of all of the methods. Pill users are significantly more likely to indicate that they experienced a contraceptive failure (i.e., they became pregnant while using the method) than IUD or injectable users.

Table 4 Percent distribution of 12-month discontinuation rates during the five-year period prior to the survey according to the reason for discontinuation by method, Egypt 2000

Method	Contraceptive failure	Side effects/ health concerns	Other method/ service-related reasons	Desire to get pregnant	Not exposed to pregnancy	Total percent
Pill	12.6	43.6	11.8	15.5	16.7	100.0
IUD	7.0	60.6	4.9	21.8	5.6	100.0
Injectables	1.7	69.8	12.8	7.4	8.9	100.0
All methods[1]	10.2	47.8	17.6	14.2	10.5	100.0

[1]Total includes segments of use of other modern and traditional methods as well as the pill, IUD and injectables.

Table 5 presents differentials in the distribution of discontinuations by reason according to background characteristics of users. In the table, the reasons for discontinuation are grouped into two categories: (1) reduced need and (2) method- or service-related. The reduced-need category includes discontinuations due to the desire to become pregnant or to a change in exposure status. The method- or service-related category includes discontinuations due to contraceptive failure, fears about side effects/other health concerns, other reasons relating to the method (e.g., inconvenient to use), service factors including access or availability, fatalism and other unspecified factors. Discontinuations due to the latter group of factors are considered to be preventable. For example, contraceptive failure is often the result of inappropriate or incorrect use of the method; presumably better counseling from a provider would result in lower failure rates. A provider also should be able to counter a woman's fatalistic attitudes about pregnancy.

The results in Table 5 suggest that there is a fairly uniform pattern in the reasons for discontinuation across subgroups. Regardless of the user's characteristics, more than 70 percent of all discontinuations are the outcome of method- or service-related problems.

Table 5 Percent distribution of the 12-month discontinuation rate for all methods by reasons for discontinuation according to selected background characteristics of the user, Egypt 2000

Background characteristics	Reduced need	Method/ service-related[1]	Total percent
Age			
15-24	27.1	72.9	100.0
25-34	21.6	78.4	100.0
35-49	28.3	71.7	100.0
Number of living children			
None	*	*	100.0
One	23.2	76.8	100.0
Two	27.8	72.2	100.0
Three	25.7	74.3	100.0
Four+	21.9	78.1	100.0
Urban-rural residence			
Urban	22.8	77.2	100.0
Rural	25.8	74.2	100.0
Place of residence			
Urban Governorates	20.2	79.8	100.0
Lower Egypt	27.3	72.7	100.0
Urban	25.2	74.8	100.0
Rural	28.0	72.0	100.0
Upper Egypt	23.6	76.4	100.0
Urban	25.3	74.7	100.0
Rural	23.3	76.7	100.0
Frontier Governorates	15.8	84.2	100.0
Level of education			
No education	22.0	78.0	100.0
Less than primary	24.7	75.3	100.0
Primary complete, some secondary	25.7	74.3	100.0
Secondary/higher	26.7	73.3	100.0
Wealth index quintiles			
1	23.4	76.6	100.0
2	22.0	78.0	100.0
3	24.9	75.1	100.0
4	26.0	74.0	100.0
5	25.4	74.6	100.0
Total	24.7	75.3	100.0

*Omitted due to small number of segments of use

5 Status after Discontinuation

Curtis et al. (1999) suggest that discontinuation in and of itself is not necessarily a problem; rather it is the behavior following discontinuation that matters. For example, method switching may be indicative of a service delivery environment in which women have a choice of methods, allowing them to move freely between methods as their contraceptive needs change (Curtis and Blanc 1997). The key element is whether discontinuation leaves a user unprotected from unintended pregnancy.

5.1 Status after Discontinuation by Method

Table 6 presents the distributions of twelve-month discontinuation rates by the status of the user immediately following discontinuation according to the method used. Overall, the results suggest that around half of discontinuations may be considered 'positive' in nature, i.e., they reflect a user's decision that she is no longer in need of contraception or the discontinuation is followed a change to another method.

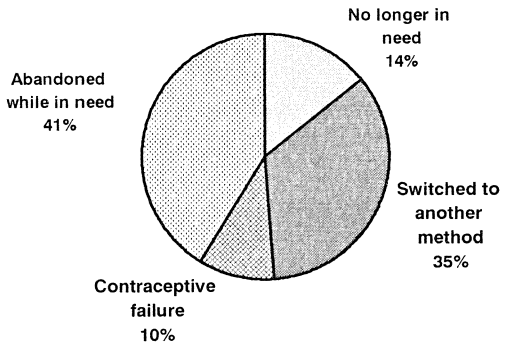
Table 6 Percent distribution of 12-month contraceptive discontinuation rates according to the status in the month following discontinuation, by method, Egypt 2000

Status	Pill	IUD	Inject-ables	All methods[1]
No longer in need	15.5	21.8	7.4	14.2
Switched to another method	28.5	33.1	37.4	34.5
Contraceptive failure	12.6	7.0	1.7	10.2
Abandoned while in need	43.4	38.0	53.5	41.0
Total percent	100.0	100.0	100.0	100.0

[1]Total includes segments of use of other modern and traditional methods as well as the pill, IUD and injectables.

Particularly notable is the proportion of discontinuations followed by method switching. Figure 1 shows that more than one-third of users who discontinue immediately switch to another method. Following an additional 14 percent of the discontinuations, users are classified as no longer in need of contraception (e.g., because they discontinued to become pregnant or because they were no longer at risk of becoming pregnant). In more than half of all discontinuations, however, the user abandoned the method because of method- or service-related reasons. In more than one-fifth of the latter discontinuations—10 percent of all discontinuations—the woman became pregnant while using (contraceptive failure).

Figure 1
Distribution of Twelve-Month Discontinuation Rates by Status in the Month Following Discontinuation



Switching behavior is more common among IUD and especially injectable users than among pill users. Table 6 shows that the user switched to another method in slightly more than one-quarter of pill discontinuations, compared to around one-third of discontinuations among IUD users and 37 percent of discontinuations among users relying on injectables.

Fifty-six percent of all discontinuations of the pill are either the result of contraceptive failure (13 percent) or abandonment for other method- or service-related reasons (43 percent). In comparison, very few discontinuations among injectable users are attributed to method failure; however, the likelihood that a user abandoned the method while still in need is higher among injectable users (54 percent) than pill users. IUD users are least likely to be classified as in need following a discontinuation. Even among IUD users, however, abandonment of contraception while in need and contraceptive failure together account for 45 percent of all discontinuations.

5.2 Differentials by User's Background Characteristics

Table 7 looks at variation in the status after discontinuation according to selected background characteristics of users. The percentage of discontinuations in which the user stopped using because she was no longer in need (mainly due to a desire to have a child), or in which she

switched to another method, is lower among older users than among users under age 35. Parity is also inversely related both to the likelihood of discontinuing because of a change in need status and method switching. Contraceptive abandonment while in need occurs more often among users age 35 and older than among younger women.

Residence is associated with differences in the status of the user following discontinuation. For example, method switching is most common following discontinuation among users in urban Lower Egypt (41 percent) and least common among users in rural Upper Egypt (28 percent).

Table 7 Percent distribution of 12-month contraceptive discontinuation rate for all methods by the status in the month following discontinuation according to background characteristics of the user, Egypt 2000

Background characteristics	No longer needs	Switch to other method	Contaceptive failure	Abandoned use	Total percent
Age					
15-24	22.9	35.4	8.6	33.1	100.0
25-34	15.1	35.7	12.0	37.1	100.0
35-49	6.3	31.7	7.4	54.6	100.0
Number of living children					
None	*	*	*	*	
One	17.5	38.4	9.2	34.9	100.0
Two	22.1	36.8	9.1	31.9	100.0
Three	14.9	34.3	11.2	39.6	100.0
Four+	7.2	32.3	10.7	49.8	100.0
Urban-rural residence					
Urban	14.3	37.9	12.1	35.7	100.0
Rural	14.0	32.5	8.6	44.9	100.0
Place of residence					
Urban Governorates	14.3	37.9	12.1	35.7	100.0
Lower Egypt	14.0	32.5	8.6	44.9	100.0
Urban	13.2	41.1	10.1	35.7	100.0
Rural	18.1	36.9	9.6	35.4	100.0
Upper Egypt	10.8	29.1	8.3	51.6	100.0
Urban	14.3	32.7	9.7	43.3	100.0
Rural	9.5	27.5	7.7	55.3	100.0
Frontier Governorates	13.4	34.9	10.6	41.1	100.0
Level of education					
No education	10.7	32.7	8.4	48.2	100.0
Less than primary	9.2	33.2	11.9	45.8	100.0
Primary complete, some secondary	18.2	36.3	7.9	37.6	100.0
Secondary/higher	18.1	36.8	12.3	33.2	100.0
Wealth index quintiles					
1	11.4	29.7	7.5	51.7	100.0
2	11.9	35.5	8.5	43.7	100.0
3	14.3	35.2	8.0	42.5	100.0
4	16.1	34.6	12.3	36.6	100.0
5	16.1	38.3	13.3	32.3	100.0
Total	14.2	34.6	10.2	41.0	100.0

Residence is also strongly related to the likelihood of failure or abandonment; for example, more than 60 percent of discontinuations among users in rural Upper Egypt were the outcome of contraceptive failure or a decision to abandon use without an accompanying change in the user's need for contraception. In contrast, among users in rural Lower Egypt, only around 45 percent of discontinuations ended in these outcomes.

Method switching generally increases with both education and with wealth status. There is an inverse relationship between abandonment and both the user's educational status and the rank on the index of household wealth.

5.3 Differentials by Source

Table 8 presents the distribution of 12-month discontinuations by the status in the month following the discontinuation according to the source from which the user obtained the method. Overall, differences in the likelihood of method switching according to the type of source are quite small. Discontinuations among users who obtained the method from a pharmacy at the beginning of a segment of use are somewhat more likely to end in contraceptive failure than are discontinuations among users who obtained the method from either a public or NGO/private clinical provider. Discontinuations followed by abandonment of use are also somewhat more frequent among users obtaining the method from a public sector provider.

Table 8 Twelve-month contraceptive discontinuation rates by status in the month following discontinuation according to method and source, Egypt 2000

Contraceptive method and source	No longer needs	Switch to other method	Contaceptive failure	Abandoned use	Total
Pill					
Public	12.8	31.1	14.6	41.4	100.0
NGO/Private clinical	18.7	32.0	10.7	38.6	100.0
Pharmacy/other	14.9	26.4	12.7	46.1	100.0
Injectables					
Public	7.6	35.4	2.0	55.0	100.0
NGO/Private clinical	8.2	39.4	1.5	50.9	100.0
IUD					
Public	21.8	34.0	6.8	37.4	100.0
NGO/Private clinical	22.2	31.9	7.4	38.5	100.0
All methods[1]					
Public	14.0	34.5	7.4	44.2	100.0
NGO/Private clinical	17.3	33.6	8.8	40.3	100.0
Pharmacy	12.9	31.4	14.6	41.1	100.0

[1]Total includes segments of use of other modern and traditional methods as well as the pill, IUD and injectables.

Looking at the patterns for specific methods, switching is more common among pill users who obtained the method from a clinical provider (public or NGO/private) at the beginning of a segment of use than among those who got the method from a pharmacy or other source. On the other hand, pill users who obtained the method at a nongovernmental clinical or other private provider are somewhat less likely to report 'adverse' outcomes—failure or abandonment—than users who obtained the method at a public clinical provider or at a pharmacy or other source (49 percent, 56 percent, and 59 percent, respectively). Lower levels of method switching and higher levels of abandonment and failure were also found for injectable users obtaining the method from a public provider than for those who got the method at a private provider. Finally, in contrast to the patterns found for pill and injectable users, there are only very slight differences among IUD users in the status following discontinuation according to the method source.

6 Consequences of Failure and Abandonment While in Need

A number of researchers have pointed to the need to address contraceptive discontinuation since it contributes substantially to the number of unplanned and unwanted births (Bongaarts and Rodriguez 1991 and Jain 1999). Using data from the 2000 EDHS, it is possible to estimate the

effect that contraceptive failure and abandonment while in need are having on fertility in Egypt. In deriving that estimate, any birth that occurred within two years of a contraceptive failure or discontinuation for method- or service-related reasons is considered as potentially preventable. Although it is unrealistic to expect that all such births will be prevented, nevertheless, the measures provide a useful approach to assessing the overall magnitude of the impact that contraceptive failure and abandonment have on fertility in Egypt.

As Table 9 shows, preventing contraceptive failures or helping women to avoid discontinuation for method- or service-related reasons could have a substantial impact on fertility levels in Egypt. For example, it is estimated that the total fertility rate (TFR) in Egypt during the three-year period prior to the 2000 DHS would have been 3.3 births if all births due to contraceptive failure had been prevented. The impact of contraceptive abandonment is also substantial; if all discontinuations in which contraceptive use was abandoned because of method- or service-related reasons had been prevented, the TFR would have been 3.1 births. If all births due to contraceptive failure or following a segment of use in which use of a method was abandoned because of method- service-related issues had been prevented during the three-year period before the EDHS, the TFR would have dropped to 2.8 births, roughly 20 percent lower than the actual rate.

Table 9 Actual total fertility rate (TFR) and total fertility rates in the absence of contraceptive failure and contraceptive abandonment while in need for the three years preceding the survey, Egypt 2000

Background characteristics	Actual TFR	TFR if births due to contraceptive failure prevented	TFR if births following contraceptive abandonment prevented	TFR if births due to/ following contraceptive failure/ abandonment prevented
Urban-rural residence				
Urban	3.1	2.9	2.7	2.5
Rural	3.9	3.7	3.4	3.1
Place of residence				
Urban Governorates	2.9	2.7	2.6	2.3
Lower Egypt	3.2	3.0	2.9	2.7
Urban	3.0	2.8	2.7	2.5
Rural	3.3	3.1	2.9	2.7
Upper Egypt	4.2	4.0	3.6	3.4
Urban	3.4	3.2	2.9	2.7
Rural	4.7	4.4	4.0	3.7
Frontier Governorates	3.8	3.5	3.2	3.0
Level of education				
No education	4.1	3.9	3.6	3.3
Less than primary	3.8	3.5	3.1	2.9
Primary complete, some secondary	3.4	3.1	3.0	2.7
Secondary/higher	3.2	3.0	2.9	2.7
Total	3.5	3.3	3.1	2.8

Preventing discontinuation due to contraceptive failure or to abandonment for method- or service-related reasons would have a substantial impact on the TFR among all subgroups of the population. However, the impact would be especially significant among women in rural Upper Egypt and among those with less than a primary education.

7 Conclusions and Policy Implications

This analysis addresses questions relating to the level and potential impact of contraceptive discontinuation. The study found that substantial proportions of users discontinue use within a year of adopting a method. Twelve-month discontinuation rates approach 50 percent in the case of the pill and injectables, and one in seven IUD users will stop using the method within a year of adopting it. A quarter or more of users in all key population subgroups discontinue within 12 months of adopting a contraceptive, and more than a third of users in rural Upper Egypt and the Frontier Governorates—where discontinuation rates are highest—will stop using a method within a 12-month period. Over 70 percent of all discontinuations are the outcome of method- or service-related issues, regardless of the user's characteristics.

The impact of discontinuation clearly depends on whether or not the user is left exposed to the risk of unintended pregnancy. The analysis of data on the user's status following discontinuation suggests only about half of all discontinuations leave the user in this state. In the majority of the remaining discontinuations—slightly more than one-third of discontinuations—the user switches to another method. Just under 15 percent of discontinuations involve reduced need, i.e., the user stops because they want another birth or because they are no longer exposed to the risk of pregnancy. Method switching is somewhat less common following discontinuation for pill or injectable users than for IUD users, and pill and injectable users are also somewhat more likely than IUD users to be in an 'adverse' status following discontinuation.

Both the levels of discontinuation and the user's status following discontinuation are related to the source from which the user obtained the method at the beginning of the segment of use. However the association varies with the method used. Among pill users, discontinuation rates are lowest among users who had obtained the method from an NGO or private provider and highest among users who got the method from a pharmacy or other nonclinical source. Pill users obtaining the method from a nongovernmental or private provider are also less likely to be in an 'adverse' status as a result of contraceptive failure or abandonment than users obtaining the method from public sector providers or a pharmacy or other nonclinical source.

Among injectable users, the relationship of source to discontinuation presents a more mixed picture. Discontinuation rates are somewhat higher among users who obtain the method at a NGO or private provider than among users obtaining the method at a public sector source. However, method switching is slightly more common and contraceptive abandonment slightly less common among injectable users obtaining a method at a NGO or private provider than from a public sector source. Among IUD users, there is virtually no relationship between the source from which the method is obtained and either the level of discontinuation or the user's status following discontinuation.

Finally, although not all discontinuations result in 'adverse' consequences for the user, the study shows that preventing discontinuations entirely and/or increasing the proportion of discontinuations that involve method switching would have a significant impact on fertility levels. Interventions to reduce discontinuation need to take into account user characteristics. They must target groups where discontinuation levels due to abandonment or failure are highest (e.g., older users, users in rural areas in Upper Egypt, users with the least education, and users living in the poorest households). Of particular concern are the high levels of discontinuation found among injectable and pill users.

Jain (1999) has argued that the quality of care provided by family planning providers, including the range of methods available and the quality of counseling at the time that the method is

obtained, plays a key role in improving contraceptive continuation. There is clearly a need to improve the counseling that Egyptian women receive at the time they get the method from their provider since results from the 2000 EDHS indicate that the average user receives no information from her provider on method options, on the side effects that she may experience in using the method she is adopting, or on how to handle any side effects she does experience (El-Zanaty and Way 2001). Interventions aimed at increasing and improving the content of the exchange of information between the pill user and the pharmacist are of particular importance since many pill users do not see a clinical provider.

In the effort to reduce discontinuation, users must also be encouraged to obtain regular follow-up care. In an indepth study in two Upper Egypt governorates (Assuit and Souhag), El-Zanaty et al. (1999) found evidence that regular follow-up visits to health care providers contributed to lower discontinuation rates among pill and injectable users. However, fewer than one in four users of these methods returned to their provider for such care.

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Egypt Demographic and Health Data: a Geographic Perspective

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The 2000 Egypt Demographic and Health Survey represented the first DHS survey in which information on the geographic location (latitude and longitude) was collected for each sample unit (shiakha/village). In this paper, these geographic coordinates are used to estimate and map key health and socio-economic indicators at the sub-governorate level. This experiment offers an opportunity to explore how using these estimation techniques may be employed to obtain a more indepth prospective on geographic differentials in the demographic and health situation of Egypt's population. It is hoped that, in the future, the approach may be helpful in incorporating a geographic dimension in planning and evaluating programmatic interventions in the health and population sectors.

1 Data and Methodology

The sample for the 2000 Egypt Demographic and Health Survey (EDHS) was designed to provide statistically reliable results for all variables at the national level and regional level. It was selected in such fashion as to allow for the estimation of a more limited set of indicators at the governorate-level (El-Zanaty et al. 2001). However, the sample size for the 2000 EDHS does not permit calculating reliable estimates separately for lower geographic units, thus, limiting the utility of the survey in providing insights into variations in the health situation of women and children at the sub-governorate level. This paper experiments with the use of geographic interpolation to explore these sub-governorate variations.

Because the approach is experimental, the focus is on exploring variation in a cross-section of the indicators that are used to monitor the health situation of Egyptian women and children including:

- *Current contraceptive use*: Percentage of currently married women 15-49 who were using any family planning method at the time of the survey;
- *Regular antenatal care*: Percentage of births in the five years before the survey for which a woman received at least four antenatal care consultations;
- *Medical assistance at delivery*: Percentage of births in the five years before the survey that were attended by a medically trained provider (doctor or trained midwife/nurse);
- *Stunting*: Percentage of children 0-59 months who are stunted, i.e., too short for their age.[1]

In addition, several key socio-economic indicators are mapped including:

- *Girl's education:* Percentage of all girls 6-15 who are currently attending school
- *Household wealth:* Percentage of households in the bottom third on the household wealth index.[2]

[1] Stunting is assessed by comparing the height-for-age among children in a population to that of a reference population of well-nourished children. Children whose height-for-age measures are below minus two standard deviations from the median of the reference population of well-nourished children are stunted or too short for their age. For more information on the procedures used to assess stunting and the calculation of measures of stunting, see El-Zanaty and Way 2000. An indepth examination of the clustering of nutritional deficiencies is included in the paper by El-Zeini and Casterline in this volume.

[2] The wealth index uses a procedure that assesses household assets as a proxy for wealth. The underlying assumption is that these items are a proxy for consumption, which is a more traditional measure of household status. To construct the index, individual assets were assigned a weight or factor score generated through principal components analysis. The

In the procedure used to create each of the maps, values for the health or socio-economic indicator in question was estimated for each of the 1000 DHS clusters.[3] Then a gridded surface area map was created by smoothing the cluster-level values for the indicator. An inverse distance weighted method was employed for the smoothing.[4] The methodology in creating maps is similar to that employed in previous work from the West Africa Spatial Analysis Prototype project to estimate variation in DHS indicators across large geographic areas (McGuire 2000). The method assumes that the value for an indicator for a DHS cluster point represents local determinants whose influence diminishes with distance. Thus, in estimating values for specific grid cells, the values for DHS clusters closest to a cell are given greater weight than those further away.

In the application of the methodology for this paper, the value for each grid cell on the map for an indicator was obtained by averaging the values for the 12 EDHS clusters nearest to the grid cell. Cluster distance from the grid cell was taken into account calculating this value; thus, the further away one of the 12 clusters was from the grid cell, the less influence it has on the estimated value for the cell, and vice versa. The grid cell size is about 5 square kilometers.

In creating the gridded surface maps for the indicators, arbitrary cutoffs were used to establish three equal-sized classes, each representing one-third of the total range of the interpolated values for the indicator. The number of cells falling into each class varied, depending on the shape of the distribution of the interpolated values. Separate urban and rural cutoffs were employed in defining the classes because of the substantial differentials that exist between urban and rural populations for each of the indicators. Table 1 shows the absolute numeric ranges represented in three classes in mapping of urban and rural surfaces for each indicator. This approach to establishing cutoffs is designed to yield maps in which areas that are low (or high) in absolute terms on a specific indicator can be readily identified. In the maps presented below, the focus is on concentrations on the low end of the range for each indicator, except for stunting where it is on high levels; cells falling in the focal category are mapped in black while those in the other two classes are shown in white.

Table 1 Numeric ranges for classes used in surface maps by indicator and urban-rural location of map cell

	Urban			Rural		
Indicator	Low	Medium	High	Low	Medium	High
Current contraceptive use	15-39.9	40-64.9	65-91	2-33.9	34-66.9	67-100
Regular antenatal care	6-36.9	37-67.9	68-99	0-20.9	21-41.9	42-63
Medical assistance at delivery	9-38.9	39-69.9	70-100	3-34.9	35-66.9	67-100
Stunting	0-19.9	20-39.9	40-60	0-21.9	22-44.9	45-67
Girls' current school attendance	25-49.9	50-74.9	75-100	0-32.9	33-66.9	67-100
Wealth status	1-2.29	2.3-3.69	3.7-5	1-2.29	2.3-3.69	3.7-5

Depending on the objective of the mapping exercise, other approaches to establishing cutoffs for the mapping can be used. For example, a larger number of classes could be established if there is

scores for each asset were standardized, and a household was assigned a standardized score for each of the items it possessed. Households were then ranked into quintiles according the summed scores. For details on the methodology see Rutstein 1999 and Filmer and Pritchett 1998.

[3] Calculating values at the cluster level put some constraints on the choice of indicators since the sample sizes are quite small. Thus, the procedures described in this paper cannot readily be used for exploring sub-governorate-level variation in fertility or mortality rates or for proportions in which the base populations are typically quite small at the national level (e.g., immunization rates in which the base population is limited to children 12-23 months) or the indicator calculation is complex (e.g., unmet need for family planning).

[4] The Spatial Analyst extension in ArcView (ESRI) was used to create the maps.

interest in more detailed differentiation for a specific indicator. A single cutoff also could be established, e.g., to identify areas that fall below a minimum value. This paper concludes with illustrations of ways in which the cutoffs can be manipulated to increase the utility of geographic mapping for informing program planning or monitoring.

2 Presentation of Maps

Maps showing cluster-level variation in the indicators described above are presented and discussed in this section of the paper. To assist in identifying the location of specific governorates, a governorate-level map of Egypt is included in the Appendix at the end of this paper.

2.1 Contraceptive Use

According to the 2000 survey, 56 percent of currently married women 15-49 are using family planning in the country as a whole. Residence is a strong predictor of contraceptive use levels in Egypt. There are significant differentials in use levels between Upper Egypt, where 45 percent of married women are using family planning, and the Urban Governorates and Lower Egypt, where the use level exceeds 60 percent (Table 2).

