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Female Labor Force Participation in the Middle East and North Africa

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Female Labor Force Participation in the Middle East and North Africa

Female labor force participation rate (FLFP) in the Middle East and North Africa (MENA) is lower than any other region in the world. This trend has been consistent throughout the region's history despite periods of high economic growth, lower female illiteracy rates, faster urbanization, and even lower fertility rates than at least one other region in the world. However, in recent years this trend of low FLFP in MENA has begun to change with females entering the labor force in greater numbers than ever before. This paper seeks to identify the factors influencing female labor force participation in MENA and the potential impact of an increase in female labor force participation for the region.

Chart 1: Regional Female Labor Force Comparison
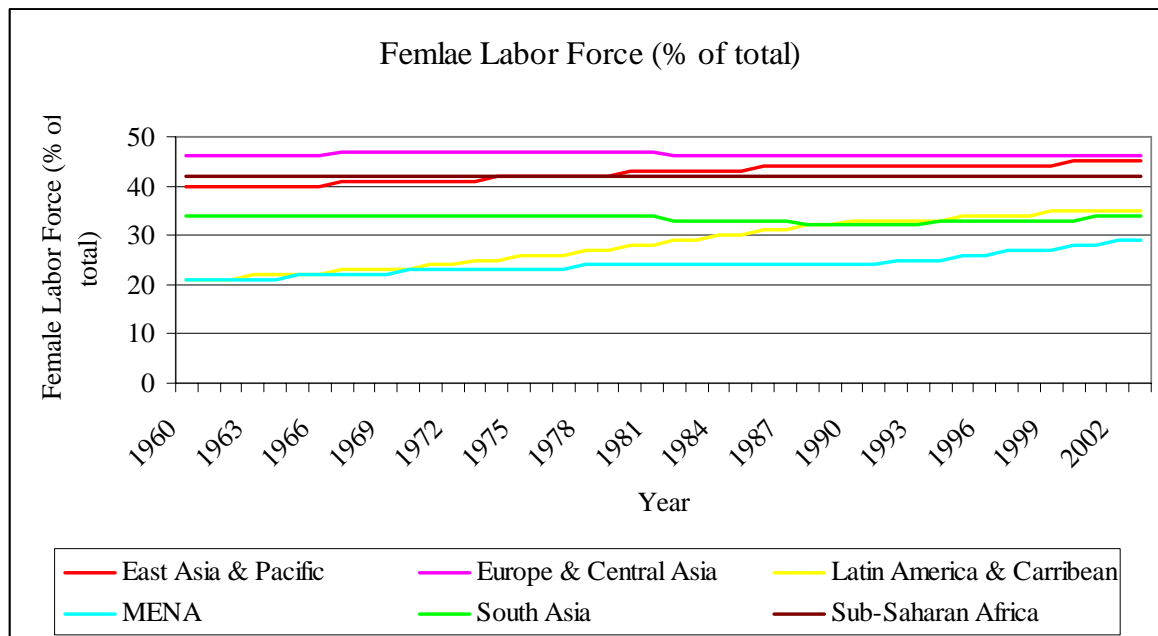
Source: World Bank WDI Online

Part 1: A Brief History of the Economy and Labor Force of the Middle East and North Africa

Economic History

From the 1960s until the mid-1980s MENA was generally economically successful outperforming most other developing regions of the world in GDP/capita growth despite the numerous armed conflicts in the region. However, beginning in the mid-1980s lower oil prices, greater competition, and increasingly mobile capital caused an economic decline.

In the late 1980s many MENA economies initiated programs of reform to improve their economic situation. The success of these programs has been marginal at best and the region still faces many economic problems: its total factor productivity growth is lower than most other regions (meaning that its competitiveness is declining), it has had difficulty integrating into the world economy, and its unemployment rates are among the highest in the world (Claiming the Future).

In recent years MENA's GDP growth has been significantly lower than other regions, most notably lower than that of East Asia and the Pacific.

Chart 1: GDP per Capita Growth
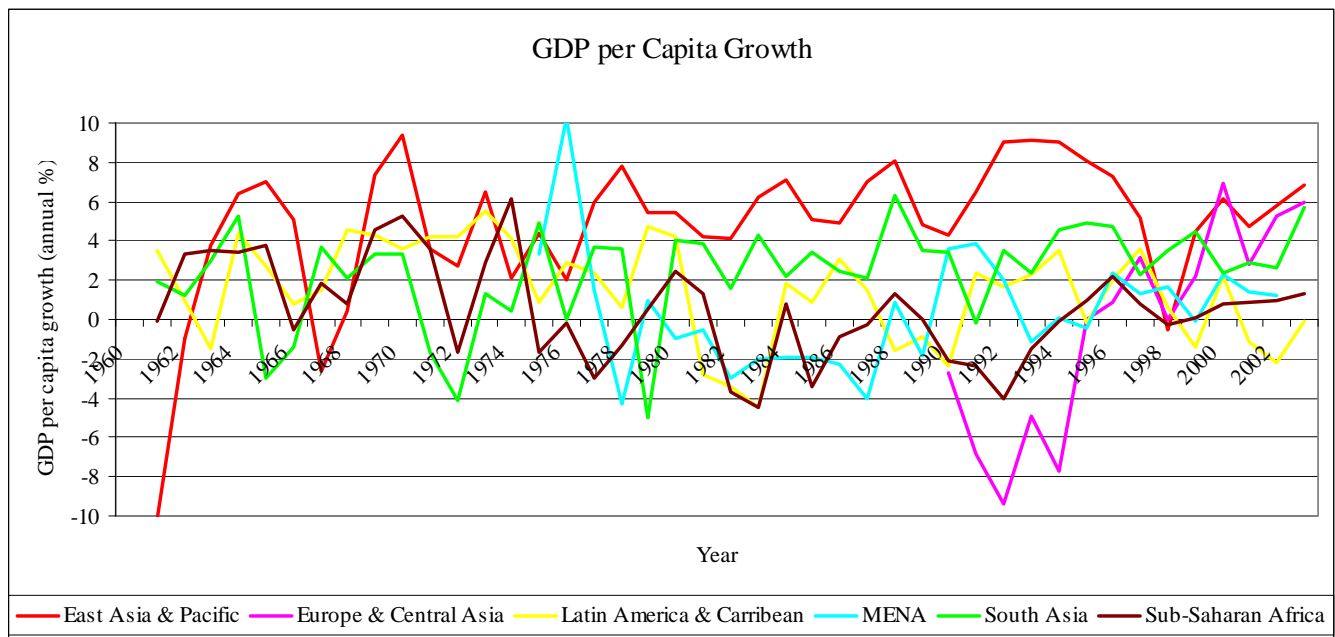

Source: World Bank WDI Online

Unemployment and the Labor Force

While there is significant variation among countries, a conservative estimate of the average unemployment rate in MENA is 15% (Unlocking the Employment Potential, 1)

This is higher than nearly any other region of the world, except for Sub-Saharan Africa (see Chart 2).