Table 2 Percentage of currently married women 15-49 currently using a family planning method by region and govern orate, Egypt 2000

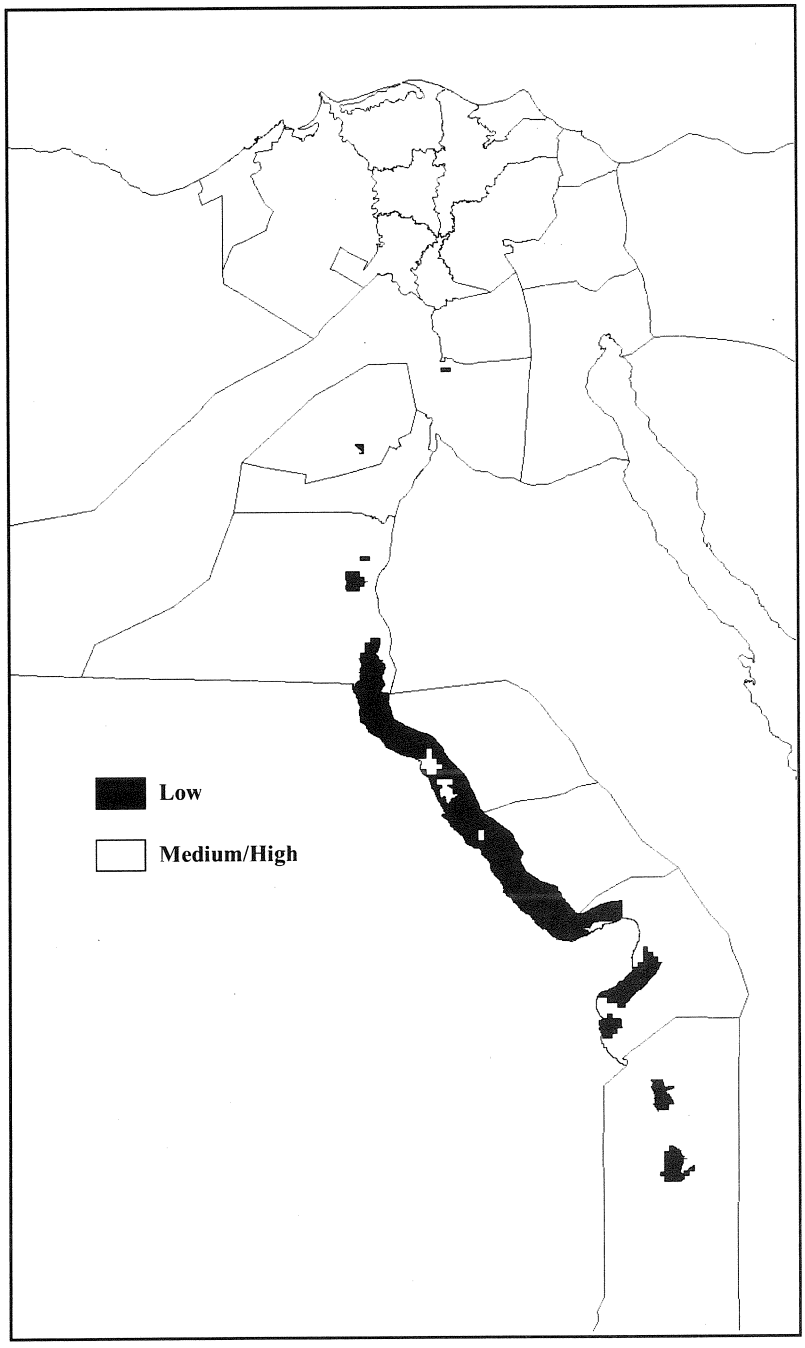
Region and governorate	Percent using any contraceptive method
Urban Governorates	**63**
Cairo	62
Alexandria	65
Port Said	58
Suez	58
Lower Egypt	**62**
Damietta	59
Dakahlia	63
Sharkia	61
Kalyubia	64
Kafr El-Sheikh	64
Gharbia	66
Menoufia	61
Behera	60
Ismailia	59
Upper Egypt	**45**
Giza	61
Beni Suef	53
Fayoum	50
Menya	47
Assuit	33
Souhag	28
Qena	35
Aswan	45
Total	**56**

Within Upper Egypt, there is marked variation in contraceptive use by governorate; in three governorates of the eight governorates in the region, use rates are below 40 percent (Souhag (28 percent); Assuit (33 percent); Souhag (35 percent)) while in the three governorates closest to Cairo, rates are 50 percent or higher (Fayoum (50 percent); Beni Suef (53 percent); and Giza (61 percent)). Governorate-level use rates are more uniform in the two other regions; in Lower Egypt, they range from 59 percent in Damietta and Ismailia to 66 percent in Gharbia, while, in the Urban Governorates, they range from 58 percent in Suez and Port Said to 65 percent in Alexandria.

Figure 1 presents the results from the use of geographic interpolation to map contraceptive use.[5] The areas shaded in black represent those where the values fell into the bottom third of the range for the contraceptive use indicator (see Table 1). The results show little within-governorate at the low end of the contraceptive use scale. Marked concentrations of low use levels are limited to a band running from Assuit through Souhag. More scattered but notable concentrations of low prevalence are found in Menya, Qena, and Aswan. Pockets of low prevalence are extremely rare in governorates outside of Upper Egypt.

[5]For reference purposes, a map showing the location of Egypt's governorates is included in Appendix A at the end of the paper.

Figure 1
Geographic Clustering of Areas of Low Levels of Contraceptive Use, Egypt 2000



2.2 Maternal Health

Regular antenatal care from medical providers is important in ensuring women have healthy pregnancies, and medically-assisted deliveries are associated with reduced mortality and morbidity risks for both the mother and child. In Egypt as a whole, women reported receiving regular antenatal care for a little more than a third of the births in the five-year period prior to the 2000 DHS, and they reported having a medically assisted delivery for three in five of these births.

Residence is a strong predictor both of the likelihood that women receive an appropriate level of care during pregnancy and that medical personnel are present when they deliver. Women living in the Urban Governorates are roughly twice as likely as those in Upper Egypt (56 percent versus 27 percent, respectively) and around 30 percent more likely than women in Lower Egypt (39 percent) to see a provider for regular care during pregnancy (Table 3). Medically assisted deliveries range from 48 percent in Upper Egypt to 84 percent in the Urban Governorates.

Table 3 Percentage of births in which the mother received regular antenatal care and in which the mother was attended at delivery by a medical provider by region and governorate, Egypt 2000

Region and governorate	Regular antenatal care	Medically-assisted delivery
Urban Governorates	**56**	**84**
Cairo	50	84
Alexandria	64	82
Port Said	77	95
Suez	56	88
Lower Egypt	**39**	**65**
Damietta	72	94
Dakahlia	48	72
Sharkia	37	58
Kalyubia	39	63
Kafr El-Sheikh	37	71
Gharbia	42	74
Menoufia	35	69
Behera	26	46
Ismailia	52	79
Upper Egypt	**27**	**48**
Giza	49	71
Beni Suef	18	33
Fayoum	29	30
Menya	20	38
Assuit	23	45
Souhag	14	35
Qena	18	47
Aswan	43	75
Total	**37**	**61**

Note: Regular antenatal care refers to four or more visits to a medical provider for care during the pregnancy.

There are marked variations by governorate in the levels of both indicators. Considering the levels on both indicators, women are least likely to receive adequate maternity care in Beni Suef and Souhag and most likely to report receiving such care in Port Said and Damietta.

Figure 2 shows that there are large concentrations of areas with low levels of regular antenatal care within many of the governorates. Looking first at the Urban Governorates, there are fairly large concentrations of areas with low levels (black-shaded areas) in Alexandria, Port Said and Cairo. Concentrations of low levels of regular antenatal care also are found throughout all of the governorates in Lower and Upper Egypt.

Overall, Figure 3 shows markedly fewer areas with low levels of delivery care than were observed with respect to antenatal care. None of the Urban Governorates have large concentrations where delivery care levels are low. In Lower Egypt, the concentrations are small and very widely scattered. In contrast in Upper Egypt, there are a significantly greater number of areas where delivery care levels are comparatively low.

Figure 2
Geographic Clustering of Areas of Low Levels of Regular Antenatal Care, Egypt 2000

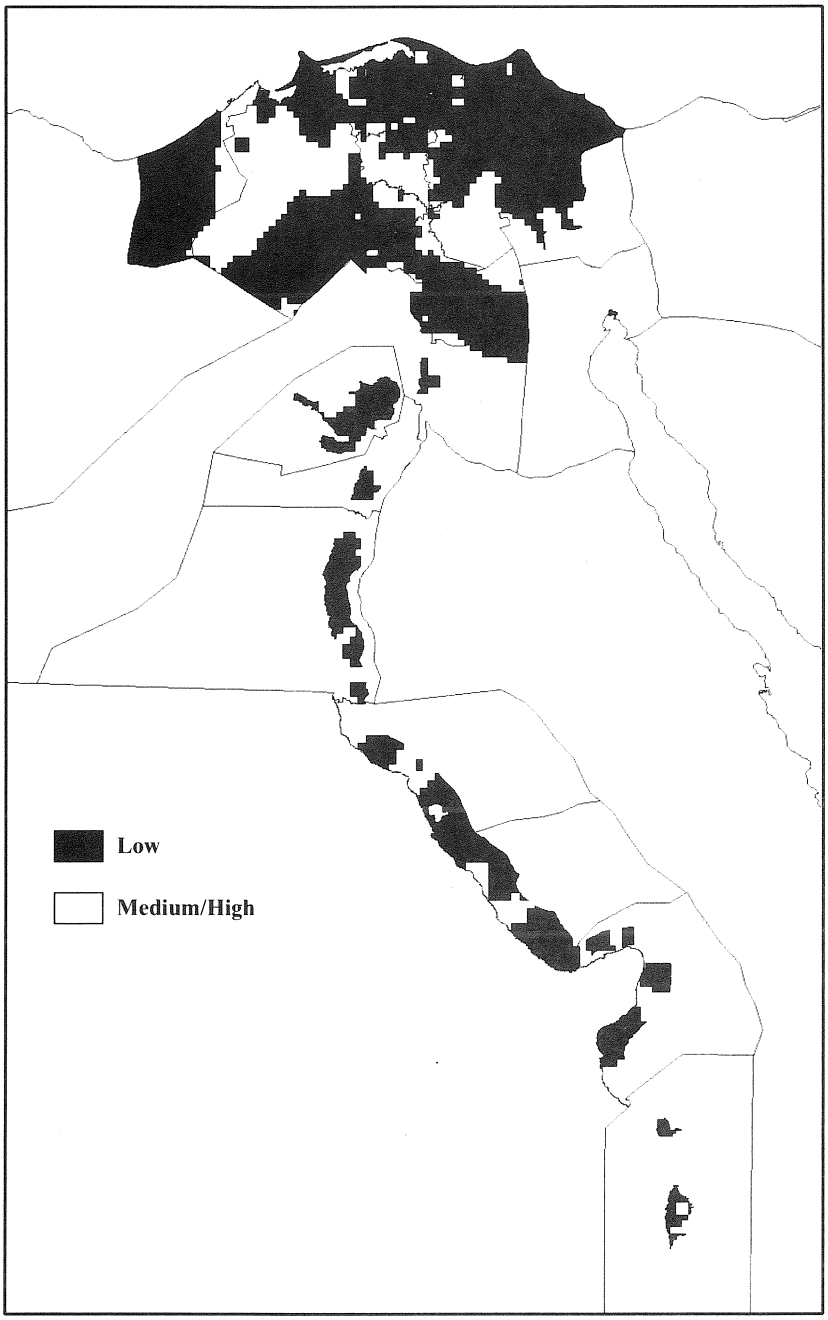
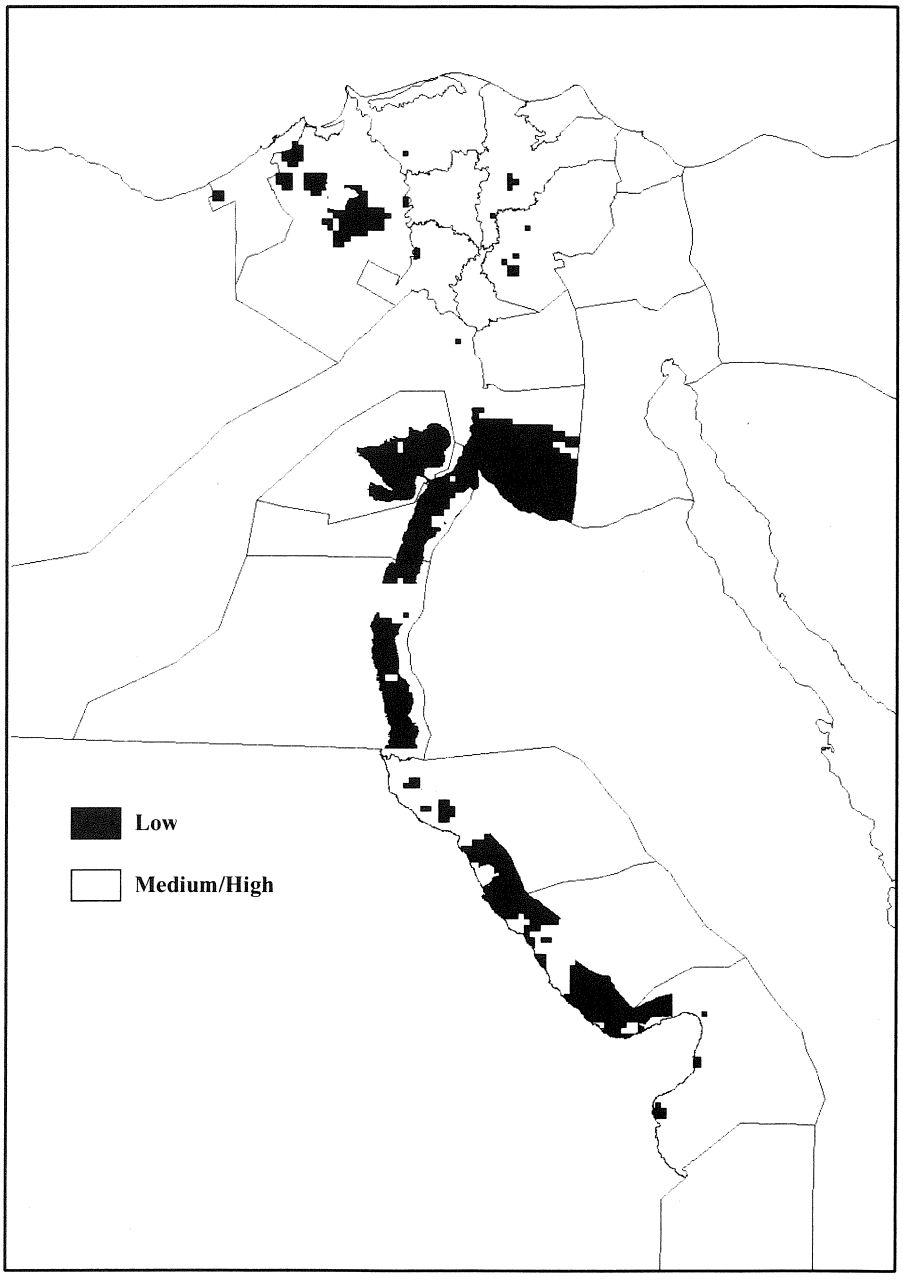


Figure 3
Geographic Clustering of Areas of Low Levels of Medically-Assisted Deliveries, Egypt 2000



2.3 Stunting

The level of stunting is a key indicator of the long-term effects of poor diet and of chronic illness on the nutrition status of children. It is a one of the primary determinants of the health and well-being of young children.

Overall, about one in five children in Egypt is stunted. Regional differences in stunting are striking, with the level varying from under 10 percent of children in the Urban Governorates to 26 percent among children in Upper Egypt.

Looking at individual governorates, stunting levels are 10 percent or below in all four of the Urban Governorates and in Damietta, Kalyubia, and Dakahlia. Stunting levels range between 11 to 18 percent in Kafr El-Sheikh and Sharkia governorates in Lower Egypt and in Fayoum, Aswan, and Qena governorates in Upper Egypt. Levels in the other governorates are above 20 percent, with Assuit and Souhag having the highest levels.

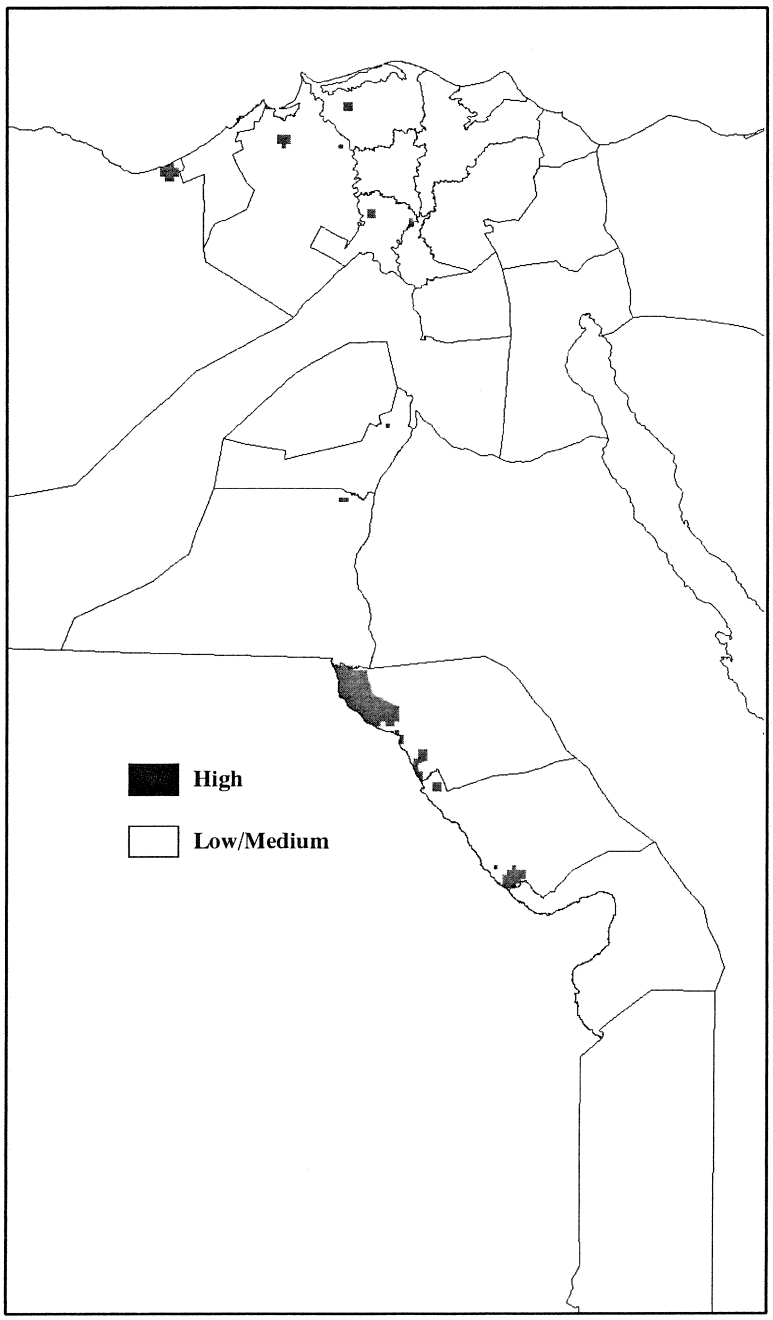
Figure 4 shows the geographic concentrations of high levels of stunting. There are comparatively few large pockets in which stunting levels are estimated to be at the high end of the range. As expected, the most marked concentrations of high stunting are found in Assuit, particularly in the northern part of the governorate. Other governorates in which scattered concentrations of very high stunting are observed include Souhag, Menya, Beni Suef, Alexandria, Kafr El-Sheikh, and Menoufia.

Table 4 Percentage of children under age five who are classified as stunted by region and governorate, Egypt 2000

Region and governorate	Percent stunted
Urban Governorates	**9**
Cairo	9
Alexandria	8
Port Said	8
Suez	9
Lower Egypt	**16**
Damietta	6
Dakahlia	9
Sharkia	18
Kalyubia	7
Kafr El-Sheikh	11
Gharbia	23
Menoufia	24
Behera	20
Ismailia	21
Upper Egypt	**26**
Giza	20
Beni Suef	29
Fayoum	15
Menya	25
Assuit	42
Souhag	34
Qena	16
Aswan	13
Total	**19**

In interpreting the absence of significant concentrations of high stunting levels, it is important to recognize that several factors may be at work. As described above, the mapping procedure divided the range of values across map cells into thirds, and cells falling into one either the lowest or highest third (depending on the indicator) were shaded on the map. To the extent that a particular indicator is highly skewed, relatively few areas may fall into the shaded range. In addition, the procedure used a distance-weighted average of the values for the nearest 12 EDHS clusters to calculate the estimate for each cell. To the extent that extreme values for a particular indicator are highly localized and, thus, are not found in adjacent clusters, these values will average out in the maps. For stunting, values are expected to be concentrated at the low or medium end of the range because children with very severe stunting have higher mortality than other children. Very extreme stunting values are also not likely to be found in large local concentrations unless there have been regular famines or serial epidemics, situations that are not characteristic in Egypt.

Figure 4
Geographic Clustering of Areas of High Levels of Stunting, Egypt 2000



2.4 Girl's Education

The level of school attendance among girls is one of the more basic indicators for monitoring the welfare of women in a society. Table 5 shows that 8 in 10 girls age 6-15 years in Egypt are in school. Current school attendance levels for girls are highest in the Urban Governorates (90 percent) following by Lower Egypt (85 percent). The levels in the Upper Egypt and the Frontier Governorates fall noticeably below the national level.

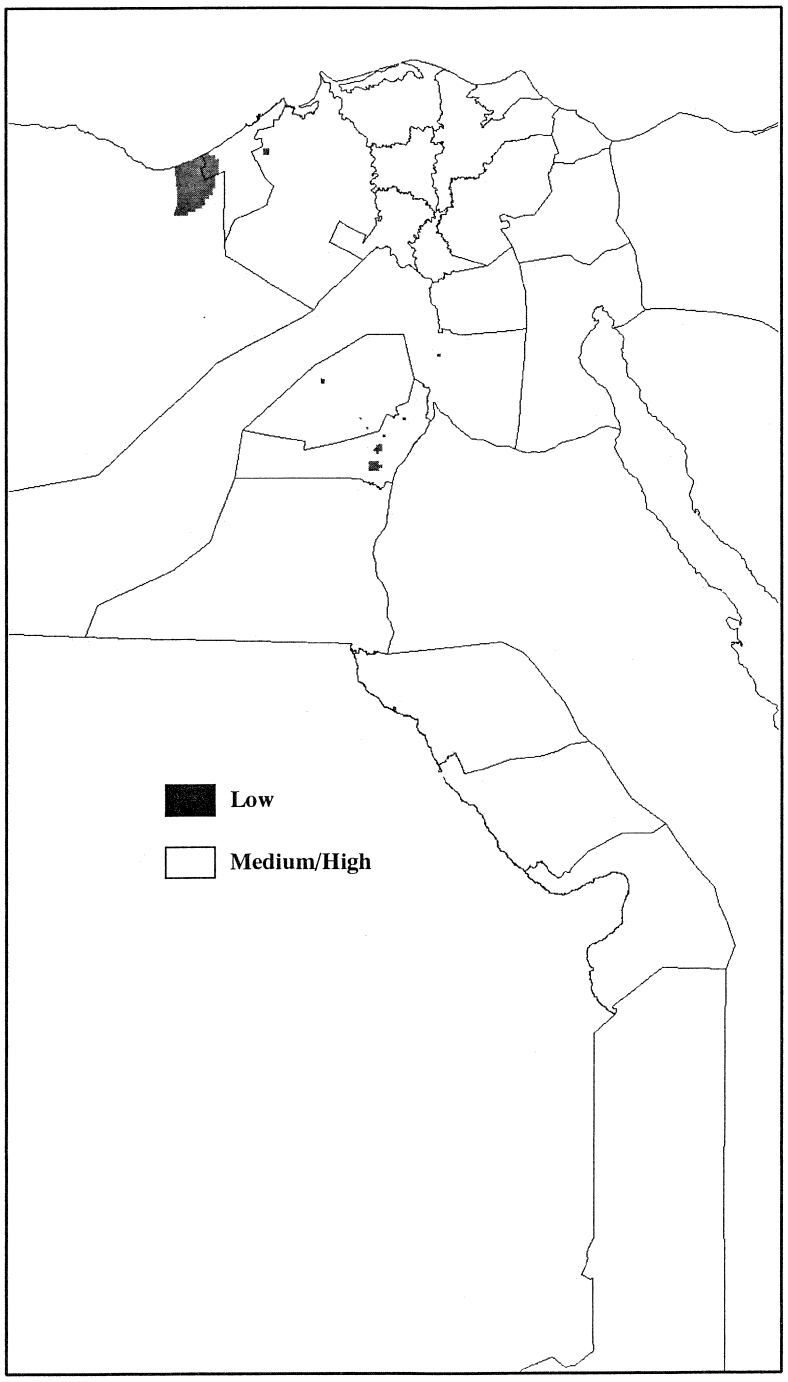
Looking at governorate-level values, school attendance rates for girls approach or exceed 90 percent in all the Urban Governorates. In Lower Egypt, the level exceeds 90 percent in five governorates and falls below 80 percent only in Behera. In Upper Egypt, the level exceeds 80 percent only in Aswan. Beni Suef and Fayoum have the lowest levels.

Figure 5 shows the results of using geographic interpolation to identify areas of low current school attendance for girls. The map shows only a few scattered concentrations of very low attendance, with the largest concentrations observed in Beni Suef. Again, as was mentioned in the discussion of stunting, several factors are involved in the lack of substantial concentrations of areas of low school attendance. First, the distribution for this indicator is not normal (i.e., clustered around the midpoint) but concentrated at the upper end of the range, as school attendance is the norm for young children in Egypt, whether girls or boys.

Table 5 Percentage of girls 6-15 currently attending school by region and governorate, Egypt 2000

Region and governorate	Percent currently attending school
Urban Governorates	**90**
Cairo	89
Alexandria	87
Port Said	92
Suez	91
Lower Egypt	**85**
Damietta	91
Dakahlia	91
Sharkia	82
Kalyubia	80
Kafr El-Sheikh	86
Gharbia	90
Menoufia	90
Behera	76
Ismailia	91
Upper Egypt	**74**
Giza	79
Beni Suef	55
Fayoum	68
Menya	75
Assuit	70
Souhag	79
Qena	77
Aswan	85
Frontier Governorates	75
Total	**81**

Figure 5
Geographic Clustering of Areas of Low Levels of Girl's School Attendance, Egypt 2000



2.5 Wealth Index

The asset or wealth index provides a means of exploring the extent to which poverty levels as reflected in this proxy for consumption vary across Egypt. Poverty frequently underlies many of the health and social welfare differences between geographic areas.

Table 6 presents the proportion of households falling in the bottom third on the household index by region and governorate. The differences by region are quite substantial. Households in Lower Egypt and the Frontier Governorates are around nine times as likely as those in the Urban Governorates to be poor (i.e., to fall at the bottom of the wealth index range) while households in Upper Egypt are more than 14 times as likely to be poor as households in the Urban Governorates.

Looking at the pattern by governorate, there is comparatively little variability across the four Urban Governorates. Within Lower Egypt, the proportions of households in the bottom third on the wealth index range from 10 percent in Damietta to 62 percent in Behera. In Upper Egypt, the lowest level is found in Giza and the highest in Beni Suef.

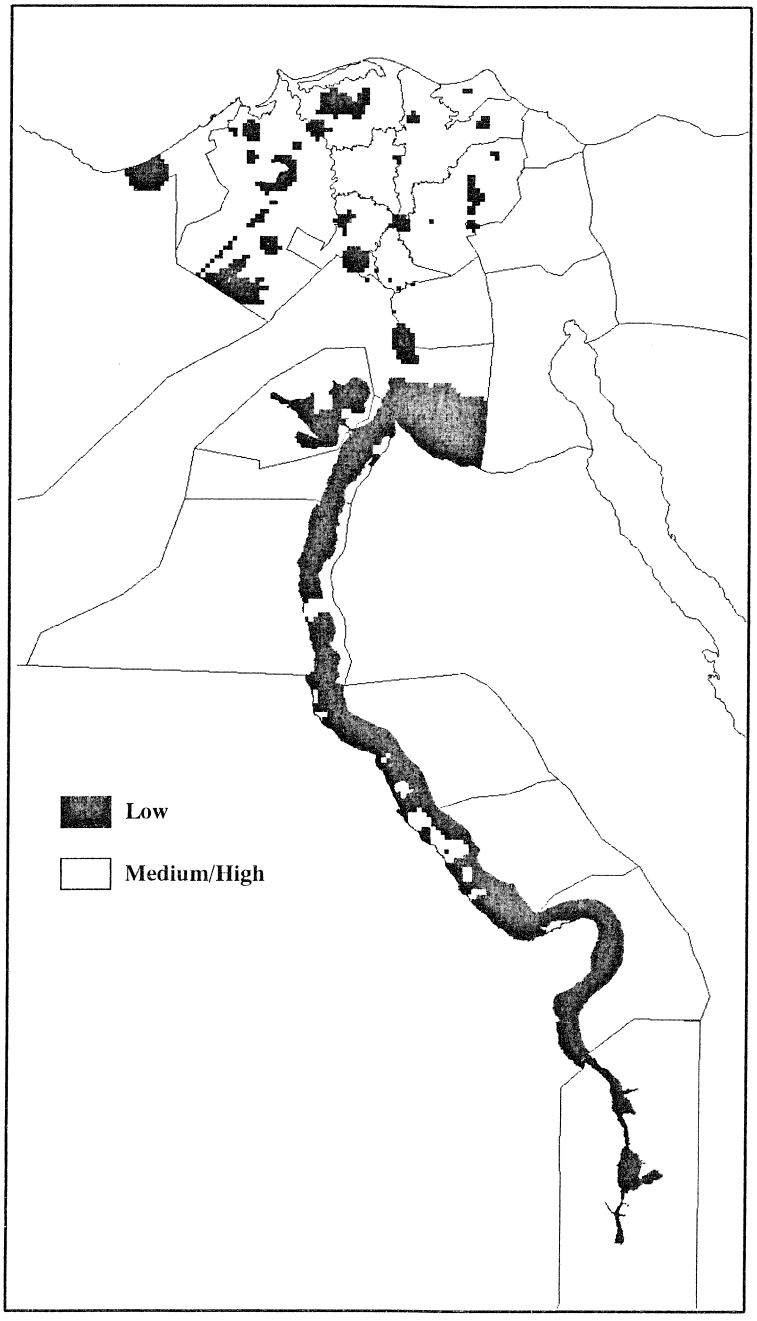
Figure 6 uses the results of geographic interpolation to explore in more depth the clustering of poor households. There are fairly substantial pockets for which the averaged values are concentrated at the bottom of the wealth index throughout Lower Egypt and in the Urban Governorates. The largest concentrations, however, are observed in Upper Egypt.

Table 6 Percentage of households ranked in the lowest third* on the wealth index by region and governorate, Egypt 2000

Region and governorate	Percent
Urban Governorates	**4**
Cairo	3
Alexandria	6
Port Said	4
Suez	2
Lower Egypt	**37**
Damietta	10
Dakahlia	25
Sharkia	51
Kalyubia	28
Kafr El-Sheikh	45
Gharbia	27
Menoufia	51
Behera	62
Ismailia	20
Upper Egypt	**54**
Giza	21
Beni Suef	78
Fayoum	64
Menya	71
Assuit	59
Souhag	62
Qena	58
Aswan	42
Frontier Governorates	**33**
Total	**36**

*Ranked between 1 and 2.29 on a scale which ranges from 1 to 5.

Figure 6
Geographic Clustering of Low Levels on the Wealth Index, Egypt 2000



2.6 Other Approaches to Establishing Cutoffs

Up to this point, the paper has focused on mapping cells falling into the bottom third on the range for an indicator (except for stunting where the map showed cells where the levels were in the highest third). Other approaches to defining the cutoffs also may be used in preparing maps.

For example, Figure 7 shows the results of setting a single value for an indicator; in this case, the indicator is stunting, and the cutoff is set at 25 percent. The map displays in black cells in which the averaged stunting values are 25 percent or higher. Using this cutoff, which is considerably above the national rate of 19 percent, much larger concentrations are identified than were found when cells in the highest third of the range for the stunting indicator were mapped (see Figure 4). In particular, significant concentrations are found in governorates in Lower Egypt when this cutoff is used, especially in the southwest corner, as well as throughout the Upper Egypt governorates.

It also may be useful to map cells exceeding a specific target or goal. For example, the map in Figure 8 focuses on identifying areas where regular antenatal care coverage is 60 percent or higher. The results suggest that there are comparatively few concentrations where regular antenatal care coverage falls at or above this target.

3 Conclusions and Implications

This paper has presented the results of the use of data on the geographic coordinates of clusters from the 2000 DHS to map the spatial distribution of a number of key maternal and child health and socioeconomic indicators. The mapping exercise identified significant variability in the spatial distributions at the subgovernorate level across the six indicators. The following summarizes the key findings:

- Geographic concentrations of areas with comparatively low contraceptive use are evident within a fairly solid band running from Assuit to Souhag and in more scattered pockets in Menya, Qena, and Aswan.
- Relatively large concentrations of areas with low ANC levels are evident in governorates throughout Egypt. In contrast, marked concentrations of low levels of medically assisted deliveries are primarily found in Upper Egypt governorates, with more widely scattered areas observed in governorates in Lower Egypt.
- A comparison of the contraceptive use map with the two maternal health maps shows that areas of low contraceptive use are relatively more concentrated spatially than are areas falling at the lowest extreme for the maternal health indicators, especially regular antenatal care.
- Concentrations of areas in which households rank in the bottom third on the wealth index are comparatively small and scattered throughout the governorates in Lower Egypt. In contrast, in Upper Egypt, large concentrations are found within most governorates.
- Few concentrations of areas at the bottom third of the range for girl's education or in the highest third for stunting were found. When the cutoff for stunting was redefined to include areas in which the averaged stunting value was 25 percent or higher (compared to the national rate of 19 percent), however, geographic concentrations were identified in governorates in both Lower Egypt and Upper Egypt.

Figure 7
Geographic Clustering of Stunting Levels of 25 Percent or Higher, Egypt 2000

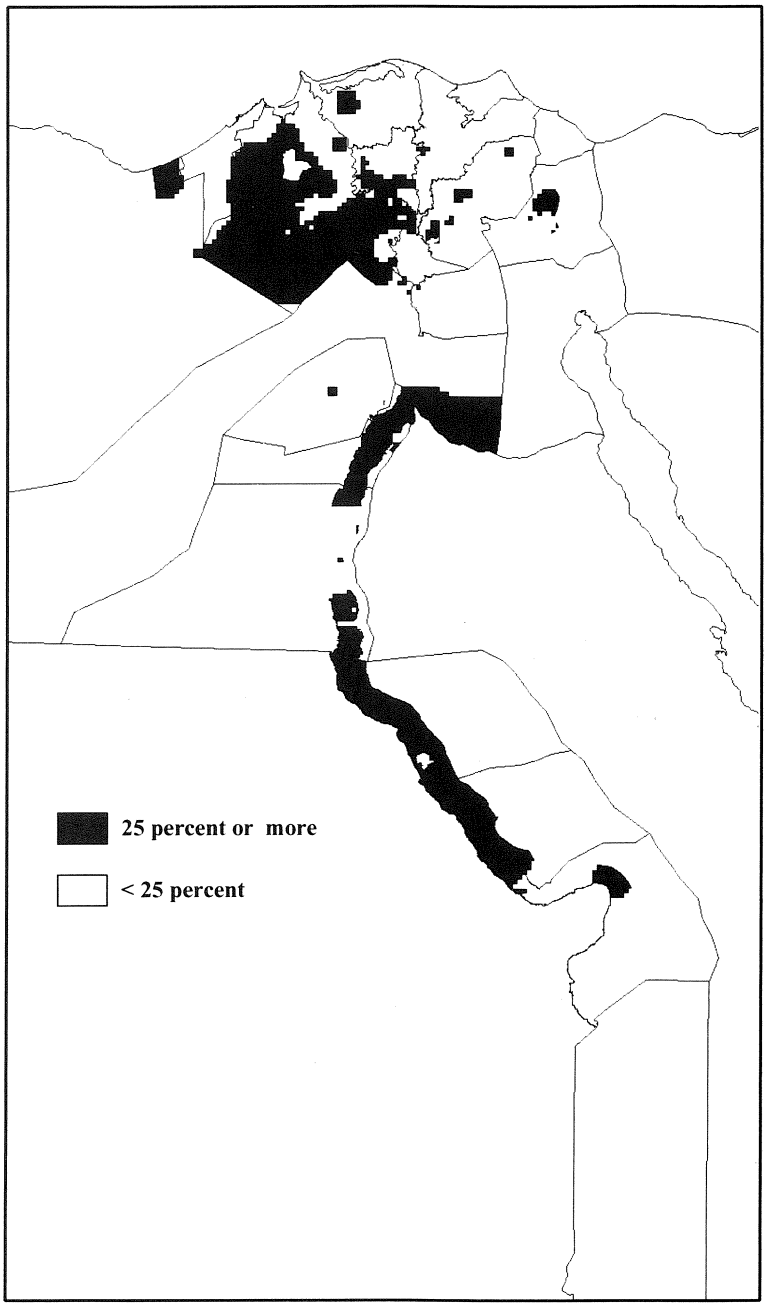
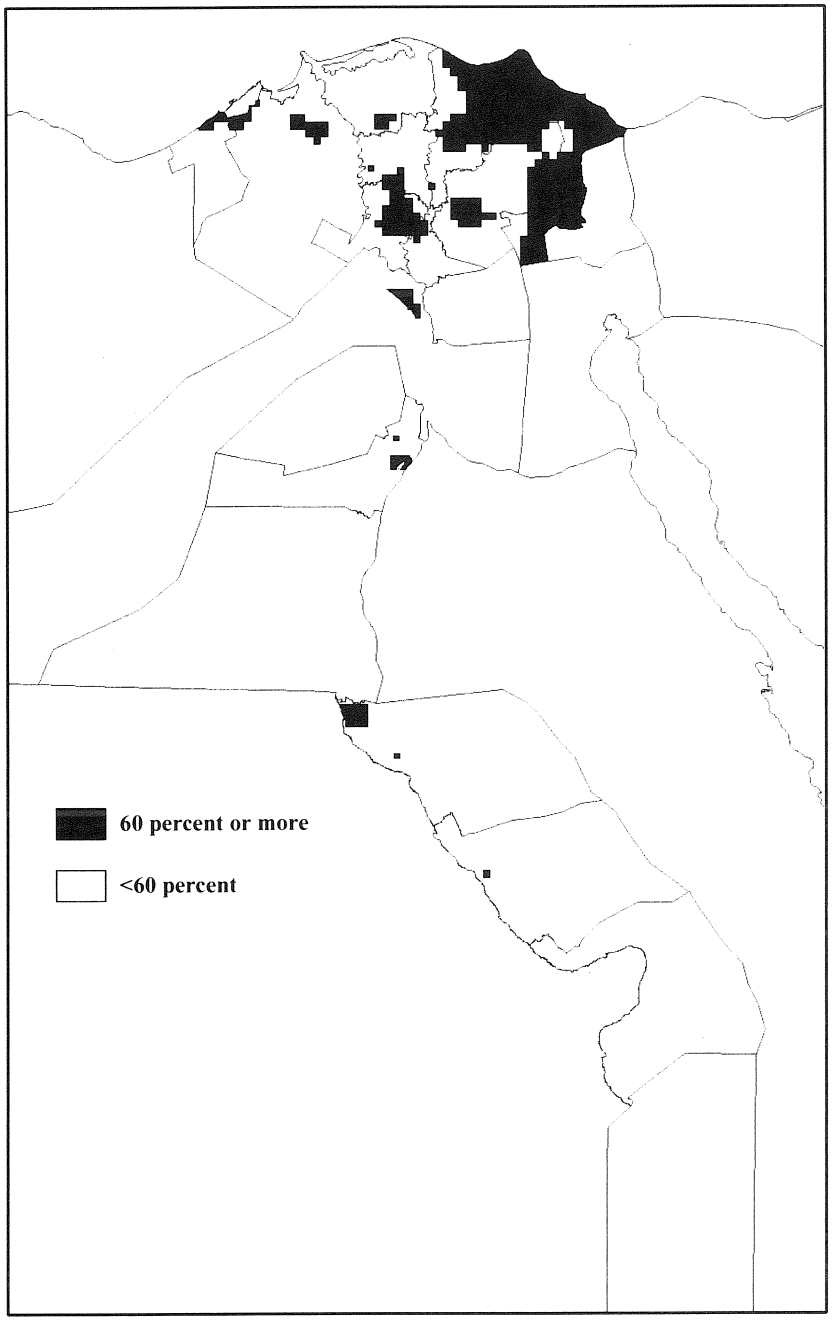


Figure 8
Geographic Clustering of Antenatal Care Levels of 60 Percent or Higher, Egypt 2000



These results highlight the potential use that the GIS coordinates obtained in the 2000 DHS offer for exploring the spatial distribution of health and population indicators. However, there are a number of issues that must be kept in mind with respect to the mapping approach employed in the paper. Most obvious is the fact that the values for map cells do not reflect the actual values found in the population living in the area represented in the cell but rather an average of values over a broader area. This smoothing undoubtedly masks additional small area differences. Use of a smaller number of clusters in calculating the averages would improve the sensitivity of the mapping to such variations; however, it would also increase the likelihood of spurious values due to the greater sampling variability inherent in the use of a smaller number of clusters. The issue of sampling variability would be an even more important concern in mapping exercises in which DHS cluster data would be employed to directly estimate values for lower-level administrative units. Employing cluster-level data offers some advantages over the moving average procedures utilized in this paper, however, including the ability to link with data from other sources (e.g., censuses, other surveys, and various administrative datasets) (El-Zanaty and Associates and ORC Macro 2003). Finally, when employing any mapping approach, it is important to consider the spatial distributions from a number of perspectives. For example, the results in this paper illustrated how varying the cutoff for the stunting indicator provided additional insights into the spatial concentrations of this indicator.

In conclusion, the collection of geographic coordinates in the 2000 Egypt DHS provided for the first time the means to employ mapping procedures to examine variations in the spatial distribution of key health and welfare indicators from the DHS. The results in this paper suggest that the ability to map indicators at the subgovernorate level offers an important tool for increasing the understanding geographic variations in these indicators and, thus, for improving the geographic targeting of program interventions.

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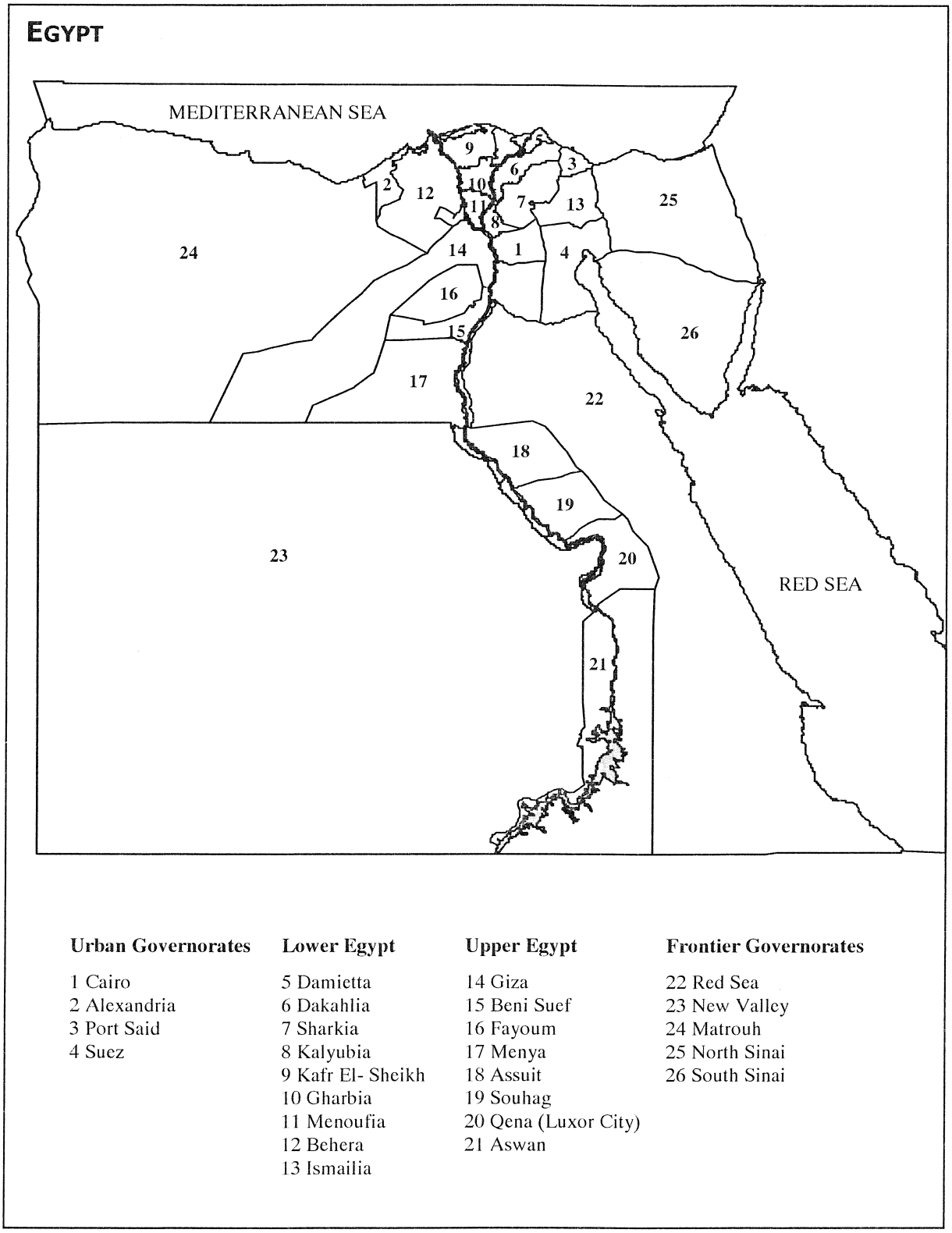
Appendix

Map of Egypt



Urban Governorates	Lower Egypt	Upper Egypt	Frontier Governorates
1 Cairo	5 Damietta	14 Giza	22 Red Sea
2 Alexandria	6 Dakahlia	15 Beni Suef	23 New Valley
3 Port Said	7 Sharkia	16 Fayoum	24 Matrouh
4 Suez	8 Kalyubia	17 Menya	25 North Sinai
	9 Kafr El- Sheikh	18 Assuit	26 South Sinai
	10 Gharbia	19 Souhag	
	11 Menoufia	20 Qena (Luxor City)	
	12 Behera	21 Aswan	
	13 Ismailia		

Access to Health Care among Egyptian Women

Madiha Said Mohamed Abdel-Razik

1 Introduction

Investments in improving women's knowledge and access to health care are vital both to achieve good health today and to ensure healthier future generations. This study considers information from the 2000 Egypt Demographic and Health Survey (EDHS) relating to perceptions of women's roles in making health decisions and the relationship of those perceptions to their utilization of reproductive health care services. The primary objectives of the study are to:

- Explore the extent to which women perceive themselves to be in control of their access to health care services;
- Identify barriers that women perceive in case of accessing health care; and
- Develop a better understanding the implications of women's roles in decision-making and the barriers they perceive to the use of contraceptive and maternity care services.

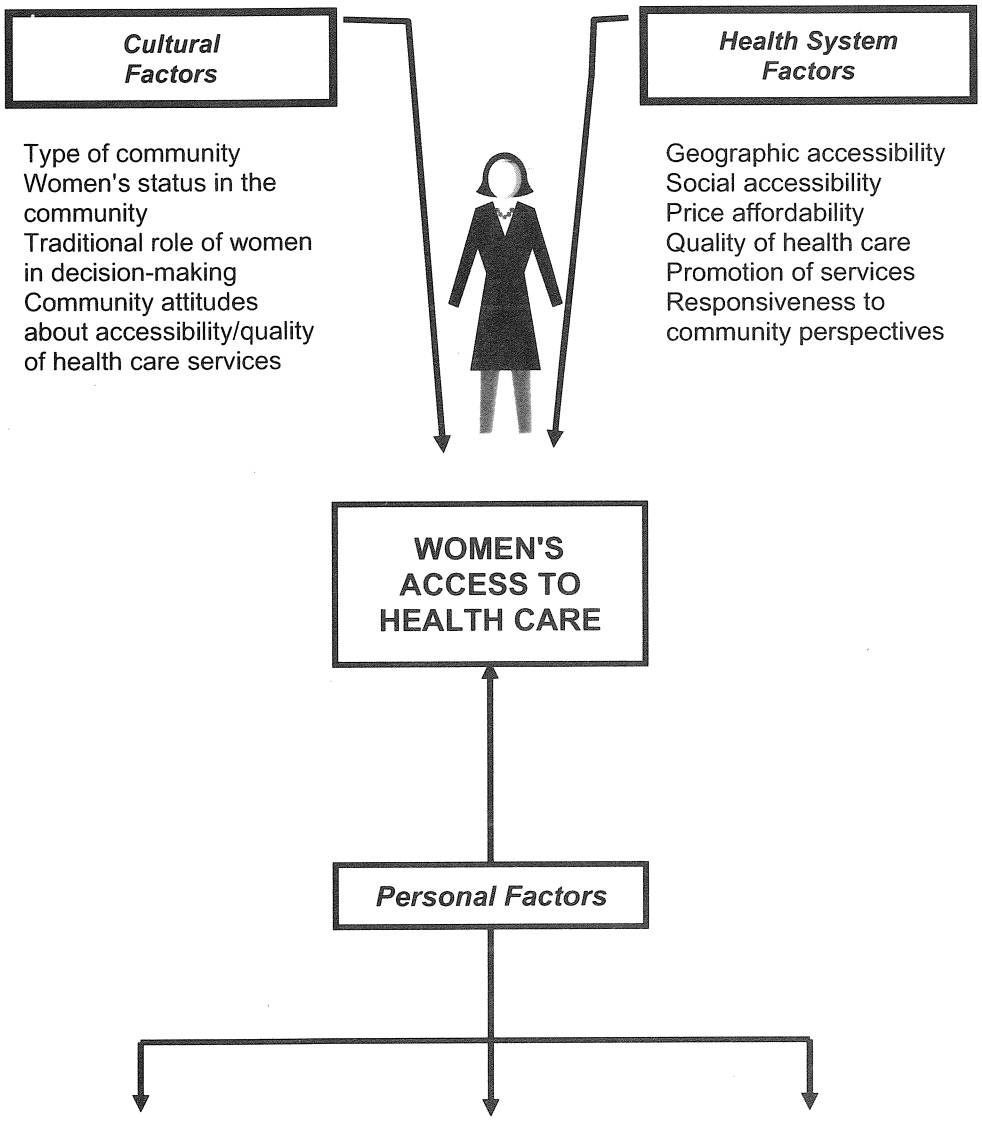
It is hoped that the improved understanding of women's roles in health care decision-making and the barriers they encounter will help in designing strategies to be targeted at men, the community and the Egyptian health care system as well as at women themselves in order to improve their access to health care.

2 Conceptual Framework

Individual autonomy, the ability to make decisions and the capacity of self-governance, especially in the area of health promotion, preventive care and curative care, are important aspects that determine women's access to health care. In turn, women's decision-making can be seen as an outcome of different and interacting determinants that may be cultural and/or personal. In addition, the degree to which the health services delivery system and its policies and regulations match with women demands and expectations, is an important programmatic determinant of women's access health care.