Chart 2: International Comparison of Unemployment Rates, 2002
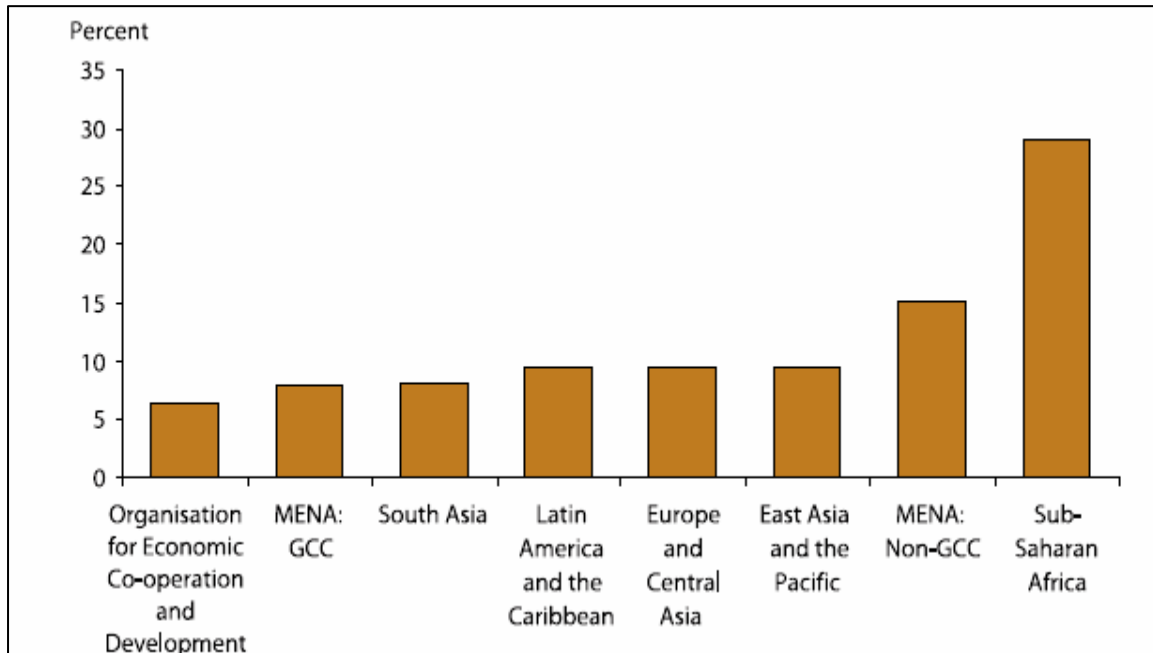
Source: Unlocking the Employment Potential in the Middle East and North Africa, 43.

Compounding the already high unemployment rate, the World Bank predicts that the labor force of MENA will grow by approximately eighty million workers between 2000 and 2020, meaning that unless millions of new jobs are created in the next 15 years, MENA's unemployment rates could skyrocket even further. Why is MENA's labor force predicted to grow so quickly? Fast labor force growth is a primarily a result of the slow pace at which the region underwent demographic transition. Following World War II and continuing until 1990, MENA's fertility rates remained high while mortality rates fell causing the region's population to grow faster than any other part of the world with an average population growth rate of 2.8% per year. As the children born during this long period of rapid population growth mature they will aspire to join the labor force. As a result, in the next fifteen to twenty years the economically active population in MENA will be greater than the economically dependent population by a larger amount than any other region.

In addition to rapid growth, the demographic composition of MENA's labor force is changing. The overall labor force is composed of a greater number of youths who are more educated than their predecessors. There is also a gender dimension: young men are staying out of the labor force longer, while females are entering it in greater numbers. The next section examines the factors that contribute to FLFP rates and what factors are changing in MENA that are contributing to the region's increasing FLFP.

Part 2: Determinants of Female Labor Force Participation

Framework

Researchers have identified many factors that contribute to female labor force participation. These factors may be broken down into intervening and background variables. Intervening variables include supply and demand factors and a woman's status as a migrant. Background factors are demographic and socio-cultural factors that influence the supply factors (Shah 213). This regression analysis of female labor force participation in the Middle East and North Africa looks at a several intervening factors including: GDP/capita, fertility rates, female illiteracy rates, unemployment rates, and urbanization.

Background Factors   **Intervening Factors**

Demographic:
age, Family size, age of youngest
child, marital status, household
headship, family type

Supply:
women's education and skill
level, availability of child care,
attractiveness of jobs, husband's
income/occupation/education,
woman's motivation to work

Socio-Cultural:
protective norms, non-
desirability of specific jobs,
status considerations

If woman is a migrant:
nature of move (autonomous?),
network of support (esp help in
job search), aspiration wage

**Female Labor
Force Participation**

Demand:
rate and character of econ
development, size of informal
sector, discrimination against
hiring females, wages and sex
discrimination hiring regulations

Regression Analysis

In five multiple linear regressions for the years 1960, 1970, 1980, 1990, and 2000 I have analyzed the impact of several supply and demand factors on female labor force participation.

The dependent variable used in the study is:
- Female labor force ((% of total labor force)

The independent variables used are as follows:
- GDP per Capita in 1995 US$

- Illiteracy rate of adult females (% of females ages 15 and above)
- Total fertility rate (births per woman)
- Urban population (% of total)
- MENA dummy variable: 1 if MENA, 0 otherwise

The rationale for each of these independent variables examined and their expected correlation with the female labor force participation are outlined below. For a definition of the variables see appendix 1.

Dependent Variable: Female labor force (% of total labor force)

While this variable is clearly intended to measure the extent to which women are active in the labor force, it is important to clarify the definition of labor force activity as the definition has changed over time and across studies, surveys, and statistics. This data set defines the labor force as all people who meet the International Labour Organization's definition of the economically active population:

> All persons of either sex who furnish the supply of labour for the production of economic goods and services as defined by the United Nations systems of national accounts and balances during a specified time-reference period. According to these systems the production of economic goods and services includes all production and processing of primary products whether for the market for barter or for own consumption, the production of all other goods and services for the market and, in the case of households which produce such goods and services for the market, the corresponding production for own consumption.[1]

GDP per Capita: Measured by GDP per Capita in 1995 US$

GDP growth (the expansion of output) is an important determinant of labor demand (Unlocking the Employment Potential, 74-77). Output and labor are related by the following equation:

g(output/labor force) = g (employment / labor force) + g (output/ employment)
$\qquad\qquad$ =creating employment opportunities+boosting W*, which is linked to productivity

This equation describes the labor force as a factor of production that contributes to output growth so that strong output growth both reflects and leads to employment growth and lower unemployment. Based on this equation one would expect to see a positive correlation between GDP per capita and labor force growth.

Perkins et al. verifies this anticipated positive correlation asserting that female labor force participation is expected to be related to the stage of development: "using the conventional definitions, women participate increasingly in the labor force as

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[1] In accordance with the 13th International Conference of Labor Statisticians in October 1982.
http://www.ilo.org/public/english/bureau/stat/res/ecacpop.htm

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development proceeds and the number of jobs outside the home rises" (Perkins, 292). However, other scholars however have found opposing results:

> There is marked diversity in female participation rates between countries, with little evidence that such patterns relate to a particular 'stage' of development…If a large sample of OECD and less developed countries is examined, a rank correlation between female participation rates and the level of national income per head reveals a quite weak relation, high female participation rates are found in countries with high as well as low income per head. (Chan-Lee)

One explanation for the conflicting results is that the relationship between FLFP and GDP may not be linear. For example, in many developing countries most people have to work to survive regardless of the person's gender. Thus a very low GDP may force all people into the workforce, while woman in countries that are slightly better off may have not have to work and in this economic state a patriarchal gender contract can be endorsed.

There is not a consensus in literature on how industrialization effects female labor force participation. There are three competing hypothesis:

- Emancipation hypothesis: there is "a direct relationship between industrialization and increasing employment and 'freedom' for women" (Rau 505) because industrialization fosters a new mentality and disintegration of patriarchy.