Figure 1 summarizes a conceptual framework for understanding the various personal, cultural, and programmatic determinants of women's access to medical care. The figure illustrates the diverse range of personal factors that play a role in decisions to access health care, from personality traits to biological factors such as the frequency and severity of morbidity. A woman's experience with illness in general and/or a specific disease condition or the experience of relatives and friends may shape her decisions about seeking care, e.g., by influencing her perception as to whether traditional methods will be adequate to manage the illness or whether treatment must be sought on an outpatient or inpatient basis at a health facility.

Figure 1. Determinants of Women's Access to Health Care



Socio-economic and demographic characteristics also influence access to health care. In particular, financial costs are often a principal concern in making health care decisions, i.e., whether the family income or the woman's own income is sufficient to afford health care. In this regard, women may give priority to children's health care needs over their own. Women also may have concerns about the time costs involved, i.e., the time spent to access care and the impact on daily household responsibilities.

Cultural factors, particularly community attitudes about women's status and empowerment, influence the ease with which women can access health care. Health care policies and programs that relate to the costs, geographic accessibility, and quality of health services also may play a role in women's access to care. Moreover, simply by promoting certain services, the health care system may increase their use.

3 Data

3.1 Factors Constraining Access to Care

Data from the 2000 Egypt DHS can be used to look at how a number of the factors included in the conceptual framework relate to women's access to family planning and maternal health care services. First of all, the 2000 EDHS collected information relevant to women's roles in the process of decision-making in their household, including specifically their involvement in decisions about accessing health care for themselves. A number of prior research studies have explored in some depth the relationship between measures of women's empowerment to make decisions for themselves and their use of health services. In this regard, recent studies undertaken by the Research Management Unit of the National Population Council (NPC/RMU) and the Community Medicine Department of Suez University using 1995 EDHS data found that a woman's education level and her degree of empowerment were strongly related to the use of reproductive health services (NPC/RMU and Suez University, 1998a and 1998b). Also in a study using 1995 EDHS data, Kishor (1997) found a positive association between contraceptive use levels and two key aspects of women's empowerment—control over decision-making and freedom of movement.

In addition to the questions on decision-making roles, the 2000 EDHS asked women whether they considered a number of potential barriers to accessing health care to be 'big' problems for them. The barriers about which women were asked can be grouped into the following types:

- Source awareness/availability (distance to health facility; the need for transport to get to source; lack of knowledge about where to go)
- Financial (difficulty in getting money for treatment)
- Lack of autonomy (difficulty in getting permission to go)
- Other cultural and/personal barriers (lack of female provider; not wanting to go alone)

The 2000 EDHS survey also included a number of the basic demographic and socio-economic characteristics that may directly or indirectly influence a woman's access to care. These include the woman's age and number of children, her education, residence, her husband's education, and the wealth status of the household. For example, a number of studies have shown that women's empowerment, and, consequently access to health care, vary among Egypt's regions. A community-based study conducted by the NPC/RMU and CDC (2001) found that women were much more likely to report being forbidden to go outside the home as the reason for not going the pharmacy in Upper Egypt (25 percent and 38 percent in urban and rural Upper Egypt, respectively)

than in other areas. Improvements in the economic status of women were also found to be associated with better access to quality health care as shown in the results of the study conducted by the NPC/RMU and BERG (2001) on the impact of micro-credit on the lifestyle of youth.

It must be noted that the 2000 EDHS data has limitations in addressing factors relating to women's access to health care. For instance, the study cannot take into account a number of factors that prior research in Egypt indicate have an important impact on women's health care decision-making, including perceptions of the quality of the available services (NPC/RMU and DTRC 1996 and Ministry of Health and Population 1997). Also it is only possible to indirectly take into account women's perceptions of the need to obtain care. A woman's own experience or the experience that her friends or neighbors share with her obviously has an impact on her sense that accessing health care is necessary or useful.

Despite the data limitations, the study offers an opportunity to look in-depth at a number of the barriers that women face in accessing health care. Hopefully the results will help policy makers and program managers to better target interventions to help women achieve full access to care.

4 Women's Role in Decision-making about Health Care

This section addresses a number of basic questions relating to women's perceptions of the extent to which they control access to health care for themselves. They include:

- What roles do women perceive they have overall in making household decisions?
- Are they more (or less) likely to believe they have the final say over health care decisions than over other types of decisions?
- How do women's perceptions of the degree of control they have over health care decisions vary according to key background characteristics?

4.1 Women's Roles in Making Decisions in Households

Table 1 describes the profile of decision-making within the family regarding three basic types of decisions: (1) decisions about internal household issues (i.e., making large purchases, daily purchases and food to cook); (2) decisions about social activities (visits to friends and relatives); and (3) decisions about women's access to health care. The results indicate that women clearly vary in the control that they have over various decisions.

As shown in the table, women have fairly influential roles in decision-making in minor household issues such as "food to cook" (66 percent have final say alone) or "daily purchases" (48 percent have final say alone). However, roles are reversed when it comes to decisions regarding "large purchases" for the household that presumably require a weighing of household priorities, financial commitments, what is available in the market, price, and experiences gained from contact with friends/relatives about different products. Husbands or other household members have the final say about large purchases in more than half of households, and only 10 percent of women say they are responsible for final decisions about such purchases.

A woman's relatives and friends represent an external social environment where she may exchange life experiences, including information and opinions about health care options. In the majority of cases, the EDHS found that decisions about which friends/relatives to visit and when are usually an outcome of joint discussion between women and their husbands. For almost a quarter of women, however, husbands have the final say about these social activities.

With regard to the issue of decisions about getting health care for themselves, the 2000 EDHS results suggest that women are more likely to say that they make these decisions themselves than they are to make decisions about major household purchases or social activities on their own. More than a third of the women have the final say alone over the decision to seek health care for themselves (36 percent), and around a quarter say that the decision is made jointly (23 percent). Nevertheless, a very substantial proportion—around four in ten women—indicate that the husband or another household member ultimately makes this type of decision.

Table 1 Percentage distribution of ever-married women 15-49 by the person having the final say about various household decisions, Egypt 2000

Woman's decision-making role	Food to cook each day	Making daily purchases	Making large purchases	Visits to friends/ relatives	Own health care
Woman herself has final say	66.3	47.6	10.0	16.8	36.4
Woman has final say jointly with:					
Husband	13.7	18.4	31.0	53.6	22.9
Someone else	9.8	4.2	1.3	3.5	1.0
Other person has final say					
Husband	4.3	22.4	53.5	23.8	38.0
Someone else	5.9	7.3	4.2	2.3	1.8
Total percent	100.0	100.0	100.0	100.0	100.0
Total number	15,573	15,573	15,573	15,573	15,573

4.2 Differentials in Control over Health Care Decisions

Table 2 provides information about the association between women's socioeconomic background characteristics and their perception about their role in health care decision-making. As the table shows, the younger the woman the less likely she is to feel she has final control for decisions about her own health care. Women 40-49 more frequently claim autonomy in decision-making regarding their access to health care (43 percent) than acknowledge dependency on the husband/or others to take such decisions (35 percent). In contrast, women in the 15-24 age group are about twice as likely to say the husband/someone else has the final say than to indicate they make the decisions about seeking care on their own. The proportion saying that decisions are made after joint discussion with the husband varies in a narrow range from about one-quarter of women in the 15-24 and 25-39 age groups to a little more than a fifth of women 40-49.

Living in urban areas appears to give more autonomy to women, perhaps because they have more opportunities for communication with others to develop strong and sound opinions and more limited risks for the outcome of decision-making. In any case, women who are resident in urban areas perceive that they have the final say about their access to health care (43 percent) more often than rural women (31 percent).

A different profile with respect to health care decision-making is evident for each region. Women from the Urban Governorates tend to more often perceive they have final say about their access to health care (Urban Governorates, 50 percent; Lower Egypt, 36 percent; Upper Egypt, 31 percent; and Frontier Governorates, 23 percent). Women in Lower Egypt are somewhat more likely to report making decisions jointly with their husbands/others than women in the other areas (Lower Egypt, 28 percent; Urban Governorates, 25 percent; Upper Egypt, 19 percent; and Frontier Governorates, 24 percent). Women in the Frontier Governorates and Upper Egypt are most dependent on their husbands/others on making decisions about their access to health care (Frontier

Governorates, 53 percent; Upper Egypt, 51 percent; Lower Egypt, 37 percent; and Urban Governorates, 26 percent).

Table 2 Percent distribution of ever-married women 15-49 by the person(s) perceived to have final say in making decisions about the woman's health care according to selected background characteristics, Egypt 2000

Background characteristics	Respondent alone	Respondent jointly	Husband/ someone else	Total percent	Number of women
Age					
15-24	27.0	25.6	47.4	100.0	2,860
25-39	36.0	24.5	39.5	100.0	8,224
40-49	43.1	21.5	35.4	100.0	4,489
Urban-rural residence					
Urban	42.7	25.3	32.0	100.0	6,871
Rural	31.4	22.8	45.8	100.0	8,702
Place of residence					
Urban Governorates	49.8	24.7	25.5	100.0	2,992
Lower Egypt	35.7	27.6	36.7	100.0	6,826
Urban	39.6	31.2	29.2	100.0	1,946
Rural	34.2	26.1	39.7	100.0	4,880
Upper Egypt	30.5	18.9	50.7	100.0	5,546
Urban	35.3	19.5	45.2	100.0	1,808
Rural	28.1	18.6	53.3	100.0	3,738
Frontier Governorates	22.6	23.7	53.7	100.0	209
Work status					
Working for cash	49.8	30.4	19.8	100.0	2,266
Working but not for cash	34.1	22.7	43.1	100.0	13,307
Woman's education					
No education	33.4	19.0	47.5	100.0	6,734
Primary incomplete	35.3	23.0	41.7	100.0	2,060
Primary complete/some secondary	36.2	24.4	39.5	100.0	2,026
Secondary/higher	41.1	30.9	28.0	100.0	4,753
Husband's education					
No education	35.4	19.7	44.9	100.0	4,678
Primary incomplete	33.0	21.5	45.5	100.0	2,225
Primary complete/some secondary	35.1	22.6	42.2	100.0	2,757
Secondary/higher	38.9	28.7	32.4	100.0	5,894
DK/missing	75.0	19.1	5.9	100.0	18
Wealth index quintiles					
1	31.9	17.0	51.1	100.0	2,535
2	31.9	20.7	47.3	100.0	2,771
3	33.2	23.1	43.7	100.0	2,876
4	37.6	26.3	36.2	100.0	2,965
5	43.0	28.7	28.3	100.0	4,425
Total	36.4	23.9	39.7	100.0	15,573

Working for cash is a strong determinant of independence in decision-making. Women in this category are much more likely to make their own decisions about access to health care (50 percent) or decide such issues with their spouses (30 percent) than other women.

Increases in the level of education, particularly attainment of the secondary or higher level, are directly associated with the perception that the woman herself is the only person who decides about her access to health care. Among the most highly educated, 41 percent make the decisions alone while 31 percent decide after joint discussion with her husband/others. The comparable figures for women with no education were 33 percent and 19 percent, respectively. Close to half of women

who have never attended school are dependent on their husbands/others in decision making about their health.

Husbands' education is related in more or less the same way as women's education in decision making about women's access to health care. Wives of husbands with no education tend to be dependent on their husbands/others to decide about their access to medical care (45 percent) and less likely to come to a final decision after joint discussion with their husbands (20 percent) or decide alone (35 percent). Wives of highly educated husbands have more autonomy to decide about their own health (39 percent) and more opportunities to reach joint decisions with the husband (29 percent).

The household's wealth status is positively associated with a greater degree of autonomy in decision-making. For example, women living in the wealthiest households (i.e., in households with rank 5 on the scale) have both the greatest chance of having the final say in their access to health care (43 percent) and of discussing health decisions with the husband (29 percent). Women in the poorest households (i.e., those ranking 1 on the scale) are the most dependent on their husband/others (51 percent) and have the least likelihood of open discussions with their husbands/others (17 percent) when making decisions about their access to health care.

5 Barriers to Accessing Health Care for Women

The 2000 EDHS looked not only at the issue of how women perceive health care decisions are made but also at the specific barriers to seeking care that may inhibit use of health care services even for women who can make these decisions alone. Using these data, this section addresses the following questions:

- What problems do women perceive as major barriers to accessing health care?
- How many women believe that they face multiple barriers to accessing care?
- How does a woman's perceived degree of control over decision-making relate to her recognition various barriers as 'big' problems in accessing health care?
- How do women vary in their perceptions of the major barriers to accessing care according to basic demographic and socio-economic characteristics?

5.1 Prevalence of Various Perceived Barriers

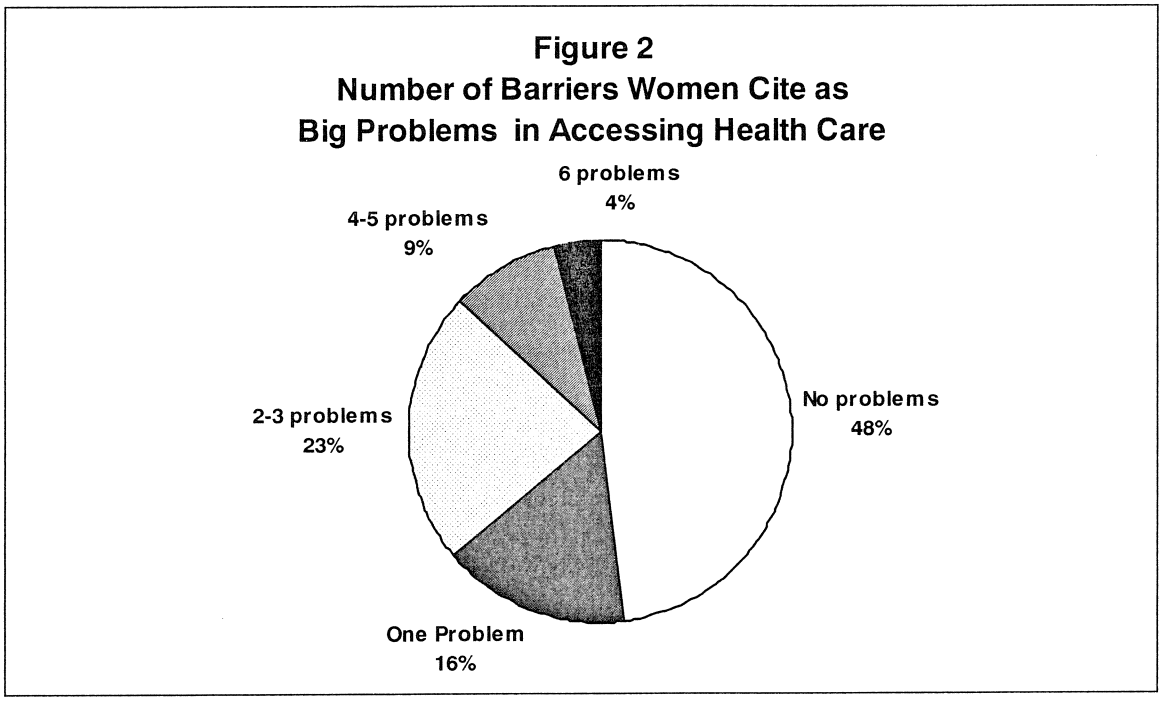
As described earlier, the 2000 EDHS collected information on women's concerns about specific barriers to accessing health care for themselves. Table 3 details the proportion of women citing barriers as 'big' problems. Lack of autonomy (28 percent) and financial concerns (27 percent) were the most frequently cited as potentially major barriers followed by cultural or personal concerns including lack of a female provider and not wanting to go alone for care. Factors relating to women's knowledge of providers or proximity to services were cited by 10-15 percent of the women interviewed.

Table 3 Percentage of ever-married women 15-49 citing various barriers as big problems in getting health care for themselves, Egypt 2000

Problems in getting health care	
Source awareness/availability	
Knowing where to go	9.6
Distance to health facility	13.5
Need to take transport	14.6
Financial problems	
Getting money for treatment	26.8
Lack of autonomy	
Getting permission to go	27.8
Other cultural/personal concerns	
Lack of female provider	20.6
Not wanting to go alone	21.6
Number	15,573

5.2 Number of Barriers Recognized as 'Big" Problems

Figure 2 looks at the number of specific barriers that women identified as big problems. It shows that slightly less than half of women (48 percent) felt that none of potential barriers to health care access were major problems. At the same time, a quarter of the women mentioned two or three barriers as problems they consider major. A minority of women (13 percent) reported 4 or more types of barriers as major problems limiting access to health care.



5.3 Interrelationship between Control over Health Care Decisions and Perceptions of Barriers to Accessing Care

Table 4 looks at the percentages of women who cite various barriers to health care access as potential problems according to the degree of control the woman has over health care decision-making. The table shows that, in general, women who perceive themselves as having the least control over health care decisions, i.e., those who report that the husband or someone else has the final say over decisions, are more likely to recognize at least one potential barriers to accessing health care as a 'big' problem. For example, 4 in 10 of the women who say that the husband or someone else has the final say over decisions about the woman's health care report that obtaining permission to go to health care is potentially an issue for them. This compares to 16 percent of women who report making health care decisions jointly with the husband and 22 percent who report making the decisions alone. The latter finding suggests that even women who feel that they can make the decision about seeking health care without interference may still have problems with getting permission to act on their decisions.

Table 4 Percentage of ever married women 15-49 citing various barriers as big problems in getting health care for themselves and percentage indicating none of the barriers poses a 'big' problems by the person having final say over health care decisions, Egypt 2000

Problems in getting health care	Respondent alone	Joint with husband/ someone else	Husband/ someone else	Total
Source awareness/availability				
Knowing where to go	7.4	6.3	13.4	9.6
Distance to health facility	13.5	10.2	15.4	13.5
Have to take transport	14.5	11.1	16.9	14.6
Financial problems				
Getting money for treatment	26.0	15.3	34.3	26.8
Lack of autonomy				
Getting permission to go	22.0	16.2	40.1	27.8
Cultural/personal concerns				
Lack of female provider	16.7	16.9	26.3	20.6
Not wanting to go alone	16.6	18.4	28.2	21.6
No barriers	53.8	60.6	35.3	48.1
Number of women	5,666	3,717	6,190	15,573

Financial issues are of concern to a sizeable minority of women regardless of the control they feel that they have over making decisions. Women who say the husband/someone else has the final say are the most likely to see getting the money to go as a problem (34 percent). These women also have a somewhat higher degree of cultural and/or personal concerns than other women. Finally, while women who say the husband or someone else controls decisions differ somewhat from other women with regard to source knowledge or access issues, the differences are much smaller than for the other barriers.

5.4 Differentials in Prevalence of Perceived Barriers to Accessing Care

Table 5 explores the links between demographic and socioeconomic status indicators and the extent to which women perceive specific barriers as big problems in getting health care. Lack of autonomy and financial issues were the barriers that women cited most often as big problems. In general, these barriers are more common among women 15-24 years, women resident in the rural areas and in Upper Egypt and the Frontier Governorates, women not working for cash, women with

no education or whose husbands have never attended school, and women living in households ranking at the bottom of the household wealth index than among other women.

Table 5 Percentage of ever-married women 15-49 citing various barriers to health care as 'big' problems in getting health care for themselves according to selected background characteristics, Egypt 2000

Background characteristics	Knowing where to go	Distance to facility	Need to take transport	Getting money to go	Getting permission	Lack of female provider	Going alone	Number of women
Age								
15-24	11.6	13.3	14.8	27.6	34.1	24.8	27.1	2,860
25-39	9.0	13.6	14.5	27.0	28.2	20.3	20.9	8,224
40-49	9.2	13.4	14.8	25.8	23.0	18.2	19.3	4,489
Urban-rural residence								
Urban	5.4	8.5	9.6	18.0	19.7	16.7	16.2	6,871
Rural	12.8	17.4	18.6	33.7	34.2	23.6	25.9	8,702
Place of residence								
Urban Governorates	3.6	6.3	8.1	14.0	16.5	16.0	15.5	2,992
Lower Egypt	9.8	15.4	16.4	24.6	29.4	20.8	20.1	6,826
Urban	6.4	11.6	11.6	18.6	23.8	16.7	16.2	1,946
Rural	11.2	16.9	18.3	27.0	31.6	22.4	21.7	4,880
Upper Egypt	11.9	14.6	15.8	36.1	31.0	22.6	26.1	5,546
Urban	6.9	8.8	10.1	23.6	19.4	18.2	16.3	1,808
Rural	14.3	17.5	18.5	42.2	36.6	24.7	30.8	3,738
Frontier Governorates	23.9	20.7	22.0	33.1	52.3	25.1	40.0	209
Work status								
Working for cash	4.9	9.2	11.0	13.4	15.6	11.5	12.0	2,266
Not working for cash	10.3	14.2	15.3	29.1	29.9	22.1	23.2	13,307
Women's education								
No education	13.6	18.4	19.7	38.6	36.0	25.3	26.8	6,734
Primary incomplete	10.3	14.6	15.4	31.0	29.5	20.4	22.7	2,060
Primary complete/ some secondary	7.5	10.9	11.6	22.1	25.1	20.7	21.3	2,026
Secondary/higher	4.4	7.1	8.4	10.2	16.6	13.9	13.9	4,753
Husband's education								
No education	13.3	18.9	19.2	38.4	33.6	23.3	25.1	4,678
Primary incomplete	11.5	15.3	17.2	35.8	34.4	23.3	24.8	2,225
Primary complete/ some secondary	9.6	13.9	15.4	28.1	28.7	22.4	22.1	2,755
Secondary/higher	5.8	8.2	9.7	13.5	20.3	16.4	17.4	5,896
Wealth index quintiles								
1	17.8	23.1	24.3	49.7	42.4	28.5	30.7	2,762
2	13.1	17.1	17.8	34.5	37.1	23.1	26.5	2,978
3	9.7	14.0	15.6	28.2	30.1	21.4	22.9	3,083
4	6.6	10.7	12.1	18.8	20.7	18.6	18.0	3,301
5	2.5	4.8	5.7	8.1	12.8	13.1	12.4	3,449
Total	9.6	13.5	14.6	26.8	27.8	20.6	21.7	15,573

Table 5 also shows that the profiles of women who are most likely to perceive other types of barriers such as the lack of a female provider or problems in finding or getting to a source as big problems are similar to those of the women who report getting permission or the money to go as big problems. Particularly noteworthy are the comparatively high proportions of women in the Frontier Governorates citing problems of access and difficulty in going alone to a source.

Table 6 looks at the number of specific barriers that women identify according to the important demographic and socio-economic characteristics. The table allows three principal groups of women to be identified. The first group is composed of women who have no barriers to access health care.

Women in this group are most likely to reside in the Urban Governorates (64 percent), live in households with the highest rank on the household wealth index score (68 percent), work for cash (66 percent), be highly educated (66 percent), and have highly educated husbands (60 percent).

The second group includes women who report that they face only one barrier that is a big problem for them in getting health care. The size of the group does not vary substantially within various socio-economic subgroups.

The third group is composed of women who perceive that they face more than one barrier to their access to health care. Women perceiving multiple barriers to accessing health care are much more likely to be reside in rural areas (e.g., 47 percent in rural Upper Egypt) or the Frontier Governorates, live in households ranked at the bottom end of the wealth index (49 percent), have had no education themselves (46 percent) or be married to husbands with no education (44 percent). It is noteworthy that more than one-fifth of women in the Frontier Governorates and of women living in households ranking at the bottom of the wealth index report four or more barriers to accessing health care as potentially big problems.

6 Measures of Access to Health Care

This section considers the question of the relationships between a woman's perception of her role in making health care decisions and her recognition of potential barriers to accessing care and her utilization of family planning and delivery care services. Implicit in the discussion is an assumption that the greater control that a woman has in making health care decisions, the more likely she is to use reproductive health services. Similarly, it is also assumed that the fewer barriers to obtaining health care services that a woman believes she faces, the more likely she is to use services.

In looking at these results, it is important to recognize that there is a temporal disjunction between the service utilization measures and a woman's perceptions about her role in making health care decisions or about the specific barriers she faces in accessing care. The information on perceived problems represents a woman's attitude at the time of the survey, while the decisions about adopting a family planning method or seeking medical assistance at delivery were made at varying times before the survey interview. However, it is assumed that there is continuity of perceptions of barriers over time and that, thus, the problems also were a part of the woman's decision-making environment at the time she began using or sought delivery assistance.

Table 6 Percent distribution of ever-married women 15-49 citing various barriers as 'big' problems in getting health care for themselves according to selected background characteristics, Egypt 2000

Background characteristics	None	One problem only	2-3	4 or more	Total percent	Number of women
Age						
15-24	42.8	15.4	27.0	14.8	100.0	2,860
25-39	48.2	16.4	22.7	12.7	100.0	8,224
40-49	51.1	16.5	21.2	11.1	100.0	4,489
Urban-rural residence						
Urban	58.7	16.0	17.7	7.5	100.0	6,871
Rural	39.6	16.4	27.3	16.7	100.0	8,702
Place of residence						
Urban Governorates	63.7	14.2	16.4	5.7	100.0	2,992
Lower Egypt						
Total	46.6	15.6	24.5	13.3	100.0	6,826
Urban	54.8	16.4	19.4	9.4	100.0	1,946
Rural	43.3	15.3	26.6	14.8	100.0	4,880
Upper Egypt						
Total	42.0	18.1	24.7	15.2	100.0	5,546
Urban	55.8	18.4	17.4	8.4	100.0	1,808
Rural	35.3	18.0	28.3	18.4	100.0	3,738
Frontier Governorates	34.6	14.8	27.7	22.9	100.0	209
Work status						
Working for cash	65.7	13.8	14.5	6.0	100.0	2,266
Working but not for cash	45.0	16.7	24.5	13.8	100.0	13,307
Women's education						
No education	36.4	17.4	27.9	18.4	100.0	6,734
Primary incomplete	42.8	18.2	25.7	13.2	100.0	2,060
Primary complete/some secondary	51.0	15.7	23.3	10.0	100.0	2,026
Secondary/higher	65.6	14.0	15.0	5.3	100.0	4,753
Husband's education						
No education	38.9	16.7	26.9	17.5	100.0	4.678
Primary incomplete	37.2	18.3	29.2	15.3	100.0	2.225
Primary complete/some sec.	46.6	15.7	24.1	13.5	100.0	2.757
Secondary/higher	60.1	15.3	17.2	7.3	100.0	5.894
DK/missing	50.6	13.8	8.2	27.5	100.0	18
Wealth index quintiles						
1	30.5	20.4	26.6	22.5	100.0	2,535
2	34.9	16.2	30.6	18.3	100.0	2,771
3	41.2	16.3	29.7	12.9	100.0	2,876
4	52.6	15.4	21.5	10.5	100.0	2,965
5	67.8	14.4	13.1	4.7	100.0	4,425
Total	48.1	16.2	23.1	12.6	100.0	15,573

6.1 Interrelationship between Control over Health Care Decisions and Use of Contraceptive and Delivery Care Services

Table 7 shows that the contraceptive prevalence rate is slightly lower among women who depend on their husbands/others in decision-making for their access to health care (53 percent) than among those women who have their own control over decision-making (58 percent) or come to those decisions jointly with their husbands (58 percent). The proportion in need of family planning[1] does not vary significantly with the women's perceptions of their control over health care decisions.

Table 7 Percentage distribution of currently married women 15-49 by current contraceptive use and unmet need status according to control over health care decision-making, Egypt 2000

Control over health care decision-making		Not using		Total Percent
	Using	In need	Not in need	
Woman alone decides	58.0	10.2	31.8	100.0
Women decides jointly with husband/other	58.0	10.4	31.5	100.0
Husband or other decides	53.4	11.1	35.5	100.0
Total	56.1	10.7	33.3	100.0

Table 8 looks at the distribution of women who had a birth in the two years prior to the 2000 EDHS by whether or not they were assisted at delivery by a trained medical provider and their perception of the degree of control that they have over health care decisions. The results parallel those found with regard to contraceptive use, i.e., women who believe that they can make their own decisions about seeking health care for themselves or who decide jointly with the husband are more likely to have medically assisted deliveries than are women who are dependent on others in decision-making. The size of the differential between women who are dependent on the husband or others in making health care decisions and other women is much larger in the case of medically assisted deliveries than in the case of contraceptive use levels.

Table 8 Percent distribution of women whose last birth occurred within two years of the survey by medical assistance during the last birth according to the control over health care decision-making, Egypt 2000

Control over decision-making	Had medically assisted delivery	Not assisted by medical personnel	Total percent
Woman alone decides	70.8	29.2	100.0
Women decides jointly with husband/other	72.5	27.5	100.0
Husband or other decides	58.4	41.6	100.0
Total	65.8	34.2	100.0

[1] The proportion of all currently married women in need of family planning presented in Tables 7 and 9 differs slightly from the figure presented in El-Zanaty and Way 2001 due to small changes in the definition used in calculating unmet need in the DHS recode file.

6.2 Interrelationship between Perceived Barriers to Accessing Health Care and Use of Contraceptive and Delivery Care Services

Distributions of women citing various problems according to whether they are using or not using family planning or obtained delivery care from a trained provider or not for the last birth are shown in Tables 9 and 10, respectively. The distributions offer some insight into the issue of whether the problems may be influencing use of reproductive health services; if the specific barriers pose actual problems for the women, they would be expected to be using the reproductive health services at much lower rates than the population as a whole shown at the bottom of the tables.

Table 9 shows the relationship between various perceived barriers to accessing health and current use of family planning. The results suggest that there is not a strong relationship between perceptions that a specific barrier is a 'big' problem and use of family planning. Women who cite 'knowing where to go' and 'not wanting to go alone' as big problems are somewhat less likely to be using family planning than the population as a whole, but the differences are not large. There is some indication that women who perceive no barriers to accessing care are more likely than the population as a whole to be using family planning; however, the differences in use levels again are not large (59 percent versus 56 percent).

Table 9 Percent distribution of currently married women who cited various barriers as 'big' problems in getting health care, who cited none of the barriers poses a 'big' problems and who cited one or more barriers by current contraceptive use and need status, Egypt 2000

Perceived barriers in getting health care	Using	Not using		Total percent	Number of women
		In need	Not in need		
Source awareness/availability					
Knowing where to go	45.6	13.3	41.1	100.0	1,376
Distance to health facility	52.1	12.0	35.9	100.0	1,905
Have to take transport	52.3	11.8	35.8	100.0	2,073
Financial problems					
Getting money for treatment	52.0	12.7	35.3	100.0	3,827
Lack of autonomy					
Getting permission to go	50.5	12.6	37.0	100.0	4,199
Cultural/personal concerns					
Lack of female provider	52.8	12.1	35.1	100.0	2,968
Not wanting to go alone	47.9	13.4	38.7	100.0	3,099
No barriers	59.2	9.5	31.3	100.0	6,836
One or more barriers	53.2	11.7	35.1	100.0	7,546
All women	56.1	10.7	33.3	100.0	14,382

Table 10 considers the relationship between a woman's receipt of medical assistance at delivery and her perception that various barriers to health care are potential problems. The table is based on women who gave birth during the two-year period prior to the survey and so as noted earlier, the results may be influenced to some degree by the temporal disjuncture between the perceptions of a specific barrier as a problem at the time of the survey and the woman's prior experience.

The table shows that women reporting specific barriers to use are less likely than women as a whole to have had a medically assisted delivery. On the other hand, women who cited none of the barriers as potential problems were more likely than women as a whole to have had a medically assisted delivery. There are not large differences among women citing specific barriers in the proportions having a medically assisted delivery; the proportions range from 51 percent among

women citing money as a potential barrier to 58 percent among those mentioning transport as a potential barrier.

Table 10 Percent distribution of women giving birth within two years of the survey who cited various barriers as 'big' problems in getting health care, who cited none of the barriers poses a 'big' problems and who cited one or more barriers by receipt of medical assistance at delivery, Egypt 2000

Perceived barriers in getting health care	Had medically assisted delivery	Not assisted by medical personnel	Total percent	Number of women
Source awareness/availability				
Knowing where to go	51.5	48.5	100.0	464
Distance to health facility	54.2	45.8	100.0	592
Have to take transport	57.9	42.1	100.0	631
Financial problems				
Getting money for treatment	50.9	49.1	100.0	1,245
Lack of autonomy				
Getting permission to go	57.1	42.8	100.0	1,404
Cultural/personal concerns				
Lack of female provider	55.2	44.8	100.0	949
Not wanting to go alone	54.6	45.4	100.0	988
No barriers	74.9	25.2	100.0	2,049
One or more barriers	58.0	42.0	100.0	2,383
All women	65.8	34.2	100.0	4,432

7 Results of Multivariate Analysis

The initial bivariate examinations of the relationships between women's control over health care decisions and perceptions of various barriers to getting health care as 'big' problems suggested that these variables are related to the utilization of reproductive health services, particularly to the use of delivery care services. However, in order to fully establish the relationship between women's control over decision-making or perceptions of barriers, it is necessary to control for demographic and socio-economic variables that are associated with both the explanatory variables—decision-making control and perceptions of barriers to getting care—and the dependent variables—contraceptive use and medical assistance at delivery. Results of the multivariate regression analyses that take into account key demographic and socio-economic variables in exploring the relationship between the explanatory and dependent variables are described below.

7.1 Multivariate Relationship between Control over Health Care Decisions and Use of Contraceptive and Delivery Care Services

Tables 11 and 12 present the results of two logistic regressions of the relationship between women's control over health care decisions and the use of contraceptive and delivery care services, respectively. In both tables, the first model presents only the effects of the various demographic and socio-economic variables on the utilization of services. The second model adds information on the extent of control that women indicate they have in making decisions about obtaining health care services for themselves.

Contraceptive Use

In Table 11, current use of contraception among currently married women is the dependent variable. The results of the first model indicate that use of contraception is significantly associated with all key socio-economic variables. It is most strongly related to the place of residence, with the odds of using contraception being markedly lower in Upper Egypt and in the Frontier Governorates after controlling for other factors than in other areas.

Table 11 Odds ratios derived from logistic regressions current contraceptive use among currently married women on women's control over health care decisions controlling for individual characteristics and socioeconomic and cultural background, Egypt 2000

Explanatory Variables	DEPENDENT VARIABLE Contraceptive use status (0: Not using; 1:Using)	
	Model 1	Model 2
Control over Decision-making		
Woman alone decides	_	Rc
Women decides jointly with husband/other	_	0.9851
Husband or other decides	_	0.9703
Individual Characteristics		
Age		
15-24	Rc	Rc
25-39	0.6844***	0.6833***
40-49	1.7656***	1.7618***
Education		
No education	Rc	Rc
Some primary	0.7965***	0.7960***
Completed primary/some secondary	0.6904***	0.6898***
Completed secondary/higher	0.7291***	0.7275***
Number of living children	0.7042***	0.7042***
Current employment status		
Not working for cash	Rc	Rc
Working for cash	0.7794***	0.7770***
Socioeconomic and Cultural Context		
Place of residence		
Urban Governorates	Rc	Rc
Lower Egypt	0.7351***	0.7370***
Upper Egypt	1.7927***	1.8017***
Frontier Governorates	2.3393***	2.3553***
Urban-rural residence		
Rural	Rc	Rc
Urban	0.7679***	0.7676***
Husband's education		
No education	Rc	Rc
Some primary	0.7960***	0.7961***
Completed primary/some secondary	0.7738***	0.7734***
Completed secondary/higher	0.7065***	0.7059***
Wealth index quintiles		
1	Rc	Rc
2	0.8829**	0.8821**
3	0.9367	0.9357
4	0.8194***	0.8178***
5	0.6783***	0.6773***

_ Variable not included in model

Rc = reference category for the variable.
***p<0.01; **p<0.05; *p<0.10

The results of the second model presented in Table 11 do not support the assumption that the degree of control a woman has over the health care decision-making process influences the likelihood she will use contraceptives. After controlling for key socio-economic and demographic variables, a woman's perception of the role she has in making decisions about her own health is not significantly associated with the odds she would be using contraception. This finding is somewhat surprising but it may simply reflect the high degree of acceptance of the need for family planning among men as well as women. Hence, greater involvement of men in the decision-making process will not necessarily mean that women will be less likely to use.

Delivery Assistance

Table 12 considers the factors associated with the odds that a woman giving birth in the two-year period before the survey had access to the assistance of trained medical personnel at the time of delivery. The results of the first model presented in the table indicate that the odds of having a medically assisted delivery are strongly influenced by the woman's age, parity, education, residence and the household's economic well-being. As was the case with contraceptive use, the results of the second model show that the odds of having a medically assisted delivery are not significantly related to a woman's perceived degree of control over health care decisions.

7.2 Multivariate Relationship between Barriers to Accessing Health Care and Use of Contraceptive and Delivery Care Services

Tables 13 and 14 present the results of logistic regressions of the relationship between women's perceptions of the severity of potential barriers to getting health care and the use of contraceptive and delivery care services, respectively. In both tables, separate models are presented for each of the specific barriers that were asked about in the survey. In addition, a model is included taking into account the number of specific barriers that women saw as "big" problems in accessing health care.

Contraceptive Use

The results of the models presented in Table 13 indicate that, after controlling for other demographic and socio-economic variables, the odds of using contraception were sharply and significantly reduced if the woman reported knowing where to go, getting permission to go, and not wanting to go alone as potential problems in accessing health care. The greater the number of barriers a woman perceived, the less likely she also was to use contraception.

Delivery Assistance

The associations between perceived barriers to accessing health care and the odds of having had a medically assisted delivery are shown in Table 14. Women who identified lack of a female provider at health facilities or not wanting to go alone for care as potential barriers were less likely to have had medical assistance at the time of delivery than other women. The number of potential barriers about which a woman expressed concern was also directly associated with the likelihood that a woman had had a medically assisted delivery.

Table 12 Odds ratios derived from logistic regressions of medical assistance at delivery at the time of the last birth on women's control over health care decisions controlling for individual characteristics and socioeconomic and cultural background, Egypt 2000

Explanatory Variables	DEPENDENT VARIABLE Medical assistance at delivery (0: Had assistance; 1:No assistance)	
	Model 1	Model 2
Control over Decision-making		
Woman alone decides	_	Rc
Women decides jointly with husband/other	_	0.9599
Husband or other decides	_	1.0729
Individual Characteristics		
Age		
15-24	Rc	Rc
25-39	1.4470***	1.4511***
40-49	13.7652***	13.8309***
Education		
No education	Rc	Rc
Some primary	0.8342***	0.8377***
Completed primary/some secondary	0.5019***	0.5044***
Completed secondary/higher	0.3855***	0.3895***
Number of living children	0.8652***	0.8650***
Current employment status		
Not working for cash	Rc	Rc
Working for cash	1.0899	1.1015
Socioeconomic and Cultural Context		
Place of residence		
Urban Governorates	Rc	Rc
Lower Egypt	0.9136	0.9128
Upper Egypt	1.1150*	1.1001
Frontier Governorates	0.9960	0.9823
Urban-rural residence		
Rural	Rc	Rc
Urban	0.6804***	0.6806***
Husband's education		
No education	Rc	Rc
Some primary	0.8353***	0.8343***
Completed primary/some secondary	0.7134***	0.7136***
Completed secondary/higher	0.7002***	0.7008***
Wealth index quintiles		
1	Rc	Rc
2	0.9178	0.9210
3	0.7289***	0.7327***
4	0.6924***	0.6985***
5	0.6595***	0.6654***

_ Variable not included in model

Rc = reference category for the variable.
***p<0.01; **p<0.05; *p<0.10

Table 13 Odds ratios derived from logistic regressions of current contraceptive use among married women on various perceptions of barriers to getting health care controlling for individual characteristics and socioeconomic and cultural background, Egypt 2000

Explanatory Variables	DEPENDENT VARIABLE Contraceptive use status (0: Using; 1:Not using)							
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Specific Barriers to Getting Care								
Knowing where to go	0.7143***	_	_	_	_	_	_	_
Distance to health facility	_	0.8883**	_	_	_	_	_	_
Have to take transport	_	_	0.9049*	_	_	_	_	_
Getting money for treatment	_	_	_	0.9526	_	_	_	_
Getting permission	_	_	_	_	0.7945***	_	_	_
Lack of female provider	_	_	_	_	_	0.9211*	_	_
Going alone	_	_	_	_	_	_	0.7529***	_
Number of Perceived Barriers	_	_	_	_	_	_	_	1.0638***
Individual Characteristics								
Age								
15-24	Rc	Rc	Rc	Rc	Rc	Rc	Rc	Rc
25-39	0.6888***	0.6840***	0.6847***	0.6848***	0.6910***	0.6868***	0.6921***	0.6909***
40-49	1.7846***	1.7685***	1.7679***	1.7712***	1.8069***	1.7763***	1.8012***	1.8067***
Education								
No education	Rc	Rc	Rc	Rc	Rc	Rc	Rc	Rc
Some primary	0.8002***	0.7979***	0.7986***	0.7977***	0.8035***	0.7990***	0.8017***	0.8058***
Completed primary/some secondary	0.6974***	0.6924***	0.6932***	0.6928***	0.7012***	0.6926***	0.6991***	0.7043***
Completed secondary/higher	0.7394***	0.7324***	0.7324***	0.7328***	0.7481***	0.7338***	0.7464***	0.7520***
Number of living children	0.7032***	0.7038***	0.7039***	0.7038***	0.7027***	0.7039***	0.7035***	0.7023***
Current employment status								
Not working for cash	Rc	Rc	Rc	Rc	Rc	Rc	Rc	Rc
Working for cash	0.7823***	0.7791***	0.7784***	0.7804***	0.7853***	0.7821***	0.7894***	0.7863***
Socioeconomic Characteristics								
Place of residence								
Urban Governorates	Rc	Rc	Rc	Rc	Rc	Rc	Rc	Rc
Lower Egypt	0.7318***	0.7328***	0.7343***	0.7362***	0.7322***	0.7353***	0.7424***	0.7351***
Upper Egypt	1.7800***	1.7906***	1.7932***	1.7871***	1.7901***	1.7931***	1.7879***	1.7808***
Frontier Governorates	2.2261***	2.3160***	2.3235***	2.3311***	2.2069***	2.3338***	2.2277***	2.2238***
Urban-rural residence								
Rural	Rc	Rc	Rc	Rc	Rc	Rc	Rc	Rc
Urban	0.7746***	0.7693***	0.7696***	0.7676***	0.7702***	0.7681***	0.7773***	0.7735***
Husband's education								
No education	Rc	Rc	Rc	Rc	Rc	Rc	Rc	Rc
Some primary	0.7953***	0.7972***	0.7954***	0.7962***	0.7940***	0.7956***	0.7942***	0.7946***
Completed primary/some secondary	0.7753***	0.7755***	0.7737***	0.7759***	0.7723***	0.7724***	0.7965***	0.7751***
Completed secondary /higher	0.7095***	0.7094***	0.7086***	0.7068***	0.7071***	0.7064***	0.7015***	0.7130***
Wealth index quintiles								
1	Rc	Rc	Rc	Rc	Rc	Rc	Rc	Rc
2	0.8894*	0.8859*	0.8854*	0.8848*	0.8829**	0.8840**	0.8829**	0.8902*
3	0.9441	0.9448	0.9435	0.9402	0.9426	0.9424	0.9471	0.9584
4	0.8287***	0.8274***	0.8269***	0.8252***	0.8366***	0.8220***	0.8298***	0.8461**
5	0.6886***	0.6864***	0.6853***	0.6853***	0.7017***	0.6820***	0.6885***	0.7091***

_ Variable not included in model

Rc = reference category for the variable.
***p<0.01; **p<0.05; *p<0.10

Table 14 Odds ratios derived from logistic regressions of medical assistance at delivery for women with a birth in the two year period prior to the survey and various perceptions of barriers to getting health care controlling for individual characteristics and socioeconomic and cultural background, Egypt 2000

Explanatory Variables	DEPENDENT VARIABLE Contraceptive use status (0: Using; 1:Not using)							
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Specific Barriers to Getting Care								
Knowing where to go	0.9182	_	_	_	_	_	_	_
Distance to health facility	_	0.8976*	_	_	_	_	_	_
Have to take transport	_	_	0.9631	_	_	_	_	_
Getting money for treatment	_	_	_	0.8874**	_	_	_	_
Getting permission	_	_	_	_	0.9563	_	_	_
Lack of female provider	_	_	_	_	_	0.8007***	_	_
Going alone	_	_	_	_	_	_	0.8153***	_
Number of Perceived Barriers	_	_	_	_	_	_	_	1.0470***
Individual Characteristics								
Age								
15-24	Rc	Rc	Rc	Rc	Rc	Rc	Rc	Rc
25-39	1.4498***	1.4468***	1.4473***	1.4497***	1.4500***	1.4604***	1.4604***	1.4588***
40-49	13.8030***	13.7896***	13.7720***	13.8689***	13.8249***	14.000***	13.9529***	13.9965***
Education								
No education	Rc	Rc	Rc	Rc	Rc	Rc	Rc	Rc
Some primary	0.8359***	0.8356***	0.8349***	0.8379***	0.8361***	0.8443**	0.8401**	0.8432**
Completed primary/some secondary	0.5035***	0.5035***	0.5027***	0.5066***	0.5037***	0.5071***	0.5076***	0.5103***
Completed secondary/higher	0.3871***	0.3872***	0.3862***	0.3908***	0.3878***	0.3925***	0.3928***	0.3953***
Number of living children	0.8650***	0.8648***	0.8651***	0.8640***	0.8649***	0.8643***	0.8654***	0.8640***
Current employment status								
Not working for cash	Rc	Rc	Rc	Rc	Rc	Rc	Rc	Rc
Working for cash	1.0904	1.0900	1.0895	1.0931	1.0910	1.1005	1.0988	1.0964
Socioeconomic Characteristics								
Place of residence								
Urban Governorates	Rc	Rc	Rc	Rc	Rc	Rc	Rc	Rc
Lower Egypt	0.9123	0.9102	0.9130	0.9145	0.9124	0.9161	0.9187	0.9112
Upper Egypt	1.1131*	1.1132*	1.1149*	1.1063	1.1138*	1.1151*	1.1097	1.1076
Frontier Governorates	0.9843	0.9876	0.9937	0.9873	0.9845	0.9936	0.9603	0.9606
Urban-rural residence								
Rural	Rc	Rc	Rc	Rc	Rc	Rc	Rc	Rc
Urban	0.6817***	0.6813***	0.6810***	0.6796***	0.6805***	0.6816***	0.6856***	0.6834***
Husband's education								
No education	Rc	Rc	Rc	Rc	Rc	Rc	Rc	Rc
Some primary	0.8355***	0.8364***	0.8351***	0.8360***	0.8348***	0.8308***	0.8331***	0.8341***
Completed primary/some secondary	0.7140***	0.7147***	0.7134***	0.7177***	0.7130***	0.7087***	0.7103***	0.7139***
Completed secondary /higher	0.7012***	0.7024***	0.7008***	0.7075***	0.7002***	0.6982***	0.6960***	0.7039***
Wealth index quintiles								
1	Rc	Rc	Rc	Rc	Rc	Rc	Rc	Rc
2	0.9195	0.9205	0.9186	0.9230	0.9175	0.9195	0.9171	0.9226
3	0.7299***	0.7344***	0.7307***	0.7352***	0.7294***	0.7380***	0.7348***	0.7401***
4	0.6943***	0.6983***	0.6946***	0.7043***	0.6948***	0.6975***	0.6980***	0.7081***
5	0.6620***	0.6667***	0.6619***	0.6760***	0.6637***	0.6686***	0.6670***	0.6811***

_ Variable not included in model

Rc = reference category for the variable.
***p<0.01; **p<0.05; *p<0.10

8 Conclusions and Policy Implications

The key study conclusions may be summarized as follows:

- Substantial proportions of Egyptian women perceive that others, principally the husband, have control over whether they may access health care or not.
- More than half of Egyptian women identify at least one potentially major barrier to accessing health care and more than a third perceive they potentially face two or more major barriers to getting care. Financial concerns and lack of autonomy are most frequently reported as major potential barriers.
- Women who are educated, working for cash, from urban areas especially Urban Governorates, living in households which are classified high on the wealth index scores are more likely to claim autonomy in making health care decisions and perceive fewer barriers to getting care than other women.
- After controlling for key socio-economic and demographic variables, utilization of health care services as captured by contraceptive use and medical assistance at delivery varied significantly with the number and type of barriers to accessing health care but not with the perceived degree of control over health care decisions.

These results point to a number of actions that are needed to improve women's access to health care services in Egypt:

- In the long term, policies to improve women status, especially education and involvement in the labor force, will be needed if women's access to health care services is to increase.
- Information, education and communication programs have to be properly designed to raise awareness among women about the importance of access to health care, especially maternal care services.
- Community leaders and workers can play an important role in the identification of barriers to accessing health care and in providing information to women on how to overcome those barriers.
- Non-governmental organizations and women's associations can adopt an advocacy program to support a woman's right to access health care. Such an approach should extend to involve men to be more supportive of their wives' access to health care.
- The health system should make an effort to capitalize on the opportunities to reach women afforded by women's presence at health facilities when they obtain child health care services. In particular, the compulsory immunization and health insurance programs for children provide opportunities for women's contact with health care providers. Child health service providers could be trained to be proactive in motivating women to utilize maternal and family planning services.
- More studies are needed to assess women's health problems, their behavior in response to the health problems they experience, and their attitudes about the quality of services delivered in the health facilities. The health service delivery system must in turn adjust its strategies to respond to the information obtained about women's needs and demands for health care.

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Prevalence of Female Circumcision among Young Girls in Egypt: Evidence from the 1995 and 2000 Egypt Demographic and Health Surveys

Ann Way and Fatma Hassan El-Zanaty

1 Introduction

The practice of female circumcision, which is referred to as "female genital mutilation" or "female genital cutting" in the international literature (Carr 1997), is widespread in Egypt as it is in a number of other African countries including Eritrea, Guinea, northern Sudan, and Mali (Yoder and Mahy 2001). In Egypt, female circumcision represents a tradition that written records suggest has been followed for at least 2000 years (Cloudsley 1983). Publicly supported efforts to eliminate this longstanding custom gained momentum in Egypt in the mid-1990s in the midst of rising worldwide concerns about the violation of women's rights and risks to women's health that the practice posed (UNFPA 1994). In 1996, a Ministerial Decree was issued by the Egyptian government, which made it illegal for medical personnel in Egypt to perform the procedure. The late 1990s also saw the beginning of an information campaign using a variety of communication channels to educate the Egyptian population about the social, psychological and medical problems associated with female circumcision and to change attitudes (Morsy 2002).

This study employs data collected from the 1995 and 2000 Egypt Demographic and Health Surveys to derive estimates of the prevalence of circumcision among young girls in Egypt. These estimates allow an exploration of the question as to how the prevalence of female circumcision changed during the latter half of the 1990s as efforts to eliminate the practice were adopted. In addition, the estimates provide a measure of the level of female circumcision among young girls in 2000 against which future progress in reducing female circumcision can be assessed.

2 Female Circumcision among Reproductive Age Women in Egypt

The 1995 and 2000 Egypt DHS surveys represent the only national-level studies available on the patterns of female circumcision among women of reproductive age in Egypt (El-Zanaty et al. 1996 and El-Zanaty and Way 2001). According to the 2000 Egypt DHS, 97 percent of ever-married women 15-49 had been circumcised, a level identical to that reported in the 1995 DHS (Table 1).