- U-hypothesis: there is a curvilinear relationship between industrialization and FLFP. In pre-industrial societies women work at home and are able to work, rear children, and perform other domestic duties all under one roof. In early phases of industrialization FLFP decreases as farms become specialized and mechanized, and work production begins to move to factories, where work is mainly restricted for men. FLFP increases in the post-industrial society when white-collar service jobs appear and family structures change.

- Constancy hypothesis: woman always worked and the curvilinear pattern often found is "a statistical artifact due to the under enumeration of women's work activity during industrialization" (Rau 506). In other words, until the 1982 when ILO came up with a standard definition of labor force activity, census' and data collection methods were inconsistent. They also frequently underrepresented female labor force activity in early- and mid-industrialization because they did not count many of the labor force activities that were largely performed by females during these stages of development.
  (Rau 505-6)

While there is large debate within the literature, I believe support for the u-hypothesis is most convincing. Chart 4 below lends some support for this hypothesis, except for segment of Europe and Central Asia. Because I expect that the relationship between

FLFP and GDP per capita will be curvilinear while my regression is linear, I expect to find a weak positive correlation between FLFP and GDP per capital.

Chart 4: Analysis of GDP per Capita vs FLFP

FLFP vs GDP per Capita
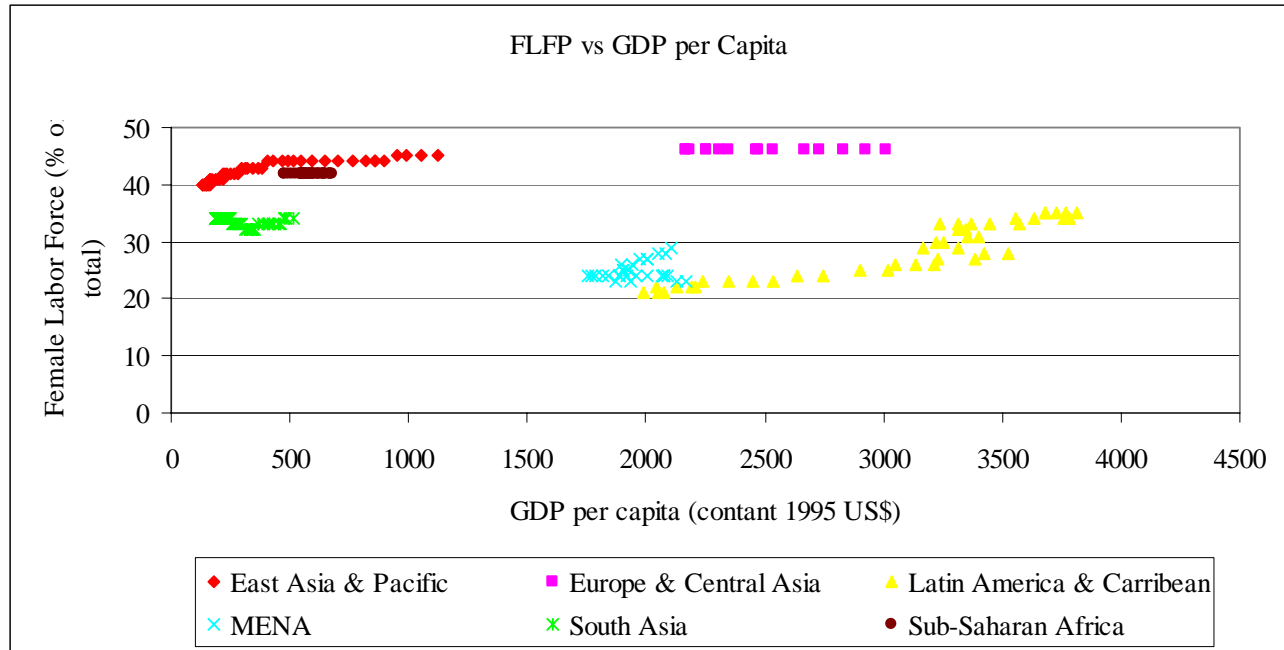
Source: World Bank WDI Online

Education: Measured by the illiteracy rate of adult females (% of females ages 15 and above)

There are several reasons to expect a positive correlation between education and female labor force participation. More education can increase the assets a woman can offer to a potential employer. Her opportunity cost of not working increases as she has devoted otherwise productive work time (and possibly money) to her education and her real wage expectations will likely increase with higher levels of education. (Note however that education cannot increases wages or the probability of finding employment for the entire labor force. Unless there are changes in aggregate demand, education and labor force participation cannot be positively correlated no matter how great the increase in education level of the total population.) Also, higher levels of education are usually associated with lower fertility rates (women who are more educated usually have fewer children), and, lower fertility rates in turn are usually associated with higher FLFP.

Nevertheless, studies have shown mixed results. Widarti notes that research in several Middle Eastern and Latin American countries have demonstrated a positive relationship between FLFP and educational achievement, but countries such as India, Pakistan, and Sri-Lanka have demonstrated a j-curve. She suggests that "these mixed findings probably reflect the impact of interrelated socio-economic and demographic differences on women's participation in the labour market" (Widarti 94).

A curvilinear relationship between education and labor force participation is not uncommon. For example, in the Middle East male labor participation displays a v-pattern of labor participation—with higher participation rates at the extreme levels of educational attainment, but low participation rates at intermediate levels—while female labor participation does not (Unlocking the Employment Potential 68-71). Researchers suggest that this occurs in MENA because uneducated workers are willing to take any job, while moderately to highly educated labor force participants have high wage expectations. If there is only a small supply of higher wage jobs, these jobs will go to the most educated candidates and the moderately to highly educated workers will be unemployed.

Because of a curvilinear relationship between education and FLFP in several countries and in several demographic segments, I expect female illiteracy rates to have a small negative correlation in my linear regression of female labor force participation.

Chart 5: Analysis of Literacy vs FLFP
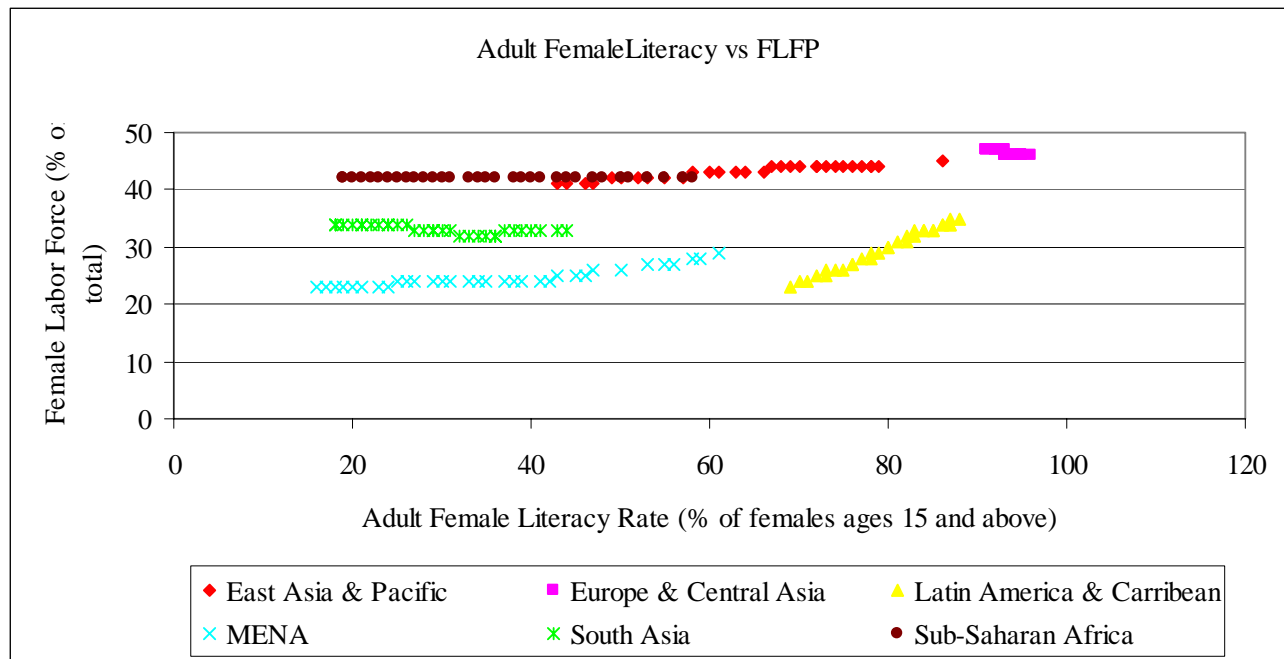
Source: World Bank WDI Online

Fertility: Measured by the total fertility rate (births per woman)

Fertility is generally expected to have a negative correlation with female labor force participation. More and better job opportunities will increase the relative cost of having children. While there is some suggestion that there are two opposing effects (higher female wages, job attractiveness, or job opportunities can be viewed as an increase in the price of having children relative to commodity services, but female employment and higher female wages also increase the full income of the household, which tends to increase the demand for children (O'Neil 76)) most prior studies have found a negative relationship between FLFP and fertility.

In addition to wage opportunities, other factors can influence this relationship. McCabe and Rosenzweig find that the level of urbanization can affect the correlation between fertility and FLFP, "economically active women have lower birth rates according to the various criteria used than do non-economically active women, although the inverse association between female economic activity and fertility does not seem to be nearly as strong in rural area as it does in urban areas" (141). Differences in the child-rearing compatibility of different occupations, the extent to which relatives or older children can rear young children in different countries, and the ability to purchase inputs that will substitute for the wife's time in raising children will affect the ability to work and will also influence the relative allocations of the wife's time (O'Neil 76).

Despite these other effects and because I am also taking into account urbanization, I expect to find a negative correlation between fertility and labor force participation.

Chart 6: Analysis of Fertility vs FLFP
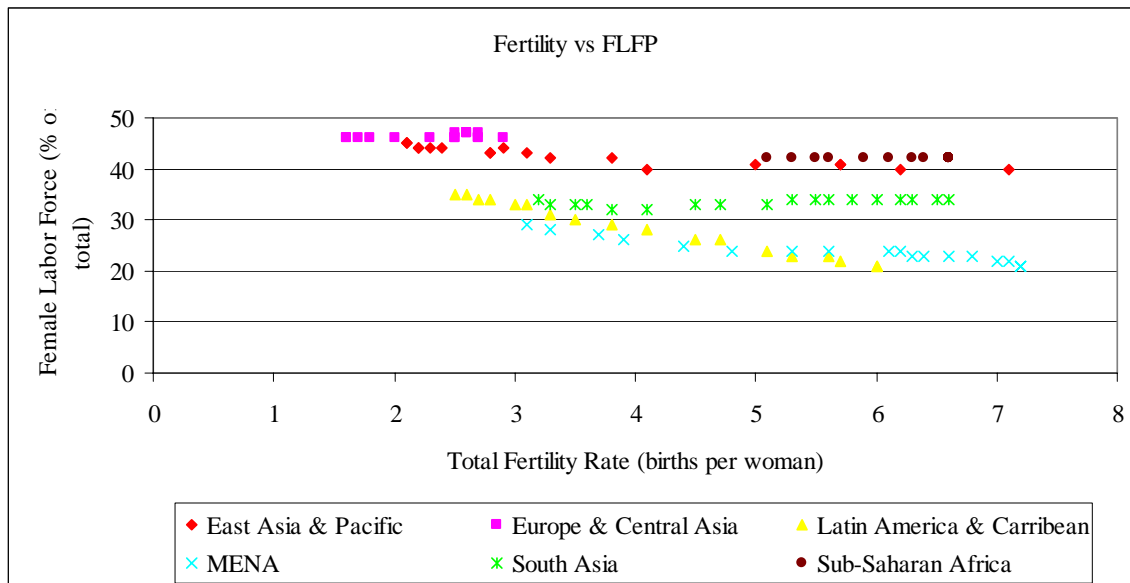
Source: World Bank WDI Online

Urbanization: the urban population (% of total)

While an urban environment reflects many job opportunities and possibly changing family norms and patriarchal values, urbanization may have a curvilinear relationship with FLFP similar to that of GDP per capita. Urbanization often increases with industrialization so the three hypotheses discussed in GDP per capita are also competing here.

Coony finds mostly long run trends and remarks, "in the long run, urbanization is associated with increased female participation in the nonagricultural sector (359)." She emphasizes that these are only *long run* trends, "consistent association of greater

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urbanization with increased female participation is evident in only three countries [out of the US and 7 European countries studied] (359)."

Like GDP per capita, I expect to find a positive but weak correlation between urbanization and female labor force participation because I have employed a linear regression technique.

Chart 7: Analysis of Urbanization vs FLFP
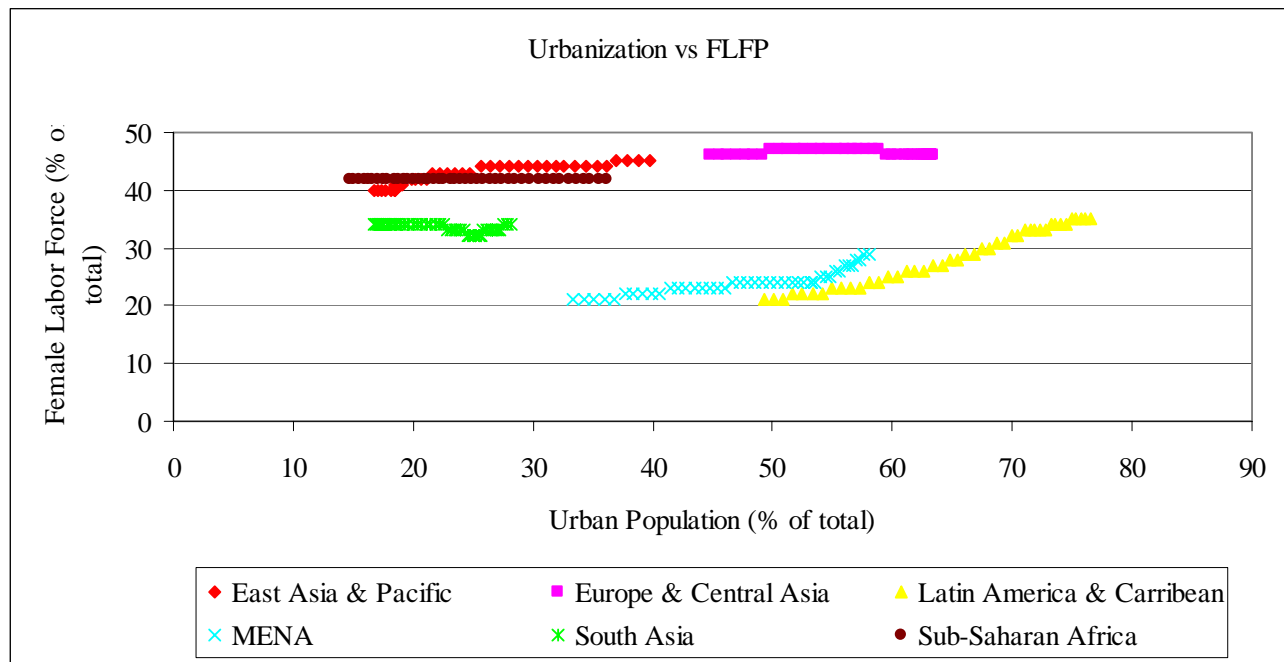
Source: World Bank WDI Online