Table 1 Trend in Female Circumcision Indicators, Egypt 1995-2000

Indicator	1995	2000
Percentage of ever-married women 15-49 who are themselves circumcised	97	97
Percentage of ever-married women 15-49 who believe the practice should continue	82	75
Percentage of ever-married women 15-49 who say at least one daughter is circumcised or who intend to have their daughter(s) circumcised	87	81

The absence of change in the prevalence of circumcision between the two surveys is not surprising in view of the prevailing age pattern of circumcision in Egypt. Most circumcisions take place in Egypt in the pre- or early adolescent years; in fact, information from respondents in the 2000 DHS suggest that the median age at circumcision among their daughters is 10 years, and virtually all daughters are circumcised by age 13 (El-Zanaty and Way 2001). Thus, significant change in the

prevalence of circumcision was only possible among EDHS respondents in the 15-19 age group, who would have been age 10-14 at the time of the 1995 survey. However, no evidence of change in the level of circumcision was found between the 1995 and 2000 surveys for women in this group. This is not surprising because as the age at marriage has risen in Egypt, women who are married in their teenage years are increasingly concentrated in the most traditional subgroups in the population.

In addition to the prevalence data, the EDHS surveys obtained information on women's attitudes towards the practice. A comparison of these results for the two surveys indicates that there has been some change in the level of women's support for the practice. For example, Table 1 shows that three-quarters of 2000 EDHS respondents believed the practice of circumcision should continue compared to 82 percent of women interviewed in the 1995 DHS. The proportion of women with daughters who said that they had at least one daughter circumcised or they intended to circumcise a daughter also declined between the surveys, from 87 percent in 1995 to 81 percent in 2000.

The question remains as to whether these attitudinal changes have been accompanied by actual behavior changes. This study attempts to answer that question by using information obtained from mothers on the circumcision status of their daughters in both the 1995 and 2000 surveys to estimate the circumcision levels among girls ages 0-19.

3 Data and Methods

The estimates of the prevalence of female circumcision among young girls will be based on the following two items of information collected in both the 1995 and 2000 DHS surveys: (1) the number of living daughters that the woman reported as circumcised and (2) the age and birth order of the daughter most recently circumcised. This information is used to assign a circumcision status to all of the living daughters that DHS respondents had at the time of the survey. The assignment of a circumcision status is simple if the number of daughters that the mother reported as having been circumcised is equal to the total number of daughters that the woman has. The procedure is more complex if the total number of daughters exceeds the number of daughters reported as circumcised. In such cases, an assumption is made that older daughters are more likely than younger daughters to have been circumcised.

An example helps to make the procedure clear. A DHS respondent had four daughters, ages 16, 13, 10, and 8. She reported that only two of her daughters had been circumcised and her 13-year old daughter was the daughter most recently circumcised. According to the procedure described above, the 16 and 13-year old daughters would be assigned the status "circumcised" and the 8- and 10-year old daughters would be considered "not circumcised."

The approach is subject to a number of potential sources of error. Mother's misreporting of the circumcision status of their daughters is one potential source of bias. The effect of this bias is uncertain. Some respondents may have felt pressure to report daughters as circumcised even if they were not, because of the strong cultural support for the practice. Other respondents may have felt some reluctance to admit to having had their daughters circumcised because of recent public campaigns to end the practice.

Another source of possible bias is the assumption that circumcision status is always directly associated with the age of the daughter, i.e., older daughters will always have been circumcised before younger daughters. The bias introduced by the assumption is likely to be quite small since, as Table 2 shows, the circumcision status of the vast majority of daughters could be assigned exactly.

This is either because the respondents had only one or two daughters or because, where they had three or more daughters, they either reported none or all daughters as circumcised.

Table 2 Percent distribution of ever-married women with daughters according to whether the circumcision status of the woman's daughter could be assigned exactly

Assignment of circumcision status	
Status known exactly:	
1-2 daughters	72.1
3 daughters or more	
No daughters circumcised	5.5
All daughters circumcised	9.5
Status assigned based on daughter's age	12.9
Total percent	100.0
Number of women with daughters	11,547

It should also be noted that the procedure does not yield an estimate of the circumcision status for all girls ages 0-19 years in Egypt. This is because the mothers of some girls in that age range were not interviewed in the DHS, either because the mother was not eligible for interview due to her age (i.e., the mother was 50 years or older) or was not interviewed for other reasons (i.e., the mother was not at home or the mother had died, etc.). A comparison of the total number of daughters aged 0-19 (N=19,691) with the total number of girls aged 0-19 resident in the households interviewed in the DHS (N=21,149) indicates that information on circumcision status was not obtained for six percent of girls aged 0-19 years.

Overall, although clearly it is subject to some error, the procedure for assigning a circumcision status to the daughters of DHS respondents provides a useful tool for exploring the current prevalence of circumcision among girls in Egypt. It also allows for examination of regional patterns and trends. Finally, in combination with information on mother's intentions with regard to the circumcision of their daughters, the results can be used to explore the potential for additional changes in circumcision levels in the future in Egypt.

4 Results

4.1 Circumcision Levels among Daughters

Table 3 presents the percentages of daughters aged 0-19 years who are considered to be circumcised at the time of the 1995 and 2000 EDHS surveys based on the mothers' report of the numbers of daughters circumcised. The results suggest that the prevalence of circumcision among girls aged 12-19 declined modestly between the two surveys, from 88 percent in 1995[1] to 84 percent in 2000. The decrease was most evident for the 12-15 age group; the rate fell from 84 percent in 1995 to 78 percent in 2000 among girls in those ages.

[1] The estimate of level of circumcision among adolescent girls derived from the 1995 EDHS data on the numbers of daughters circumcised can be compared with the results from a household survey conducted as part of the Adolescence and Social Change in Egypt project (Ibrahim et al. 1999). The ASCE survey reported a circumcision level of 86 percent for girls 13-19 in 1997; using EDHS data, the level estimated for daughters 13-19 in 1995 was 89 percent.

Table 3 Percentage of daughters aged 0-19 years considered as circumcised based on the mother's report of the number of daughters circumcised by the daughter's age at the time of the survey, Egypt 1995 and 2000

Age of daughter	1995	2000
0-6	3.0	3.1
7-8	12.3	12.3
9-11	40.0	37.7
12-13	78.9	73.3
14-15	88.8	83.8
16-17	92.0	89.9
18-19	93.8	92.2
Total 12-15	83.7	78.3
Total 16-19	92.8	91.0
Total 12-19	87.6	83.9

4.2 Differentials in Circumcision Levels among Daughters

A more detailed examination of the patterns of circumcision among the daughters of EDHS respondents indicates that the likelihood of a young girl being circumcised is related to a number of basic socio-economic characteristics including residence and mother's education.

A substantial urban-rural differential in circumcision levels was already evident at the time of the 1995 EDHS. For example, Table 4 shows that 82 percent of daughters 12-19 in urban areas were considered as circumcised at the time of the 1995 EDHS compared to 92 percent daughters in the same ages in rural areas. Looking at the trend between the two surveys, circumcision prevalence appears to have declined sharply in urban areas and only modestly in rural areas. As a result, the urban-rural gap increased. Overall, at the time of the 2000 survey, 75 percent of urban daughters 12-19 were considered circumcised based on the mother's report, a rate that is 15 percentage points lower than the level for rural daughters.

Table 4 Percentage of daughters 0-19 years considered as circumcised based on the mother's report of the number of daughters circumcised by the daughter's age at the time of the survey according to urban rural residence, Egypt 1995 and 2000

Age of daughter	Urban		Rural	
	1995	2000	1995	2000
0-6	1.9	1.5	3.7	4.0
7-8	10.5	7.3	13.6	15.4
9-11	37.9	31.1	41.7	42.1
12-13	74.0	63.2	82.6	79.6
14-15	83.5	73.6	93.1	90.9
16-17	85.2	81.5	97.4	95.5
18-19	88.6	85.3	98.3	97.6
Total 12-15	78.7	68.3	87.6	84.9
Total 16-19	86.7	83.3	97.8	96.4
Total 12-19	82.2	75.2	91.9	89.9

Table 5 shows that circumcision levels vary according the area in which a girl lives. Levels were substantially higher in both Lower Egypt and Upper Egypt than in the Urban Governorates or in

the Frontier Governorates. With regard to trends, there were substantial declines in the percentages considered circumcised based on the mother's report, especially among girls 12-15 in the Urban Governorates and Lower Egypt between the 1995 and 2000 surveys. Circumcision levels among younger girls also declined modestly in the Frontier Governorates during the period. In contrast to the other areas, there was little change in Upper Egypt.

Table 5 Percentage of daughters 0-19 years considered as circumcised based on the mother's report of the number of daughters circumcised by the daughter's age at the time of the survey according to place of residence, Egypt 1995 and 2000

Age of daughter	Urban Governorates		Lower Egypt		Upper Egypt		Frontier Governorates	
	1995	2000	1995	2000	1995	2000	1995	2000
0-6	0.7	0.7	1.2	0.5	5.8	6.7	2.5	1.9
7-8	7.4	3.5	9.2	5.8	18.0	23.8	16.9	11.4
9-11	38.2	26.8	40.1	33.3	41.0	46.5	43.4	31.3
12-13	69.9	58.9	83.3	72.8	79.6	80.1	58.4	60.2
14-15	84.4	65.0	91.8	87.9	88.3	87.8	73.6	64.0
16-17	81.3	76.5	95.8	92.8	93.8	93.5	64.0	69.5
18-19	84.9	78.5	96.4	95.6	97.5	96.1	70.9	65.9
Total 12-15	77.0	61.8	87.5	79.9	83.8	83.8	65.6	62.0
Total 16-19	83.0	77.5	96.1	94.1	95.3	94.7	67.2	67.8
Total 12-19	79.6	69.1	91.3	86.3	88.4	88.4	66.3	64.7

Table 6 shows that there is a strong relationship between the mother's educational level and a daughter's circumcision status, with daughters of highly educated mothers being substantially less likely to be circumcised than other girls. Looking at results for the 12-19 age group, for example, the proportion considered circumcised varies from 51 percent among the daughters of women who had a secondary or higher education at the time of the 2000 EDHS to 90 percent among the daughters of women who never attended school.

Looking at the trends, circumcision levels generally declined more rapidly between the 1995 and 2000 surveys among girls in the 12-15 age group whose mothers had a primary or higher education than among girls in that group whose mothers had lower levels of education. The absence of a clear pattern for older girls is at least in part owed to the comparatively small number of daughters in these ages, especially in the highest two categories of mother's education.

Table 6 Percentage of daughters 0-19 years considered as circumcised based on the mother's report of the number of daughters circumcised by the daughter's age at the time of the survey according to the mother's level of education, Egypt 1995 and 2000

Age of daughter	No education		Less than primary completed		Primary completed/ some secondary		Secondary completed/higher	
	1995	2000	1995	2000	1995	2000	1995	2000
0-6	3.5	4.7	3.9	3.0	2.1	3.7	1.6	0.7
7-8	12.9	15.6	13.2	10.9	15.9	14.7	7.2	6.4
9-11	41.7	44.5	40.1	39.2	49.5	39.2	28.1	18.2
12-13	83.9	79.5	81.8	81.9	80.0	70.7	50.3	44.2
14-15	92.9	91.1	95.1	89.9	90.8	85.2	51.7	50.0
16-17	98.2	95.1	95.9	94.7	84.9	88.7	52.9	57.6
18-19	98.7	96.1	97.6	97.4	93.1	96.7	46.5	59.4
Total 12-15	88.4	85.0	88.0	85.8	85.3	78.1	50.9	46.9
Total 16-19	98.4	95.5	96.6	96.0	88.5	92.9	50.7	58.4
Total 12-19	92.7	89.6	91.7	90.3	86.8	85.3	50.8	51.1

5 Prospects for Future Decline in Circumcision Levels

Table 7 Percentage of daughters age 0-19 years already circumcised or predicted to be circumcised by age 20 based on the mother's intention to have the daughter circumcised by the daughter's current age, Egypt 2000

Current age of daughter	
0-3	72.5
3-5	75.9
6-8	76.2
9-11	79.7
12-13	85.6
14-15	88.0
16-17	91.2
18-19	92.7

The comparison of information from mothers on their daughters' circumcision status at the time of the 1995 and 2000 EDHS surveys provided some evidence that the practice of circumcision is becoming less widespread in Egypt. Using the 2000 EDHS data, it also is possible to look at the prospects for further change in the prevalence of female circumcision.

Table 7 combines the 2000 EDHS information on the daughter's circumcision status and on the mother's intention to circumcise their daughter(s) to predict the proportion of girls currently aged 0-19 years who will be circumcised by their twentieth birthday.[2] The results suggest that, given present attitudes, female circumcision levels are likely to continue to decline. For example, if mothers of the girls act on their intentions, it is predicted that only 80 percent of girls 9-11 years will be circumcised by their twentieth birthday. Among younger girls, the proportions likely to be circumcised decline further to a level of 73 percent among girls 0-3 years.

6 Conclusions and Policy Implications

This analysis of data on daughters' circumcision status from the 1995 and 2000 Egypt DHS surveys indicates that female circumcision levels are declining gradually in Egypt among young girls. The decline in circumcision levels among urban and educated groups was clearly underway prior to the 1995 DHS and, thus, cannot be considered wholly as an outcome of the publicly

[2]The denominator includes all daughters in the age group. The numerator includes daughters who have already been circumcised and daughters whose mother expresses the intention to have her daughters circumcised in the future.

supported effort to eliminate the practice that was initiated in the latter half of the 1990s. However, the continuation of the downward trend during the period between the DHS surveys likely reflects the impact of recent legal and educational efforts by both the government and a network of nongovernmental agencies to encourage families to stop practicing circumcision.

The 2000 EDHS results also suggest the declines in circumcision prevalence are likely to accelerate in the future. Only around seven out of ten young girls will be circumcised if families act on the mother's current intentions with respect to the circumcision of their daughters. While these results are encouraging, sustained efforts at public education are clearly vital to further reduce the prevalence of female circumcision in Egypt. In particular, programs must target rural families, especially those living in Upper Egypt, where there has been little change to date in circumcision levels.

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Clustering of Malnutrition among Egyptian Children

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1 Introduction

With the substantial decline in infant and childhood mortality in Egypt during the last two decades, improving survival prospects is no longer the paramount child health challenge. Instead, the emphasis must now shift to improving the health status of the very large fraction of children who survive beyond the critical first years of their lives. This change in emphasis is especially justified because there are reasons to doubt that the success in reducing early childhood mortality will carry over to improved health and continued survival at later ages. The gains in survival prospects in early childhood have been achieved mainly through better case-management of diarrhoreal diseases and through wider immunization coverage (Rashad 1989; Miller and Hirschhorn 1995), not through better household socioeconomic conditions that, among other effects, might have led to significant improvements in feeding and hygienic practices. As a result, the nutritional status of children—and micronutrient deficiencies in particular—has become a more prominent focus of Egyptian health programs. Improvements in the nutritional status of children would have many potential benefits: even further reduction in child mortality, an enhanced quality of life for young children, better school performance, and in general healthier and stronger developmental patterns (mind and body). These benefits have long-term implications for well-being that extend far beyond childhood (Elo and Preston 1992; Allen 1995; Rivera et al. 1995; Haas et al. 1996; Blackwell et al. 2001).

The 2000 Egypt Demographic and Health Survey collected information on a number of indicators related to the nutritional status of children (El Zanaty and Way 2001). The main report of the survey has identified nutritional problems among this most vulnerable segment of the Egyptian population that clearly merit attention. For example, the report notes that a large fraction of infants under six months are not exclusively breastfed, and roughly one-fifth of children under age five are stunted. In addition, coverage of vitamin A supplements and iodized salt remains far from complete. The report also highlighted differences among major population sub-groups in the prevalence of these nutritional problems, as revealed by bivariate tabulations.

For the purpose of assessing the success of existing programs and developing new programs, the analysis in the EDHS report is a helpful first step, but important questions about the correlates of nutritional deficiencies among Egyptian children remain unanswered. The basic question for the formulation of policies and programs is: among which groups of children are nutritional problems more prevalent? In an effort to answer this question, empirical research can describe and explain differentials between sub-groups of the population. However, the set of potential determinants is virtually unlimited, particularly in the case of a multi-dimensional phenomenon such as nutritional status (Neumann and Harrison 1994; de Onis et al. 2000). Moreover, even if the main determinants of nutritional status and the mechanisms through which they work were to be identified, few empirical studies would be able to measure anything approaching the full set of direct and indirect determinants.

Recognizing the importance of investigating differentials, yet lacking measures of many of the commonly hypothesized direct determinants of nutritional status (market availability of food, household availability of food, practices of food allocation within the household, prevalence of morbidities that compromise nutritional status, and so forth), the current analysis adopts a different strategy—the investigation of "nutritional clustering"—to assess the nature and magnitude of

disparities in nutritional status among Egyptian children. Stated most simply, nutritional clustering refers to the extent to which children who share a common physical unit resemble each other in their nutritional status. That is, clustering exists when nutritional status is more homogeneous within specific physical units (clusters) than between those units.

The term "physical unit" is deliberately general, allowing for the investigation of clustering according to diverse criteria and at various levels of aggregation. The first, and the most investigated, type of clustering is geographical clustering, recognizable by the tendency of specific geographical regions and localities to have higher prevalence of malnutrition than other geographical units. Clustering can also occur at the household level, and hence a second type of nutritional clustering is the clustering of malnourished children within specific households. Household clustering occurs when households with one malnourished child are likely to contain other children who are malnourished. Finally, a further and rather different form of nutritional clustering is the clustering of different types of malnutrition within individuals. Here the question is whether a child suffering from a specific nutritional problem, such as stunting, is more likely to suffer from other kinds of malnutrition, such as anemia.

Since they pertain to units at different levels, these three types of clustering can be attributed to different sets of explanatory factors. Not all of these factors, however, can be identified using the available data set. Although the EDHS contains information on many important demographic and socioeconomic variables, as noted above it did not attempt to measure many of the major direct determinants of nutritional status. Lacking measurement of key determinants, observed patterns of nutritional clustering remain largely unexplained. Nevertheless, assessing the extent of clustering *per se* is an important first step, for two reasons. First, it suggests where in-depth investigations of the underlying causes might direct their attention. Analysis of nutritional clustering can be revealing even when relevant data are lacking, for the simple reason that most explanatory factors must express themselves through clustering according to one or more social classifications. Put in another way, if the data were to show that malnutrition is distributed randomly through the population, then there would be no grounds to trace its cause to any factors that vary among geographic units, households, or individuals. Second, from a programmatic standpoint there is considerable value in ascertaining where nutritional problems are concentrated, even if the reasons for this are not well understood, because this permits program resources to be more efficiently targeted.

The paper is divided into three main sections, each one addressing one of the types of clustering: by geographic unit, by household, and by individual. Before examining the evidence for nutritional clustering in the EDHS, an introductory section discusses the data to be analyzed and the methods employed. The main body of the paper presents the empirical results for the three types of clustering. The paper concludes with a summary of the main findings and a discussion of significant questions that remain to be answered.

2 Data and Methods

One of the objectives of the 2000 EDHS was to provide policymakers with estimates of key indicators related to maternal and child nutrition (El-Zanaty and Way 2001). The survey gathered detailed data on breastfeeding and weaning practices, and it collected information on vitamin A and iron supplements and on the iodine content in salt. In addition, anthropometric (height and weight) measurements were taken. Finally, blood samples were taken from women and children and the hemoglobin level in the blood was analyzed, in order to assess anemia status. Because the EDHS also obtained information about many basic social, economic, and demographic characteristics (of the respondent and/or the household), nutritional status can be linked to background characteristics.

A basic understanding of the main parameters of the sample design for the EDHS is of particular relevance to this study in view of the multiple perspectives from which the data is analyzed. The EDHS employed a stratified, multi-stage cluster sample design that covered 16,957 households in 1,000 secondary clusters (small localities) within Egypt's 26 governorates (El-Zanaty and Way 2001). The survey sample design, by over-sampling less populous governorates, permits relatively precise estimates to be calculated for six major regions of Egypt: Urban Governorates, urban Lower Egypt, rural Lower Egypt, urban Upper Egypt, rural Upper Egypt, and the Frontier Governorates. With the exception of the Frontier Governorates, the sample design also allows for estimates at the governorate level although with less precision than the national estimates.

2.1 Measuring Child Nutritional Status

In every sampled household, all children born since January 1995 were eligible for height and weight measurement. A total of 13,561 children under six were identified within 8,195 households, out of which 13,189 children (97.3%) were measured. During the preparation of the EDHS report, the values for some children were deemed implausibly high or low (El-Zanaty and Way 2001). These cases are excluded from further analysis, leaving 12,521 children (92.3%) residing within 7,757 households with acceptable values for height and weight. By design, blood samples were to be taken in one-half of the sampled households. This sub-sample of households contained 6,716 children under age six, with anemia tests successfully carried out for 6,554 children (97.6 percent).

The anthropometric measures can be used to construct three widely-used indicators of child body growth: height-for-age, weight-for-age, and weight-for-height. The conditions that these three indicators reflect are ordinarily termed "stunting" (height-for-age), "under-weight" (weight-for-age), and "wasting" (weight-for-height). To assess each child's nutritional status, the three indicators are transformed into standard deviations from the median of the WHO-recommended international NCHS/CDC reference growth curves. If a child's value falls more than three standard deviations below the median, this is considered evidence of a *severe* condition (stunting, under-weight, or wasting), while values falling between two and three standard deviations below the median are considered evidence of a *moderate* condition. In a well-nourished population, roughly two per cent of children will fall more than two standard deviations below the median of the reference (Osman 1998). In this paper, no distinction is made between severe and moderate conditions.

A child is said to be malnourished if he or she is classified as stunted, wasted, or underweight. Although all three conditions are the result of protein and calorie deficiency, they point to somewhat different nutritional problems. Low height-for-age (stunting) reflects long-term chronic nutritional inadequacy. A deficit in weight-for-height (wasting), on the other hand, is due to short-term severe nutritional insufficiency. The weight-for-age (underweight) index is a composite measure. Low weight for age could be indicative of either chronic or severe malnutrition, or both. Stunting, wasting, and underweight can result from insufficient or inadequate food consumption, or from prolonged or severe diseases, intestinal diseases in particular (WHO 1995).

Micronutrient deficiency constitutes a fundamentally different nutritional problem. The body requires various vitamins and minerals, although many of them are needed in only small quantities. Micronutrient malnutrition can lead to many adverse outcomes. For example, severe deficiency of vitamin A can result in blindness, iodine shortage is related to mental retardation, and iron deficiency can permanently impair manual and mental abilities of children (World Bank 1994). Micronutrient deficiency is a function of the content of the diet rather than the volume of food intake. Significant deficiencies are possible despite an adequate amount of food intake.

Iron is essential for forming hemoglobin, which carries oxygen in the red blood cells. A relatively low concentration of hemoglobin in the blood is the condition termed anemia. Anemia is diagnosed through analysis of blood samples. A child is said to suffer severe anemia if the concentration of hemoglobin in the blood is less than 7.0 g/dl (gram per deciliter). A hemoglobin level from 7.0 to 9.9 g/dl is indicative of moderate anemia, while a level between 10 and 10.9 is indicative of mild anemia. In this paper, mild anemia is not considered as a nutritional problem. Severe and moderate anemia are combined in one category.

Table 1 shows the prevalence of stunting, wasting, and underweight and of anemia among children under age six. Egyptian children suffer most from stunting (low height-for-age) and anemia. These conditions are most prevalent among children aged 6 through 23 months.

2.2 Correlates of Child Malnutrition

Although exploring the determinants of malnutrition in children is beyond the objectives of this study, there is some value in taking a quick look at the principal measured correlates. Some exogenous correlates (such as age and sex) may contaminate the clustering patterns, and hence controlling for these correlates from the outset of the analysis is advised. Other correlates (such as socioeconomic variables) work as intermediate factors that could explain or account for detected clustering, and hence should be introduced in the analysis in a later step. This sub-section reviews the bivariate associations between nutritional status and selected demographic and socioeconomic factors.

It is clear from Table 1 that the child's age is strongly associated with the likelihood of a nutritional problem. The prevalence of stunting, for example, increases during the first two years of life and then decreases thereafter. In contrast, the age-pattern of wasting, under-weight, and anemia are nearly the same, peaking among children aged 6 to 18 months and then declining with age. These age-patterns suggest that Egyptian children's diets after the second year of life are adequate enough to overcome some nutritional challenges during weaning.

It should be noted that the abrupt decline in the prevalence of under-weight and wasting at age two might in part simply reflect discontinuities in the standard reference curves, rather than being indicative of genuine improvements in nutritional status (Dibley et al. 1987). Another artifact to which the improvement in children's nutritional status with age might be attributed in part is selective mortality: severely malnourished children are subject to a higher mortality risk, which in itself has the consequence of producing a positive association between age and the nutritional well-being of (surviving) children. Some evidence suggests that weight-for-age is the indicator most affected by this selectivity bias (Boerma et al. 1992).