Region: MENA dummy variable

The purpose of the MENA variable is to encompass the socio-cultural and other variables specific to the region that are not easily encompassed in hard statistics. Many researchers have suggested that traditional beliefs in MENA (primarily a result of the large Muslim population and orthodox Islamic practices observed in many regions) encourage a conservative role for women to work in the home raising children and carrying out domestic duties, rather than in the market. While female labor force participation has increased significantly in MENA in recent years, it is still significantly below that of other regions in the world. I expect to find that once GDP per capita, female illiteracy, fertility, and urbanization are taken into account, the countries in MENA will still have a lower FLFP than the other countries included in this analysis for two reasons.

I believe that socio-cultural factors and variables inherent to a region itself are very important in a woman's decision to work, especially in MENA. I believe that there are pressures not accounted for in the other variables encouraging a woman to stay out of the labor force. For this reason I expect to see a high negative correlation between this variable and FLFP.

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Notes on the Regression

For each year (1960, 1970, 1980, 1990, and 2000), my data included all countries with data available for that year via the 2002 World Development Indicators CD-rom for all of the independent variables, except for the extreme outliers in each year which are as follows:

- 1960: Oman and Saudi Arabia
- 1970: Oman, Saudi Arabia, and Kuwait
- 1980: Saudi Arabia, Kuwait, Bahrain, and the United Arab Emirates
- 1990: Saudi Arabia, Bahrain, and the United Arab Emirates
- 2000: Saudi Arabia

Also note that in the results summarized below I have included GDP per capita in 1995$ for the years 1960 and 1970 and GDP per capita at PPP for 1980, 1990, and 2000. Independently regressing both GDP per capita at PPP and at1995 $US, GDP per capita at PPP proved to be a slightly more statistically significant variable. However, GDP per capita at PPP statistics were available for few countries in the years 1960 and 1970. Using this variable would have significantly limited the number of observations for those years. In addition, female illiteracy for 1960 was excluded because this data was not available.

Results

The results of the regression are summarized below but are included in full in appendix 2.

Chart 8: Regression Summary

	1960		1970		1980		1990		2000	
Rsquare	0.3519		0.3773		0.3667		0.2566		0.2392	
Rsquare Adj	0.3231		0.3374		0.3285		0.2162		0.1988	
Prob>F	<.0001		<.0001		<.0001		<.0001		<.0001	
Sample Size	95		84		89		98		100	
Mean of Response	31.1863		33.426		35.16629		38.2235		39.576	
	Est.	prob>ltl	Est.	prob>ltl	Est.	prob>ltl	Est.	prob>ltl	Est.	prob>ltl
GDP per capita	0.0005	0.1489	0.0005	0.4267	0.0008	0.2196	0.0004	0.2380	-0.0001	0.5595
Adult Female Illiteracy			0.1445	0.0064	0.1374	0.0091	0.0228	0.6437	0.0307	0.4702
Urban population %	-0.3247	<.0001	-0.2332	0.0016	-0.1812	0.0047	-0.1291	0.0344	-0.0724	0.1079
Fertility Rate	-1.1740	0.1738	-1.9550	0.0598	-1.1514	0.1085	0.0041	0.9963	-0.8410	0.2339
MENA	3.3470	0.1650	4.8670	0.0321	6.0858	0.0005	6.2796	0.0002	5.7820	<.0001

From these regressions I found that GDP was indeterminate and never statistically significant (with a probability >ltl less than .05). Contrary to my hypothesis female illiteracy had a positive correlation and this correlation was statistically significant in the 1970 and 1980 regressions. Also contrary to my hypothesis, the urban population percentage was negatively correlated to FLFP and this result was statistically significant in four of the five regression years. As expected, fertility displays a negative correlation with FLFP, although this result is not highly statistically significant. Finally, the non-MENA dummy variable is positively correlated as expected.

Looking at the adjusted r-squared (which takes into account the sample size and the number of independent variables) this study found that the 5 variables considered account for between 23% and 38% of the variation in the female labor force as a percentage of the total labor force, and that over time the amount of variation the variables account for decreases.

There are a few key conclusions to be drawn from this analysis. First, the MENA dummy variable has become increasingly important over time and in fact is the only statistically significant variable in the year 2000 regression. This suggests that something about the region itself best explains MENA's low female labor force participation (FLFP) rate. In fact, a regression analysis of GDP per capita, female illiteracy rates, urbanization, and fertility of the constituent countries would predict a much higher FLFP rate than is actually the case.

As a result of the strong effect of the MENA variable, I created a second model using all of the variables included in the first model plus five more "dummy" regional variables: East Asia and the Pacific, Europe and Central Asia, Latin America and the Caribbean, South Asia, and Sub-Saharan Africa. The results of these regressions are included in appendix 3. Interestingly, incorporating binary variables for other regions, I found that over the five regressions, only Europe and Central Asia had a more significant effect on FLFP than MENA. It is also interesting to note that there were no statistically significant non-regional variables in the year 1990 and year 2000 regressions.

Following these conclusions one must ask, what is it about the MENA region in particular that precipitates such a low female labor force participation rate? If the supply and demand factors previously examined do not provide a satisfactory explanation, are the low FLFP rates a result of demographic or socio-cultural factors?

Sources of Error in the Regression

Curvilinear relationships between FLFP and GDP per capita, Education, and Urbanization

See analysis of variables above and bivariate second degree polynomial fits below.

Education

The fact that education may have a curvilinear relationship with FLFP may be a source of error in my regression for two reasons: first, my regression was linear; and second, female illiteracy may not be a good indicator of the relationship between FLFP and female educational achievement. Illiteracy itself is a binary variable: a person either meets the definition of illiteracy or he/she does not; this factor does not account for the vicissitudes of educational attainment levels that may play a role in FLFP.

To demonstrate the curvilinear relationship between female education and FLFP, a better method would have been to use several educational variables to measures variations and

dimensions of educational achievement. For example, one could include the percentage of females who are illiterate, the percentage of females who completed primary school, the percentage of females who completed secondary school, and the percentage of females that completed university or a post-secondary school. Unfortunately, data on the levels of educational attainment is only available for a very limited number of countries, especially prior to the 1990s.

Data Measurement Issues and Errors

Many studies have suggested that official labor force participation statistics underestimate the actual labor contribution of women especially in developing countries and especially in data collected prior to 1982 (when the ILO established a standard definition of the economically active population). Sources of error exist in consensus and in understanding by the respondent or interviewer on the definition of labor force activities and in fieldwork/data collection methods. Studies on data collection have found that the questionnaire design, sex of the respondent, and gender of the interviewer can have also a significant impact on the results (Anker 1983).

Independent Variables

Returning to Shah and Sulayman's model, the independent variables used in the regression (without the addition of other regional variables) do not account any socio-cultural factors or political-legal factors (such as status considerations, cultural acceptance of female labor, or household structure) except for the all encompassing MENA variable. Also, while my analysis takes into account labor demand through GDP, it ignores several other dimensions of demand such as wage and sex discrimination regulations or the size of the informal sector. Nor does it take into account the effect of migration, which may be particularly important in MENA where migratory workers played a significant role in the labor force of oil exporting countries in the 1970s and 1980s.

Bivariate Second Degree Polynomial Analysis

To further analyze whether or not there is a curvilinear relationship between any of the independent variables and FLFP, I compared the linear and 2nd degree polynomial fits of GDP per capita, illiteracy, urban population percentage, and fertility with FLFP for the year 1960, 1970, 1980, 1990, and 2000. The results are attached in appendix 4 and a summary of the results are included below.

Chart 9: <u>Summary of 2nd Degree Polynomial Bivariate Analysis</u>

	Linear Fit				Polynomial Fit Degree = 2				
	Rsquare	Rsquare Adj	Model Effectiveness (prob>F)	T Ratio Significance Probabliity (prob >ltl)	Rsquare	Rsquare Adj	Model Effectiveness (prob>F)	T Ratio Significance Probabliity (prob >ltl) Variable	T Ratio Significance Probabliity (prob >ltl) Variable^2
1960									
GDP per capita (1995$)	0.0178	0.0074	0.1943	0.1943	0.05314	0.031	0.0862	0.0272	0.0732
Urban population %	0.2582	0.2513	<.0001	<.0001	0.4264	0.414	<.0001	<.0001	<.0001
Fertility	0.0157	0.0051	0.2265	0.2265	0.0175	-0.0038	0.4432	0.2355	0.6782
1970									
GDP per capita (1995$)	0.0729	0.0816	0.013	0.013	0.209	0.1894	<.0001	<.0001	0.0004
Illiteracy	0.1735	0.1634	<.0001	<.0001	0.2368	0.218	<.0001	<.0001	0.0113
Urban population %	0.2685	0.2596	<.0001	<.0001	0.3915	0.3765	<.0001	<.0001	0.0001
Fertility	0.0612	0.0498	0.0233	0.0233	0.1237	0.102	0.0048	0.0012	0.0186
1980									
GDP per capita (PPP)	0.0751	0.0644	0.0094	0.0094	0.2268	0.2088	<.0001	<.0001	<.0001
Illiteracy	0.0505	0.0404	0.0277	0.0277	0.0998	0.0804	0.0075	0.1403	0.0264
Urban population %	0.1677	0.1588	<.0001	<.0001	0.2616	0.2457	<.0001	<.0001	0.0009
Fertility	0.0075	-0.003	0.4005	0.4005	0.0113	-0.0099	0.5885	0.3839	0.5511
1990									
GDP per capita (PPP)	0.0062	-0.0041	0.4392	0.4392	0.0473	0.0267	0.103	0.0418	0.0474
Illiteracy	0.0008	-0.008	0.7623	0.7623	0.075	0.059	0.0122	0.158	0.0032
Urban population %	0.0993	0.0914	0.0008	0.0008	0.144	0.1289	0.0002	<.0001	0.0166
Fertility	0.0029	-0.0058	0.5856	0.5856	0.1018	0.0859	0.0023	0.8437	0.0006
2000									
GDP per capita (PPP)	0.0179	0.0078	0.1851	0.1851	0.0612	0.0418	0.0468	0.0137	0.0369
Illiteracy	0.0005	-0.0084	0.8107	0.8107	0.0599	0.043	0.0324	0.1091	0.0093
Urban population %	0.0906	0.0825	0.0011	0.0011	0.1091	0.093	0.0016	0.0006	0.1321
Fertility	0.0067	-0.0022	0.3881	0.3881	0.1962	0.1817	<.0001	0.3067	<.0001

These results show that a second degree polynomial fit improved the r-squared (and adjusted r-squared) and the model effectiveness (probability > F) for GDP per capita and urbanization. In terms of percentage increase in adjusted r-squared and model effectiveness when using a second degree polynomial model rather than a linear model, the curvilinear model was most effective in strengthening GDP per capita fit. It improved both measures of effectiveness and adjusted r-squared in every year analyzed except for 1990. For the urbanization and FLFP model, the polynomial model increased adjusted r-squared and model effectiveness for each of the 5 years tested. The results for illiteracy are inconclusive because the curvilinear model strengthened the fit between FLFP and female illiteracy rate for the years 1970 and 1980, but for the years 1990 and 2000 the second degree polynomial fit decreased the adjusted r-squared while strengthening the model effectiveness variable. Results for fertility do not provide evidence of a curvilinear relationship between fertility and FLFP. For the five years analyzed, the polynomial fit did not strengthen or weaken the bivariate model in any consistent pattern.

These results lend support for a u-curve model between FLFP and GDP per capita, and between FLFP and urbanization.

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Part 3: A Case Study: Female Labor Force Participation in Egypt and Indonesia

Several researchers have attributed the low FLFP in MENA to cultural and religious explanations, specifically the large Muslim population in many MENA countries. I use Egypt and Indonesia as a case study to analyze demographic and socio-cultural factors on female labor force participation because while the vast majority of both populations are Muslim, their FLFP rates differ significantly. In Egypt, 94% of the population is Muslim (mostly Sunni) and in Indonesia 88% of the population is Muslim (World Fact Book). However, despite this similarity, female labor force participation rates in Indonesia have been higher than FLFP rates in Egypt since the 1960s and the difference between the two countries' FLFP rates grew significantly between 1970 and the early 1990s (see Graph 1).

While the previous regression looked only at several supply and demand factors, this regression not only examines GDP/capita, fertility rates, female illiteracy rates, unemployment rates, urbanization, and employment by sector, but also turns to labor laws, social policy, and cultural factors in search of an explanation of the differences in female labor force participation rates in Egypt and Indonesia.

Egypt

Since the early 1990s several gender indicators in Egypt have improved: between 1993 and 2002 female literacy rates increased from 34% to 54% and girls' share in primary school enrollment increased from 46.6% to 48.6%. However, there is still considerable inequality: female labor force participation is significantly lower than that of men and female unemployment rates are approximately three times those of men (World Bank Country Brief: Egypt 2).

Indonesia

Indonesia makes a good comparison to Egypt because despite the large Muslim population "Indonesian women enjoy higher labour force participation than their counterparts in many other Muslim countries, although the rates are still lower than those in some other parts of Southeast Asia" (Wodarti 94). It is also an interesting comparison because it is an example of a newly industrializing economy where female paid labor force participation has been expanding rapidly and has included "a fairly explicit principle of shared growth 'that makes efficient use of labor and [has] invested in the human capital of the poor.'"[2]

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[2]Gallaway 520. Referenced from World Bank 1990, 51.