Table 1 Prevalence of stunting, underweight, wasting, malnutrition, and anemia among children under six years of age, by age in months, Egypt 2000

Age in months	Stunting[1]	Under-weight[2]	Wasting[3]	Mal-nutrition[4]	Number of children	Anemia[5]	Number of children
<6	10.6	1.4	5.3	16.2	1,007	12.1	605
6-11	19.4	6.8	4.0	24.2	1,061	18.7	540
12-17	23.6	6.8	3.0	26.6	1,043	19.9	527
18-23	23.5	4.5	3.3	26.7	1,012	17.3	525
24-29	19.0	3.5	1.6	20.8	1,113	10.0	558
30-35	19.5	4.0	1.8	21.4	1,007	10.8	518
36-41	15.8	2.3	1.1	17.5	1,082	8.0	562
42-47	17.9	3.4	1.0	19.6	978	8.3	493
48-53	18.6	4.0	1.5	20.6	1,017	5.1	514
54-59	18.1	3.6	2.4	20.7	893	4.9	452
60-71	18.8	3.0	1.2	20.1	2,080	5.5	1123
Total	18.6	3.9	2.2	21.2	12,293	10.6	6417

[1]Percentage of children whose height-for-age is below -2 standard deviations below the median of the reference population
[2]Percentage of children whose weight-for-age is below -2 standard deviations below the median of the reference population
[3]Percentage of children whose weight-for-height is below -2 standard deviations below the median of the reference population
[4]Percentage of children classified as stunted, underweight, or wasted (including multiple conditions)
[5]Percentage of children whose hemoglobin level is less than 10 g/dl (severe or moderate anemia)

Table 2 displays the relation between malnutrition and other demographic variables, controlling for age. In general, boys seem to be more susceptible to malnutrition than girls, while the prevalence of anemia is not associated with the sex of the child. Family formation patterns are also related to the prevalence of malnutrition. In particular, a semi-linear relation is evident between birth order and the prevalence of stunting, under-weight, and anemia, with higher-order births more susceptible. Under-weight and stunting are also significantly more prevalent among children born within two years after the birth of the previous child. This finding is consistent with previous studies in Egypt and other developing countries (e.g., Osman 1991; Mozumder et al. 2000). The association between family formation patterns and child malnutrition could be attributed to the depleting impact on maternal nutrition of frequent and closely spaced births (with maternal nutritional problems adversely affecting the child's health and nutrition). Another possible explanation is the competition for food resources among closely spaced siblings, especially in large families.

Table 2 Prevalence of stunting, underweight, wasting, malnutrition, and anemia among children under six years of age, by selected demographic characteristics, Egypt 2000

Demographic characteristics	Stunting	Under-weight	Wasting	Malnutrition	Number of children	Anemia	Number of children
Children < 6 months							
Sex			*	*			
Males	12.1	1.4	6.8	19.1	512	11.9	293
Females	9.3	1.6	3.6	13.1	495	12.2	312
Birth order							
First	11.0	1.9	5.3	16.7	264	10.8	157
2 – 3	11.0	1.1	5.6	16.8	465	12.7	275
4 – 5	8.7	1.7	5.8	14.5	172	11.9	101
6 +	12.9	2.0	3.0	15.8	101	12.5	64
Previous birth interval							
<2 years	12.9	1.3	6.5	18.8	154	11.5	78
2+ years	10.0	1.2	5.0	15.2	579	11.7	290
Children 6 to 23 months							
Sex	*	*		*			
Males	23.6	7.2	3.9	27.4	1,627	19.9	853
Females	20.5	4.8	2.9	24.0	1,489	17.1	738
Birth order	*	*		*		*	
First	20.1	5.5	4.4	25.0	847	14.2	416
2 – 3	20.9	4.9	2.4	23.8	1,315	19.0	646
4 – 5	24.4	7.2	4.0	28.6	569	17.2	285
6 +	27.4	9.4	3.9	30.7	361	28.4	215
Previous birth interval		*					
<2 years	25.9	8.3	3.6	29.6	494	15.5	213
2+ years	22.0	5.7	2.9	25.2	1,738	20.9	869
Children 24 to 71 months							
Sex	*			*			
Males	19.5	3.6	1.6	21.4	4,146	7.4	2,097
Females	17.0	3.1	1.3	18.7	4,024	7.2	2,122
Birth order	*	*		*		*	
First	16.3	3.0	1.6	18.3	1,758	5.8	875
2 – 3	16.5	2.3	1.5	18.1	2,570	7.7	1,268
4 – 5	19.8	4.3	1.6	21.6	1,260	8.6	617
6 +	26.0	6.2	1.4	28.4	943	10.4	498
Previous birth interval		*		*			
<2 years	24.5	5.4	2.0	26.9	1,208	8.0	610
2+ years	17.4	3.0	1.3	19.1	3,543	8.6	1,713

* Significant at 0.05 level at least, according to likelihood ratio test

Malnutrition, especially protein and calorie deficiency, is usually attributed to poverty (Frongillo et al. 1997). No direct measures of household income or expenditure are available in the EDHS. However, the survey collected information on a set of indicators that could be used as proxies for household socioeconomic level. These proxies are used to construct a three-category socioeconomic indicator (see Appendix A). Another main predictor of child's health is maternal schooling, with several different mechanisms hypothesized to underlie this relationship: maternal schooling is one element of socioeconomic status, it can be associated with the degree of access to modern information regarding hygiene and diet (Smith and Haddad 1999), and better educated women may be in a stronger position to ensure that available household resources are effectively used for the well-being of their children (Caldwell 1979).

Table 3 shows differentials in the prevalence of different indicators of malnutrition according to household socioeconomic status and maternal education. The results confirm that prevalence of malnutrition among pre-school children is strongly related to the socioeconomic status of the households in which they reside. Mother's education is also negatively related to the prevalence of malnutrition, but only children of women with at least secondary education seem to enjoy a lower prevalence of anemia.

Table 3 Prevalence of stunting, underweight, wasting, malnutrition, and anemia among children under six years of age, by selected socioeconomic characteristics, Egypt 2000

Socioeconomic characteristics	Stunting	Under-weight	Wasting	Malnutrition	Number of children	Anemia	Number of children
			Children < 6 months				
Household socioeconomic level		*					
Low	13.2	2.9	4.0	17.3	272	14.6	171
Medium	9.4	0.6	4.8	14.0	477	14.0	272
High	10.5	1.6	7.4	18.7	257	6.2	161
Mother's education			*			*	
No education	11.2	1.3	3.4	14.4	383	12.4	177
Some primary	12.7	2.0	6.9	18.8	101	20.8	53
Primary-some secondary	13.1	0.0	3.3	16.3	124	14.3	56
Secondary +	9.2	1.8	7.6	17.3	394	6.9	217
			Children 6 to 23 months				
Household socioeconomic level	*	*		*		*	
Low	26.4	9.6	4.0	30.7	875	23.4	465
Medium	23.7	5.9	3.7	27.8	1,427	19.7	711
High	14.7	2.6	2.2	17.1	814	11.6	415
Mother's education	*	*		*		*	
No education	26.3	8.2	4.3	30.3	1,134	19.6	549
Some primary	23.8	4.8	2.6	26.7	311	24.6	167
Primary-some secondary	22.5	5.1	3.0	26.1	468	22.9	201
Secondary +	17.6	4.7	3.0	21.1	1,178	13.7	582
			Children 24 to 71 months				
Household socioeconomic level	*	*		*		*	
Low	26.6	5.0	1.6	28.5	2,494	9.5	1295
Medium	17.0	2.9	1.5	18.7	3,629	7.0	1850
High	10.5	2.2	1.2	12.3	2,048	5.0	1073
Mother's education	*	*				*	
No education	23.0	4.6	1.4	25.0	2,726	8.6	1309
Some primary	18.3	2.8	2.0	20.3	792	9.8	429
Primary-some secondary	15.7	3.5	1.7	17.3	884	9.4	417
Secondary +	13.7	2.1	1.4	15.6	2,129	5.2	1032

* Significant at 0.05 level at least, according to likelihood ratio test

2.3 Testing for the Clustering of Malnutrition

During the past decade, there has been increasing attention in demography to the clustering of basic outcomes. This has been an especially prominent concern in research on child mortality, where the main question has been whether child deaths are concentrated in specific families or among children born to the same mothers (e.g., Das Gupta 1990 and 1997; Madise and Diamond 1995; Sastry 1997). Viewed more broadly, however, the recent research on clustering is simply a continuation of the emphasis on heterogeneity that has been a main concern in population studies from the outset. What distinguishes clustering analysis is a focus on heterogeneity among

subgroups that are defined in physical terms, such as regions, local communities, and households. When specific observable characteristics of that physical unit account for variation in the outcome, it is said that an analysis of determinants has been performed. After observable characteristics have been controlled, if the unexplained variation clusters according to one or more types of physical units, this is evidence that some of the unexplained variation can be attributed to unmeasured characteristics that are in some sense attached to that type of physical unit (Ronsmans 1995). This paper departs from most of the previous demographic research on clustering in two respects: the outcome variable of interest is malnutrition not death, and the notion of clustering is extended beyond family-level clustering to refer to other levels of aggregation.

Many statistical techniques that address the problem of clustering are available. Some techniques are simple and can only accommodate a limited number of controls, e.g., through stratifying the analysis by subgroups. Other techniques are multi-factorial in nature and conveniently permit controls for other variables, an advantage if the aim is to identify sources of observed clustering without these controls. Because of the intrinsic differences in the levels of interest (geographic, household or individual), different techniques will be used at different points in this analysis.

The following describes in greater detail the methodology that will be used to explore the patterns of clustering at each level of interest—geographical, household and individual. In all cases, the focus will be on the following three outcome variables: stunting, general malnutrition (meaning stunting, under-weight, or/and wasting), and anemia. These measures were chosen because results presented in the 2000 EDHS report (El-Zanaty and Way 2001) and in Tables 1-3 above suggest that they are leading nutritional problems among Egyptian children. Since the three indicators are dichotomous, regression models for binary response variables are used, with fixed and/or random effects (Pendergast et al. 1996).

- **Geographical Clustering.** The geographical clustering of malnutrition among Egyptian children is examined at three different levels: the region, the governorate, and the small locality. Regional clustering is tested simply by comparing the prevalence of malnutrition among children in the six regions of Egypt that are the main domains of the EDHS sample: Urban Governorates, urban Lower Egypt, rural Lower Egypt, urban Upper Egypt, rural Upper Egypt, and Frontier Governorates.[1]

A similar procedure is used to test for clustering within governorates. The latter set of tests is facilitated by the over-sampling of households in less populous governorates, which provides sufficient cases to compare all governorates except for the five Frontier Governorates. At both levels (region and governorate), bivariate analysis of contingency tables is used to test for clustering without controlling for other explanatory variables, and logistic regression models that include fixed-effects for the regions or the governorates are used to test for clustering after controlling for observed sources of heterogeneity.

The cluster design of the EDHS sample also enables testing for clustering within small geographical areas[2]. The statistical technique used in this case must be different, because the sampled small areas constitute a randomly selected subset from all small localities in Egypt. Logistic regression models with random effects are suitable for testing clustering in this case, without and with controls for other explanatory factors (Neuhaus 1992).

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[1] A map showing the location of Egypt's governorates is included in Appendix A in the paper by Way et al.

[2] The 2000 EDHS sample was selected from small areas (segments) including around 200 households in the 500 primary sampling units (shiakhas and villages). See El-Zanaty and Way 2001 for a complete description of the sample design.

- **Household-level Clustering.** Malnutrition is said to cluster by household if it is found that a household containing a malnourished child is likely to contain other malnourished children. A straightforward test for clustering at the household level is the binomial test performed on the general measure of malnutrition. If no clustering exists, the number of children suffering from malnutrition in a household is only dependent on the number of children observed in that household and the overall risk of malnutrition in the population. Conditional on the number of children under six in a household (n), the number of children suffering malnutrition (x) will follow a binomial probability distribution (Ronsmans 1995). Hence deviations of observed frequencies from the frequencies implied by the binomial law—ascertained using the Chi-squared goodness-of-fit test—can be considered an indication of clustering of malnutrition by household.[3] In order to control for geographical clustering, tests for household clustering are carried out separately for each governorate. The design of the binomial test implicitly controls for child age and sex, since anthropometric measures for all children within the household are combined in the test, and these measures are based on age- and sex-specific standards.

To test for the existence of within-household clustering in the presence of controls for other measured determinants, logistic regression models with random effects for the household are fitted.

- **Individual-level Clustering**. For the individual child, do malnutrition problems come in clusters? Or, in other words, is a child suffering from one nutritional problem more likely than other children to suffer from another nutritional problem? One way to answer this question is to compare the prevalence of multiple problems among children with the prevalence that would be expected under the assumption of no such clustering. Assuming that a child is subject to the risk of problem a with a probability P_a, and subject to the risk of problem b with a probability P_b and that the two risks are independent, the risk of suffering both a and b will equal $P_a.P_b$. A discrepancy between the observed prevalence of joint problems and the expected prevalence under the assumption of independence ($P_a.P_b$) can be taken as evidence of individual clustering. This test is performed separately for children in different governorates, to control for geographical clustering.

In order to test for associations between different nutritional outcomes with controls for measured explanatory variables, multivariate regression models for binary response variables are fit. In these models, a correlation between the residuals from the regressions for each outcome variables is indicative of individual level clustering.

3 Geographical Clustering of Malnutrition

3.1 Regional Clustering

Table 4 explores the extent to which the nutritional indicators differ by region. As asterisk (*) in the table indicates that the value for the region in question is significantly different from the value for the Urban Governorates. A circumflex (^) indicates that the value for the region is significantly different the value for the preceding region on the list.

The results indicate that the prevalence of the various nutrition indicators differs significantly among the main regions of Egypt. Children living in the Urban Governorates enjoy better nutritional status than children living in other areas. Apart from lower levels among children living in this most privileged group of governorates, anemia differs little among the main regions. The

[3] The hypothesis tested is whether the outcome variable follows a compound binomial distribution, because the number of children per household is itself a random variable, and, conditional on this variable, the number of malnourished children follows a binomial distribution.

prevalence of stunting and malnutrition, on the other hand, differs markedly among the six regions. In general, children living in Upper Egypt are more likely to suffer from stunting.

Table 4 Prevalence of stunting, general malnutrition, and anemia among children aged 6-71 months, by place of residence, Egypt 2000

Place of residence	Stunting	Malnutrition	Number of children	Anemia	Number of children
Children 6-23 months					
Urban Governorates	11.1	14.1	531	7.8	269
Urban Lower Egypt	17.7 * ^	23.0 * ^	366	13.6 * ^	191
Rural Lower Egypt	19.4 *	23.4 *	985	18.6 *	483
Urban Upper Egypt	28.8 * ^	32.2 * ^	320	23.4 *	175
Rural Upper Egypt	31.7 *	35.1 *	863	24.9 *	446
Frontier Governorates	17.3 ^	17.6 ^	51	25.9 *	27
Total	22.1	25.8	3,116	18.6	1,591
Children 24-71 months					
Urban Governorates	6.5	8.0	1,291	4.1	680
Urban Lower Egypt	14.7 * ^	16.4 * ^	849	5.0	397
Rural Lower Egypt	18.8 * ^	20.5 * ^	2,581	6.0	1,351
Urban Upper Egypt	17.2 *	19.0 *	882	8.0 *	475
Rural Upper Egypt	25.7 * ^	27.9 * ^	2,436	10.6 *	1,249
Frontier Governorates	16.7 * ^	18.0 * ^	133	10.3 *	68
Total	18.3	20.1	8,172	7.3	4,220
Children 6-71 months					
Urban Governorates	7.8	9.8	1,822	5.2	949
Urban Lower Egypt	15.5 * ^	18.4 * ^	1,215	7.8 * ^	588
Rural Lower Egypt	19.0 * ^	21.3 * ^	3,565	9.3 *	1,834
Urban Upper Egypt	20.3 *	22.5 *	1,202	12.2 * ^	650
Rural Upper Egypt	27.3 * ^	29.8 * ^	3,299	14.4 *	1,695
Frontier Governorates	16.8 * ^	17.9 * ^	184	14.7 *	95
Total	19.3	21.7	11,287	10.4	5,811

*Difference from Urban Governorates is significant at 0.05 level at least, according to Wald test after simple logistic regression.

^ Difference from previous category is significant at 0.05 level at least, according to Wald test after simple logistic regression.

Interestingly, the regional pattern varies according to the age of the child. Among children under two years of age, the largest difference is between Lower and Upper Egypt, but no urban/rural differential is evident in this age group. Among older children, in contrast, those living in rural areas suffer from stunting more than those living in urban areas, a pattern found in both Lower and Upper Egypt.

3.2 Governorate-level Clustering

The differences among the regional averages may disguise further variation within region. Shifting the analysis down one level of aggregation, Table 5 examines variation among governorates in the prevalence of stunting, malnutrition, and anemia. In terms of the prevalence of stunting and malnutrition, the governorates appear to fall into the following three distinct groups:

Group SM-1 (low prevalence of stunting and malnutrition): Cairo; Alexandria; Port Said; Suez; Damietta; Dakahlia; Kalyubia. No significant differences exist among this set of governorates.

Group SM-2 (moderate prevalence of stunting and malnutrition): Sharkia; Kafr-El-Sheikh; Gharbia; Behera; Ismailia; Giza; Fayoum; Qena; Aswan. Kafr-El-Sheikh is

relatively better off, while Gharbia and Behera are relatively worse off than the other governorates in this group.

Group SM-3 (high prevalence of stunting and malnutrition): Menoufia, Beni Suef, Menya, Assuit, Souhag. Menya is relatively advantaged, while Menoufia and Assuit are relatively disadvantaged as compared to the other members of this group.

Table 5 Prevalence of stunting, general malnutrition, and anemia among children aged 6-71 months, by governorate, Egypt 2000

Governorate	Stunting	Malnutrition	Number of children under age 6 (unweighted)	Anemia	Number of children under age 6 (unweighted)
Urban Governorates					
Cairo	8.0	10.3	711	5.4	372
Alexandria	7.2	8.7	542	5.7	279
Port Said	8.2	9.2	304	1.9	161
Suez	10.0	11.2	349	1.6	183
Lower Egypt					
Damietta	8.9	12.8	258	13.0 ^	146
Dakahlia	8.8	9.7	559	10.9	285
Sharkia	19.8 ^	21.3 ^	605	14.8	270
Kalyubia	7.2 ^	8.4 ^	583	7.5 ^	293
Kafr El-Sheikh	11.4 ^	16.0 ^	449	10.8	222
Gharbia	22.5 ^	26.6 ^	515	6.0	283
Menoufia	37.1 ^	38.3 ^	472	4.5	244
Behera	23.0 ^	27.0 ^	544	6.7	282
Ismailia	20.6	22.5	306	8.0	175
Upper Egypt					
Giza	18.7	19.9	718	8.8	388
Beni Suef	29.6 ^	31.4 ^	442	12.7	237
Fayoum	14.0 ^	16.6 ^	471	8.0	249
Menya	26.4 ^	29.0 ^	500	14.3 ^	252
Assuit	39.8 ^	41.5 ^	738	21.2 ^	382
Souhag	33.0 ^	34.9 ^	633	15.0 ^	326
Qena	16.0 ^	22.1 ^	606	11.8	305
Aswan	14.8	18.4	358	26.4 ^	182

Note: The Frontier Governorates are excluded from the analysis because of the small sample sizes for those governorates.
^ Difference from previous governorate is significant at 0.05 level at least, according to Wald test after simple logistic regression.

In terms of the prevalence of anemia, three groups are also identified as follows:

Group A-1 (low prevalence of anemia): Cairo; Alexandria; Port Said; Suez; Kalyubia; Gharbia; Menoufia; Behera. No significant variation is evident among the governorates in this group.
Group A-2 (moderate prevalence of anemia): Damietta; Dakahlia; Sharkia; Kafr-El-Sheikh; Ismailia; Giza; Fayoum; Qena. No significant variation is evident among the governorates in this group.
Group A-3 (high prevalence of anemia): Beni Suef; Menya; Assuit; Souhag; Aswan. Aswan is relatively worse off than the other members of the group.

The rules used in assigning governorates to the categories shown in figure 1 do not focus solely on the "sample" prevalence of the condition but also take into account significant differences between

"populations". It is clear that more than one grouping could achieve similar levels of within-group homogeneity. The grouping shown in Figure 1 is designed to achieve a maximum overlap between the stunting and malnutrition and the anemia groups in addition to maximum within-group homogeneity for each set of groups. Because the sample for the anemia analysis is roughly one-half the size of the sample for the stunting analysis, few inter-governorate differences in anemia prevalence are statistically significant. Thus, the stunting-malnutrition classification was used as the starting point for the anemia classification, and governorates were shifted into another category (e.g., from high to moderate) only if the anemia level for that governorate was statistically significant from other governorates in the group. Using simple logistic regression models with contrasts built on deviations from the average of each group, the homogeneity within each of the resulting prevalence groups was confirmed (with the few exceptions noted above).

Clear overlaps exist between stunting-malnutrition (SM) and anemia (A) groups, as depicted in Figure 1. The four urban governorates and Kalyubia (which lies on the northern border of Cairo) enjoy the best nutritional profile with respect to both height-for-age, general nutrition, and blood hemoglobin levels. Next comes a group of governorates that perform very well in one dimension of nutritional status but less well in the other: Damietta and Dakahlia (adjacent governorates in the North East Delta) have low levels of stunting and malnutrition and moderate levels of anemia, while Gharbia and Behera (neighboring governorates in the West Delta) have low levels of anemia and moderate levels of stunting and malnutrition. A third group of governorates show moderate levels of stunting and malnutrition and of anemia. This group consists of governorates from both Lower and Upper Egypt: the adjacent governorates of Sharkia and Ismailia in East Delta, Kafr-El-Sheikh in North Middle Delta, Giza on the south west border of Cairo, Fayoum in Northern Upper Egypt, and Qena in Southern Upper Egypt.

Figure 1 Cross-classification of governorates according to the prevalence of stunting and anemia, Egypt 2000

Anemia / **Stunting/ Malnutrition**	Group SM-3 **High Level of Stunting/ Malnutrition**	Group SM-2 **Moderate Level of Stunting/ Malnutrition**	Group SM-3 **Low Level of Stunting/ Malnutrition**
Group A-3 **High Level of Anemia**	Beni Suef [20] Menya [a] [18] Assuit [b] [21] Souhag [17]	Aswan [c] [10]	
Group A-2 **Moderate Level of Anemia**		Sharkia [13] Kafr-El-Sheikh [a] [14] Ismailia [7] Giza [5] Fayoum [19] Qena [16]	Damietta [6] Dakahlia [12]
Group A-1 **Low Level of Anemia**	Menoufia [b] [11]	Gharbia [b] [8] Behera [b] [15]	Cairo [3] Alexandria [4] Port Said [1] Suez [2] Kalyubia [9]

[a] Level of stunting and malnutrition is relatively lower than the rest of the group
[b] Level of stunting and malnutrition is relatively higher than the rest of the group
[c] Level of anemia is relatively higher that the rest of the group.
[ ]: Governorate's rank with respect to human development index (Institute of National Planning 2000: Table G.1)

The final group certainly deserves the most attention. This group consists of governorates faring worst according to both nutritional indicators. Belonging to this group, as might be expected, are the four least developed governorates in Egypt, namely the neighboring governorates in Upper Egypt south of Giza: Beni Suef, Menya, Assuit, and Souhag.

A curious case in Figure 1 is Menoufia, which has a low prevalence of anemia but a high prevalence of stunting and of malnutrition. With its proximity to Cairo and its relatively high level of education, Menoufia is usually considered one of the more advantaged governorates in Egypt. It comes as a surprise, then, to find not only that it belongs to the worst group with respect to the prevalence of stunting and malnutrition but also performs significantly worse than the average of the other (poorer and much less developed) members of the group. The high level of anemia in Aswan is also worth noting.

A further and quite interesting pattern evident from Figure 1 is the association between malnutrition and the level of development, as indicated by the governorates' ranking on the human development index.[4] As one might expect, the most developed governorates fall at one end of the diagonal and the least developed at the other end. What is surprising is that other malnutrition groups are composed of governorates of divergent human development ranks. If the four urban governorates are set aside, then the spatial dimension—the proximity of governorates—appears to be a better predictor of nutritional profile than level of development. For example, Giza, the most advantaged in terms of human development among the non-totally-urban governorates, and Fayoum, one of the least advantaged, belong to the same group with respect to both stunting and malnutrition and anemia. Another notable case is that the adjacent governorates Damietta and Dakahlia fall into the same group despite their large difference in development.

Figure 1 describes the association at the governorate level between malnutrition and development. Similarly, Tables 2 and 3 documented associations between malnutrition and household-level demographic and socioeconomic variables. This leads to the question: are the differentials evident in these two analyses expressions of the same underlying causes of nutritional status, or are the governorate-level and household-level determinants of nutritional status independent of each other to a significant extent? This question is pursued in the regression analysis summarized in Table 6, which shows effects on three facets of nutritional status—stunting, general malnutrition (stunting, under-weight, and/or wasting), and anemia—of the main household-level and individual-level covariates. Two sets of regressions are estimated, one without and one with a control for the classification of the governorates into three nutritional status groups.[5] The effects of three of the four child characteristics (sex, age, and length of the preceding birth interval) are unaffected by the control for the governorate malnutrition group. The same applies to the effects of mother's education, which is a significant determinant of anemia whether or not governorate group is controlled. Note that the effect of mother's education is not monotonic: children of women with little education fare worse than children of mothers with no education or mothers with at least secondary education.

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[4] The human development index (HDI) in each governorate is computed following the standard procedure developed by the UNDP. The index combines information on life expectancy at birth (as a health indicator), the adult literacy rate and the combined second and third level gross enrolment ratio (as education indicators), and real per capital gross domestic product (GDP, in ppp$). The index is computed for 21 governorates (excluding the five frontier governorates, for which no reliable information on life expectancy at birth and GDP are available). Using 1998/99 data, the overall index for Egypt is 0.648. On the governorate level, it ranges from 0.747 in Port Said to 0.566 in Assuit (Institute of National Planning, 2000).

[5] Interaction terms between governorate group and all other explanatory variables were examined. Only the interaction with age was significant.