Data Analysis: Supply and Demand Factors

Graph 1

Female Labor Force (% of total labor force)
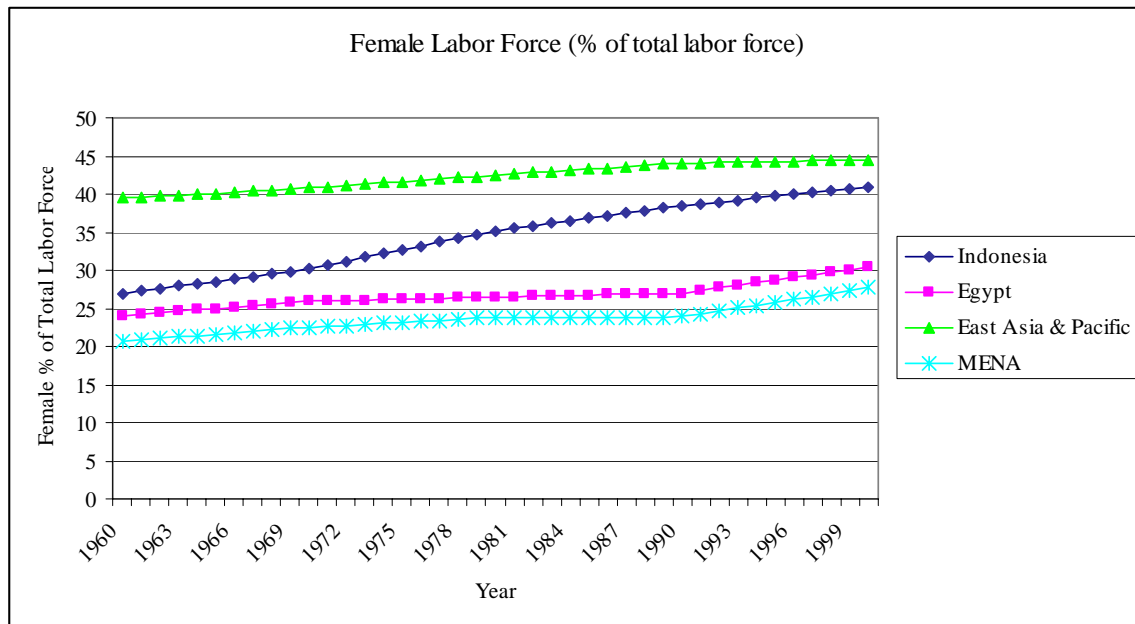
Key Insights: Indonesia's female labor force (as a percentage of the total labor force) has traditionally been higher than Egypt's female labor force percentage. In the past 30 years this difference has increased. However, Indonesia's female labor force percentage is still lower than that of the rest of East Asia and the Pacific, but this discrepancy has decreased significantly since the 1960s.

Graph 2

GDP per Capita at PPP (current international $)
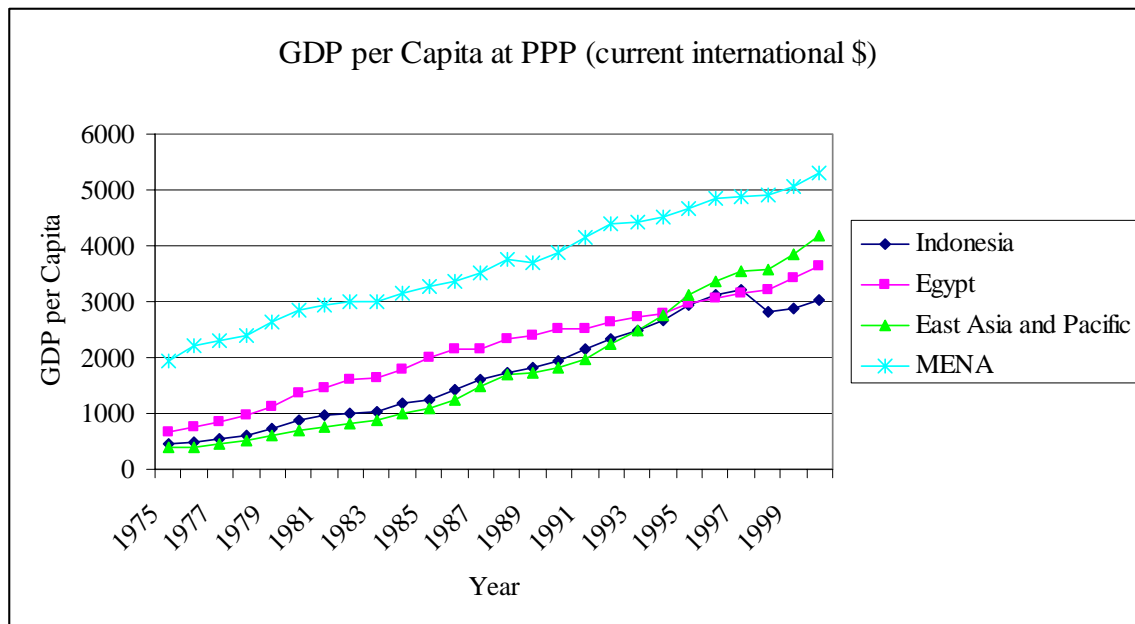
Key Insights: GDP per capita in Egypt is higher than that of Indonesia, with Indonesia's GDP growing slightly faster than Egypt's in the late 1980s and first part of the 1990s.

Graph 3
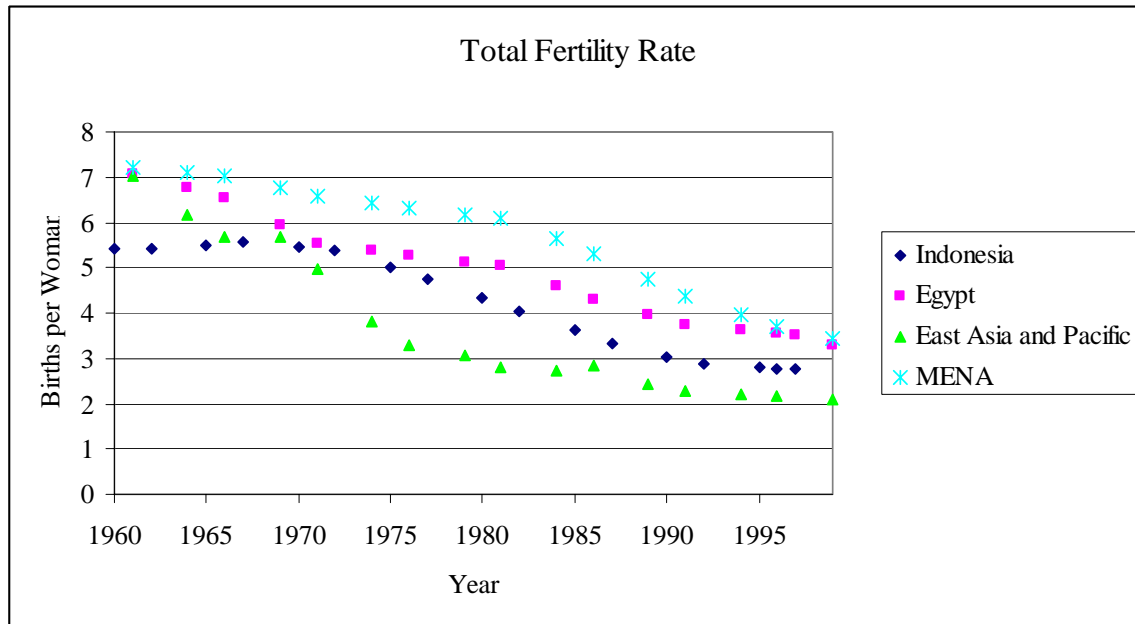
Key Insights: Egypt's fertility rate is slightly higher than that of Indonesia, but it appears that they have followed a similar patter of demographic transition since the late 1960s.