The estimated effects of the other predictors are strongly affected by the control for the governorate nutritional group. When governorate group is excluded from the model, type of place of residence and household socioeconomic status are highly significant predictors of nutritional status. Once the governorate nutritional group is controlled, however, no significant difference is evident between urban and rural areas, and the differences between households of different socioeconomic status (in particular the difference between middle and low) become less significant. Curiously, the effect of child's birth order also becomes insignificant with the control for governorate nutritional group. Apparently the negative association between birth order and nutritional status is primarily due to the fact that higher order births are disproportionately concentrated in governorates characterized by a higher prevalence of malnutrition.

Table 6 Logistic regression analysis of stunting, general malnutrition, and anemia, Egypt 2000

Explanatory Variable	Odds Ratios [b]		
	Stunting	Malnutrition	Anemia
CHILD CHARACTERISTICS			
Sex	** (*)	** (*)	n.s. (n.s.)
Males	1.0000	1.0000	1.0000
Females	0.8574	0.8636	0.9252
Age	* (*)	*** (***)	** (*)
Age (Linear term)	0.9824 *	0.9733 ***	0.9594 **
Age (Quadratic term)	1.0002	1.0003 *	1.0001
Birth Order	n.s. (**)	n.s. (***)	n.s. (*)
1-3	1.0000	1.0000	1.0000
4-5	1.0739	1.1077	0.8950
6 +	1.1654	1.1988	1.1435
Previous Birth Interval	**** (****)	**** (****)	n.s. (*)
< 2 years	1.0000	1.0000	1.0000
2+ years	0.7161 ^	0.7021 ^	1.2645
FAMILY CHARACTERISTICS			
Mother's Education	n.s. (n.s.)	n.s. (n.s.)	** (**)
None	1.0000	1.0000	1.0000
Some primary	0.8821	0.8774	1.3731 ^
Primary-some secondary	0.9402	0.9308	1.6029
Secondary+	0.8535	0.8783	1.0286 ^
Socioeconomic level	* (****)	** (****)	n.s. (**)
High	1.0000	1.0000	1.0000
Medium	1.2455 ^	1.2883 ^	1.3628 ^
Low	1.3155	1.3961	1.5262
REGIONAL CHARACTERISTICS			
Type of Place	n.s. (****)	n.s. (****)	n.s. (n.s.)
Urban	1.0000	1.0000	1.0000
Rural	1.0246	0.9839	1.0404
Governorate Malnutrition Group [a]	****	****	****
Low	1.0000	1.0000	1.0000
Moderate	2.3381 ^	2.3680 ^	3.0722 ^
High	4.6734 ^	4.1734 ^	4.8274 ^
Number of cases	9767	9767	4771

n.s Not significant; * Significant at 0.05 level; ** Significant at 0.005 level; *** Significant at 0.0005 level; **** Significant at 0.0005 level

( ) Significance level without control for governorate group (odds ratios not shown).

^ Difference from previous category is significant at 0.05 level at least.

[a] See Figure 1. For stunting, Groups SM-1 to SM-3. For anemia, Groups A-1 to A-3.

[b] From the regression that includes governorate malnutrition groups.

3.3 Clustering within Small Local Areas

The analyses of Tables 5 and 6 and Figure 1 demonstrate that cases of child malnutrition cluster by governorate. Moreover, once the governorates are classified into three nutritional groups (as in Figure 1), there is little variation among the governorates that comprise each group. We have also confirmed that there are only slight differences between the averages for urban and rural areas. These conclusions, however, apply to *averages* calculated at the governorate level. These may well disguise substantial variation within governorates (and, therefore, within governorate nutritional groupings as well).

To investigate this possibility, the analysis of clustering is pursued at one further and smaller level of geographic aggregation, that of small localities. The EDHS sample was drawn from 1,000 separate small areas (segments), randomly chosen from the primary sampling units (shaikhas in urban areas and villages in rural areas) drawn for the survey, and hence an appropriate model is the logit model with random effects for locality. Two sets of such regressions are fit. First, for each of the six governorate groups (SM-1, SM-2, SM-3, A-1, A-2, and A-3), a logit model is fit that includes all the explanatory variables listed in Table 6 (except of course the governorate malnutrition group) in addition to a random effect term for the locality. The response variable is stunting for the three groups SM-1, SM-2, and SM-3 and anemia for the groups A-1, A-2, and A-3. With the inclusion of the random effect for locality, this set of regressions provides an assessment of the magnitude of clustering at the locality level within malnutrition group. In a second set of regressions, this analysis is replicated governorate-by-governorate, i.e., a model for stunting and a model for anemia is fit for each of the 21 governorates. Comparison of the two sets of regressions indicates the extent to which governorate clustering contributes to the overall clustering by governorate group. In total, 48 random effects logit models are estimated (6 for the governorate groups, and 21 anemia and 21 stunting models for the governorates). The results are summarized in Table 7, with governorate results shown only where there is significant locality-level clustering.

Looking first at the six regressions for the governorate groups (top panel of Table 7), significant differences between localities (as captured by the random effects term) are evident in five of the six groups, the exception being group A-3 (high prevalence of anemia). And yet for the most part the random effects term for locality is <u>not</u> significant in the regressions by governorate (lower panel of Table 7). If locality-level variation in childhood malnutrition is statistically significant within governorate malnutrition <u>groups</u> but not within <u>governorates</u>, it must be the case that there is relatively more variation between localities in <u>different</u> governorates that belong to the same governorate malnutrition group than between localities in the <u>same</u> governorate. Even in the regressions by governorate nutritional group, the locality-level variance contributes a relatively small share to the total variance in nutritional status, with the maximum being one-fifth of the total variance in anemia prevalence in Group A-1. In fact in those governorates that show significant within-locality clustering, the contribution tends to be larger than in the regressions for governorate groups. There is significant inter-locality variation in the prevalence of anemia in only one governorate (Dakahlia) and in the prevalence of stunting in eight governorates (Alexandria, Dakahlia, Sharkia, Menoufia, Behera, Giza, Beni Suef, and Assuit). With the exception of these governorates, the conclusion from this analysis is that whatever factors account for the large differences in nutritional status among the Egyptian governorates, they are mainly working on the scale of the whole governorate and are not differentiated among the localities that make up each governorate. In particular, the lack of difference between urban and rural localities is confirmed.

Table 7 Logistic regression analysis of stunting and anemia, with random effects for locality, by governorate malnutrition group, Egypt 2000

Response variable	Stunting			Anemia		
Governorate Group	SM-1	SM-2	SM-3	A-1	A-2	A-3
Group-level Models						
ρ [a]	14.90 %	10.81 %	6.28 %	20.61 %	9.42 %	3.98 %
p-value for the random effect term	0.000	0.000	0.000	0.001	0.031	0.142
Explanatory variables with significant effects	Age	Previous birth interval Socio-economic level	Sex Previous birth interval Socio-economic level	None	Age Socio-economic level	Mother's education
Number of cases	3,061	4,128	2,611	1,845	1,759	1,182
Number of localities	339	413	231	374	361	205
Governorate-level Models [b]						
Governorates with significant random effect of localities	Alexandria (15.80) Dakahlia (25.3)	Sharkia (8.16) Behera (13.26) Giza (10.50)	Menoufia (16.71) Beni Suef (12.50) Assuit (7.70)	None	Dakahlia (40.21)	None

[a] Proportion of total variance contributed by the locality-level variance component.
[b] Numbers in parentheses indicate the proportion of within-governorate variance contributed by the locality-level variance component.

4 Household-Level Clustering of Malnutrition

The previous analysis has revealed nutritional clustering at the level of the governorate and the locality. Clustering at lower levels of aggregation is also possible and of considerable analytical interest, because many fundamental determinants of nutrition are thought to express themselves at the level of neighborhoods and households. Household-level clustering occurs if the probability of observing multiple cases of malnutrition exceeds what would be expected by application of the binomial law (using the average level of malnutrition in the locality and the number of children living in the household). Table 8 summarizes the results of a binomial test for household-level clustering, calculated governorate-by-governorate. The test makes use of all children less than six years of age. The outcome variable is the number of children in the household who display any indication of malnutrition: stunting, under-weight, or wasting. Table 8 shows that the hypothesis of household-level clustering of malnutrition cannot be rejected in eight governorates: Cairo, Sharkia, Kalyubia, Beni Suef, Menya, and Assuit.

Table 8 Chi-squared goodness-of-fit test for the clustering of malnutrition by household, by govern orate, Egypt 2000

Governorate	Chi-square [a]	df [b]	P-value	Number of households [c]	Number of children [c]
Cairo	69.06	14	0.0000	527	776
Alexandria	15.31	27	0.9648	399	598
Port Said	7.47	9	0.5882	229	331
Suez	6.66	5	0.2469	263	373
Damietta	3.36	14	0.9982	190	278
Dakahlia	15.54	14	0.3424	413	605
Sharkia	32.80	14	0.0031	425	658
Kalyubia	32.08	20	0.0424	385	633
Kafr El-Sheikh	11.86	14	0.6172	278	484
Gharbia	4.93	14	0.9869	364	559
Menoufia	11.02	9	0.2740	323	522
Behera	27.30	20	0.1271	359	586
Ismailia	10.30	9	0.3116	221	338
Giza	7.54	14	0.9119	512	794
Beni Suef	35.92	20	0.0157	288	482
Fayoum	15.53	14	0.3426	313	524
Menya	25.26	14	0.0321	326	546
Assuit	53.71	20	0.0000	449	770
Souhag	26.95	20	0.1366	386	695
Qena	23.91	27	0.6353	378	669
Aswan	14.07	20	0.8267	246	394

[a] $\chi^2 = \sum_{i,n} \frac{(O_{i,n} - E_{i,n})^2}{E_{i,n}}$,

where $O_{i,n}$ is the observed number of households containing n children of whom i children are malnourished (stunted, under-weight, or wasted), and $E_{i,n}$ is the expected frequency assuming the compound binomial distribution:

$$E_{i,n} = \{\sum_{j=1}^{n} O_{j,n}\}\{\frac{n!}{i!(n-i)!} p^i (1-p)^{n-i}\}$$

[b] Degrees of freedom equals the number of nonzero cells in the table of expected frequency minus the number of rows (because the expected frequency uses the total number of households for each n) minus 1 (because the value of p is estimated by the prevalence of malnutrition computed from the observed table).

[c] Unweighted

Household-level clustering can also be investigated with the same approach used in the analysis of locality-level clustering, namely the random effects logit model, an approach that has the advantage of permitting controls for other explanatory variables. A model was fitted for each one of the six governorate groups, with stunting as the response variable for groups SM-1, SM-2, and SM-3 and anemia as the response variable for groups A-1, A-2, and A-3. The same model is also fit, twice (for stunting and anemia), for each governorate (42 regressions). The results are summarized in Table 9.

As Table 9 shows, there is evidence of household-level clustering in all governorate groups except A-2 (moderate prevalence of anemia). Comparing the estimates in Table 9 with those in Table 7, it is clear that the household-level variance component is substantially larger than the locality-level variance component. As in the analysis of clustering at the locality level, the results indicate that variation between governorates belonging to the same governorate malnutrition group is a large part of the story, for the random effect term for household is not significant in most of the governorate-by-governorate regressions. Only six governorates show household-level clustering in stunting—Cairo, Kalyubia, Behera, Menya, Assuit, and Souhag—and even fewer (just four, three of them in Upper Egypt) show household-level clustering of anemia—Gharbia, Beni Suef, Assuit, and Qena. In some of the governorates that show a significant household-level effect, the main

explanation is that a relatively small fraction of households contain more than one child (under age six), and hence inter-household variation necessarily makes a large contribution to the total variation.

Table 9 Logistic regression analysis of stunting and anemia, with random effects for household, by governorate malnutrition group, Egypt 2000

Response variable	Stunting			Anemia		
Governorate Group	SM-1	SM-2	SM-3	A-1	A-2	A-3
Group-level Models						
ρ [a]	32.34 %	26.03 %	25.39 %	36.08 %	18.97 %	36.49 %
p-value for the random effect term	0.000	0.000	0.000	0.005	0.071	0.000
Explanatory variables with significant effects	Age	Previous birth interval Socio-economic level	Sex Previous birth interval Socio-economic level	None	Age Socio-economic level	Mother's education
Number of cases	3,061	4,128	2,611	1,845	1,759	1,182
Number of localities	2,228	2,923	1,689	1,326	1,268	777
Governorate-level Models[b]						
Governorates with significant random effect of localities	Cairo (31.30) Kalyubia (41.31)	Behera (35.82)	Menya (74.44) Assuit (31.81) Souhag (27.05)	Gharbia (61.80)	Qena (86.35)	Beni Suef (99.93) Assuit (36.59)

[a] Proportion of total variance contributed by the household-level variance component.
[b] Numbers in parentheses indicate the proportion of within-governorate variance contributed by the household-level variance component.

5 Individual-Level Clustering of Malnutrition

The above analysis reveals a high level of spatial clustering of cases of malnutrition among Egyptian children. The analysis has also revealed that, in some governorates, children living in a subset of households share a higher risk of suffering from certain types of malnutrition. This section considers a third, and totally different, type of clustering that we term "individual-level clustering." At issue is whether different types of malnutrition are likely to coexist in the same child. A simple test for this hypothesis is to compare the prevalence of multiple conditions with the prevalence expected under the null assumption of independence of different conditions, i.e., with the product of the marginal levels of prevalence. The results of this test, carried out by governorate, are presented in Table 10.

Table 10 Results of the t-test for the clustering of malnutrition conditions, by governorate, Egypt 2000

Governorate	P – Value					
	Stunting and under-weight	Stunting and wasting	Under-weight and wasting	Stunting and anemia	Under-weight and anemia	Wasting and anemia
Cairo	0.0081	0.1558	0.0141	0.2224	0.2748	0.2176
Alexandria	0.0021	0.2562	0.2019	0.6644	0.2804	0.8128
Port Said	0.0556	0.2693	0.0458	0.8096	0.9221	A
Suez	0.0933	0.3237	0.1655	0.7801	0.9285	0.9471
Damietta	0.0989	0.1720	0.0326	0.8344	0.7590	0.6828
Dakahlia	0.0548	0.2787	0.1592	0.3732	0.2598	0.2165
Sharkia	0.0116	0.1152	0.0593	0.3185	0.4552	0.7562
Kalyubia	0.0527	0.2695	0.1072	0.9150	0.2468	0.1948
Kafr El-Sheikh	0.0020	0.0644	0.1145	0.3432	0.0926	0.1140
Gharbia	0.2524	0.1877	0.0023	0.8868	0.3022	0.1562
Menoufia	0.0968	0.1863	0.1060	0.6858	0.2862	0.7863
Behera	0.0857	0.0209	0.0193	0.3063	0.4453	0.6951
Ismailia	0.0079	0.4081	0.0675	0.1802	0.1834	0.3101
Giza	0.0018	0.3243	0.0137	0.4232	0.4726	0.7307
Beni Suef	0.0047	0.3225	0.0022	0.3564	0.1796	0.1790
Fayoum	0.0067	0.1315	0.0809	0.2437	0.1300	0.7465
Menya	0.0042	0.1438	0.0071	0.9679	0.3292	0.1369
Assuit	0.0002	0.3312	0.0240	0.0900	0.0581	0.4843
Souhag	0.0012	0.4722	0.0325	0.1456	0.3496	0.3906
Qena	0.0000	0.1319	0.0046	0.1158	0.3314	0.4583
Aswan	0.0030	0.3988	0.0074	0.3783	0.2694	0.4248

*The difference of proportions between observed prevalence of multiple conditions and the expected prevalence under the assumption of independence
A = No cases of wasting observed in the anemia sub-sample.

Underweight seems to be related to both stunting and wasting. This is to be expected because the body weight of the child is a function of both height, measured by stunting, and body mass, measured by wasting. Stunting and wasting, however, show no evidence of clustering by child. Likewise, the condition of anemia seems to be largely independent of the three types of anthropometrical conditions. A clear conclusion from Table 10 is that, controlling for governorate, iron deficiency has a set of determinants on the child level that are basically different from the determinants of protein and calorie deficiency.

For stunting and anemia, the two most prevalent conditions among Egyptian children, individual-level clustering is investigated further through fitting a bivariate probit model. The lack of interdependence between anemia and stunting is confirmed by the results shown in Table 11. Not only does each condition have its own set of determinants, but also the bivariate model is not statistically different from the sum of the two univariate models. This means that a child suffering from stunting is not more or less likely than other children to suffer from anemia. It should be noted, however, that this result holds true only after controlling for the governorate-level and the locality-level clustering of both stunting and anemia. Without controls for clustering at those two levels, the association between stunting and anemia is far stronger (results not shown). As already revealed in Figure 1, a large overlap exists between the classification of governorates according to stunting and anemia. Were spatial clustering to be ignored, one might wrongly conclude that the two conditions are interdependent.

Table 11 Bivariate probit regression analysis of stunting and anemia, Egypt 2000

Explanatory Variables	P-Value [a]	
	Stunting	Anemia
Child's sex	0.002	0.535
Child's age (linear term)	0.065	0.003
Child's age (quadratic term)	0.171	0.462
Birth order (4-5 | 1-3)	0.845	0.900
Birth order (6+ | 1-3)	0.187	0.115
Previous birth interval (<2 years | 2+ years)	0.005	0.329
Mother's education (less than secondary | none)	0.471	0.066
Mother's education (secondary+ | none)	0.273	0.460
Socioeconomic level (medium | | high)	0.051	0.092
Socioeconomic level (low | high)	0.009	0.062
Type of place of residence (rural | urban)	0.607	0.325
Stunting governorate group (Group SM-2 | Group SM-1)	0.000	0.462
Stunting governorate group (Group SM-3 | Group SM-1)	0.000	0.015
Anemia governorate group (Group A-2 | Group A-1)	0.293	0.002
Anemia governorate group (Group A-3 | Group A-1)	0.788	0.000
ρ [b]	0.0837	

Number of cases = 4,786

[a] From the univariate models, except for the last row. Standard errors are adjusted for clustering within localities.

[b] From the complete bivariate model. If $\rho = 0$, then the two response variables are unrelated.

6 Conclusions and Policy Implications

As mentioned at the outset, the gains from an investigation of clustering are two-fold. First, unlike conventional studies of determinants, clustering analysis is not handicapped by the lack of information on basic explanatory variables, which is characteristic in surveys likely the DHS, where information is collected on a broad range of topics. Second, when patterns of clustering are uncovered, they can serve a guide for the targeting of limited resources.

Three main patterns of clustering were examined in this analysis. The first clustering pattern, and the most revealing, is spatial. The EDHS data show that the 21 governorates can be divided into a number of distinct groups, each with its special nutritional profile and, hence, its own programmatic needs. The worse nutritional profiles are found in four adjacent Upper Egypt governorates (Beni Suef, Menya, Assuit, and Souhag). The four remaining governorates in Upper Egypt (Giza, Fayoum, Qena, and Aswan) show better—but still problematic—nutritional profiles. The prevalence of anemia in Aswan, in particular, merits special attention. In Lower Egypt, three distinct groups of governorates with different needs can be distinguished. Sharkia and Ismailia constitute the first group, with evidence of both low height-for-age and low hemoglobin levels. Children residing in the second group, consisting of Damietta and Dakahlia, are mainly suffering from anemia, while children in the third group, consisting of Gharbia, Behera, and, especially, Menoufia, are suffering from a relatively high prevalence of stunting.

It is noteworthy that the governorates that make up each of the nutritional groups tend to be spatially proximate to each other and yet are heterogeneous on development indicators. This is an important finding, and one that was not anticipated in advance, given the primacy of development variables in most conceptual frameworks for health and nutrition. It appears that significant variation in childhood malnutrition is due to factors other than the amount of material resources. Culture differences with respect to child feeding practices, and differences in the types of crops cultivated in different parts of the country, are among the candidate explanations.

A second nutritional clustering pattern is found within governorates. At this level, a surprising empirical finding is the relatively weak explanatory power of type of place of residence (urban or rural). Furthermore, the majority of governorates do not show any evidence of within-governorate clustering by locality. There are, to be sure, several exceptions to this generalization: the data indicate that the prevalence of stunting varies by locality within Sharkia, Behera, and Menoufia in Lower Egypt, and within Giza, Beni Suef, and Assuit in Upper Egypt. Still, *a priori* it seemed likely that the EDHS data would reveal considerable variation from community-to-community in the prevalence of various types of malnutrition, but this does not prove to be the case, once other measured determinants of nutrition are taken into account.

A third nutritional clustering pattern occurs at the household level, i.e., the tendency for children in a subset of households to be at higher risk of nutritional problems. One might expect household socioeconomic status to account for most of this clustering, but the empirical analysis demonstrates that this is at best a partial explanation. Even after controlling for socioeconomic factors, significant household-level clustering remains. Once again, Assuit stands out in the extent of household-level clustering (both stunting and anemia).

A fourth nutritional clustering pattern occurs at the individual level. The analysis found only weak associations among the various nutritional conditions measured in the EDHS. There is little evidence that children suffering from the nutritional problems revealed by the anthropometric measures (such as stunting) are more likely to suffer from anemia, once other determinants are controlled. It should be emphasized that this conclusion is derived from multivariate analysis. Without multivariate controls, the data do show a clustering of nutritional conditions. This appears to be due to the effects of factors such as spatial location, household socioeconomic status, and maternal schooling.

The focus of this analysis was on nutritional clustering, and, thus, other determinants of child nutritional status (e.g., demographic and socioeconomic variables), have been incorporated in the analysis primarily as controls. Nevertheless, it is worthwhile summarizing the nature of the effects of these other variables in the multi-factor models that have been estimated in the effort to investigate clustering. For example, length of the previous birth interval is consistently a significant covariate of stunting. This provides a further confirmation of the many benefits of child spacing. Household socioeconomic status also shows substantial effects on stunting throughout the analysis, while maternal schooling is a significant covariate of anemia. However, the latter relationship is not monotonic: children of mothers with no schooling do not fare worse than children whose mothers have at least secondary education, and the least advantaged group with respect to anemia are children of mothers with some but less than secondary schooling. Differences in diet practices, particularly relating to weaning, may be responsible for this unexpected pattern.

The variables that showed no significant relationship with the various indicators of child nutrition are also worth mentioning. These are: the number of household members (children and adults), the schooling of the head of the household, sex of the head of the household, whether the child's parents are alive or not, the child's relation to the head of the household, whether the child has a twin, and various indicators of breastfeeding and of antenatal care.

In conclusion, the main findings from this analysis include:

- The similarity of governorates in nutritional profile is more a matter of their geographic proximity than their development levels.

- There is relatively little variation in malnutrition among localities within the same governorate. Instead, the major differences in the prevalence of childhood malnutrition occur between governorates grouped according to their nutritional profile.

- Children in some households share an elevated risk of nutritional problems, and this household-level clustering of malnutrition is only partially explained by the socioeconomic status of the household.

- There is no association between the risk of different nutritional problems–for example, stunting and anemia–once the effects of common determinants are taken into account.

Additional research is clearly needed to address the central questions that this study raises, i.e., what factors explain the nutritional clustering evident in the EDHS data and, equally, how is the relatively limited clustering along several fundamental geographic and social dimensions to be explained? These studies must be guided by a sound conceptual framework that will look beyond traditional demographic and socioeconomic variables to identify the other variables that are contributing to the patterns of nutritional clustering highlighted in this study.

However, there are some immediate implications for policy in this area. First, efforts to improve nutrition among Egyptian children clearly need to be multi-faceted, reflecting the complex nature of the relationships between a child's nutritional status and geographic, household and individual level determinants. In particular, the study results suggest that nutritional deficiencies are not solely a product of socioeconomic differences; consequently, they may not respond or respond completely to initiatives broadly promoting economic development. In addition, the existence of governorate-level clustering highlights the need for interventions to be tailored to key features of specific contexts, such as customary dietary practices.

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Appendix

Measuring the Socioeconomic Level of Households

The household questionnaire used in the 2000 EDHS includes a set of questions on housing characteristics and the possession of durable goods that can be used to assess the socioeconomic level of the household. The aim is to construct a variable that classifies households into three socioeconomic levels: low, medium, high. The input is twenty-two dichotomous indicators of the source of drinking water (two variables indicating whether the household uses in-residence piped water or in-residence well water or neither), the existence of a flush toilet, electricity, type of fuel used (electricity/LPG/natural gas or other), main material of floor (two variables indicating whether it is earth, cement, or other), the existence of washing facilities in the dwelling (water, soap, and basin), size of dwelling (less than four rooms or at least four rooms), and the possession of durable goods (recorder, television, video, telephone, electric fan, water heater, refrigerator, sewing machine, automatic washing machine, ordinary washing machine, bicycle, motorcycle, and car).

Using these twenty-two variables, three relatively homogenous groups of households are distinguished. This has been done using a three-mean iterative clustering algorithm. The algorithm starts by forming three arbitrary initial clusters, then assigns each case successively to the cluster nearest its center (defined by the means of the twenty-two input variables). After all cases are assigned, the centers of the three clusters are re-calculated, and the cases are re-assigned according to the location of the updated centers. The procedure is repeated iteratively until convergence (no further change in the cluster centers) is achieved. The final centers define the three categories, and the final classification of cases is used as the categorical output variable.

The final classification gives different weights to different variables depending on the covariance structure. For example, since more than ninety percent of sampled households have electricity, the final classification is only slightly dependent on this variable. Some variables mainly distinguished the lowest socioeconomic category from the two other categories (e.g., earth floor, no piped water, no clean fuel, no television, no electric fan, no refrigerator, no recorder, no washing machine, and no washing facilities). Other variables distinguish the highest category from the two other categories (e.g., phone, toilet, water heater, automatic washing machine, and video). Still other variables differ systematically among the three categories (e.g., cement floor, means of transportation, and dwelling size).

Notwithstanding the need to control for possible confounding factors, especially type of place of residence, the strong association shown in Table 3 between the resulting indicator of socioeconomic status and the prevalence of malnutrition can be regarded as a validity check on the constructed variable.