Graph 4
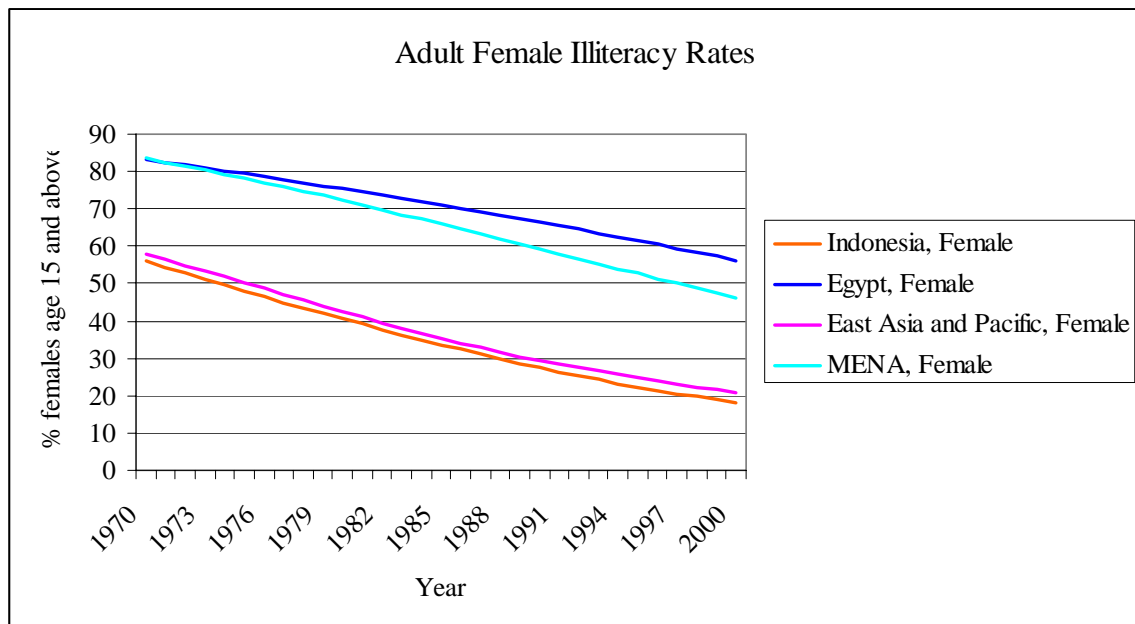
Key Insights: Female illiteracy rates in Indonesia and Egypt have held close to their regions' averages over the past 30 years. While female illiteracy rates in both countries

have decreased significantly since 1970, in both countries female illiteracy rates remain much higher in Egypt than in Indonesia.

Graph 5
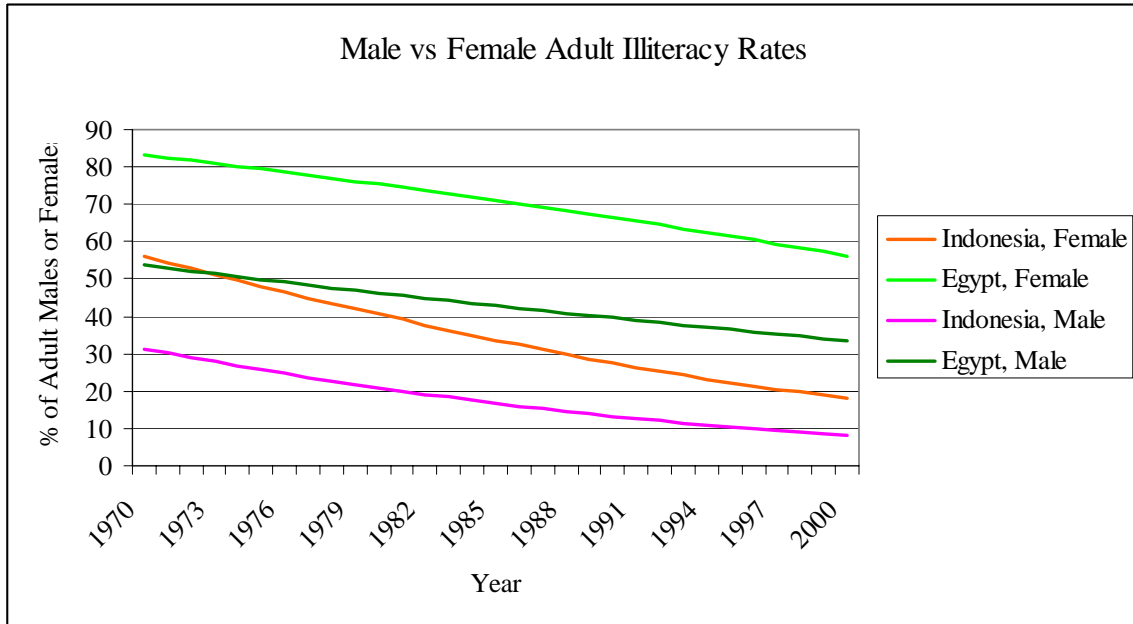
Key Insights: Male illiteracy rates are lower than female illiteracy rates in both Egypt and Indonesia. However, the difference between male and female illiteracy rates is much smaller in Indonesia than in Egypt.

Graph 6
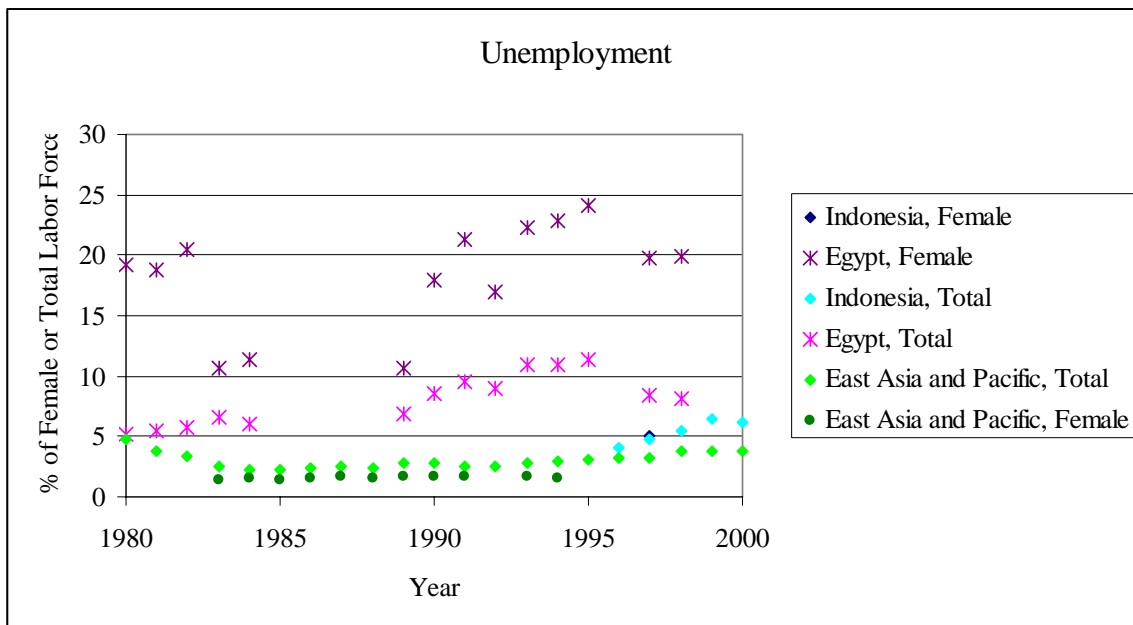
Key Insights: Female unemployment in Egypt is significantly higher than total unemployment and significantly higher than Indonesian female unemployment. Unemployment rates of Females in East Asia and the Pacific are slightly lower than total unemployment rates in the region. Note: there are many pieces of data missing for this chart (especially from total Indonesia unemployment) so I have used total unemployment statistics for the entire East Asia and Pacific region as a proxy, but I do acknowledge that unemployment rates can vary significantly among regions.

Graph 7
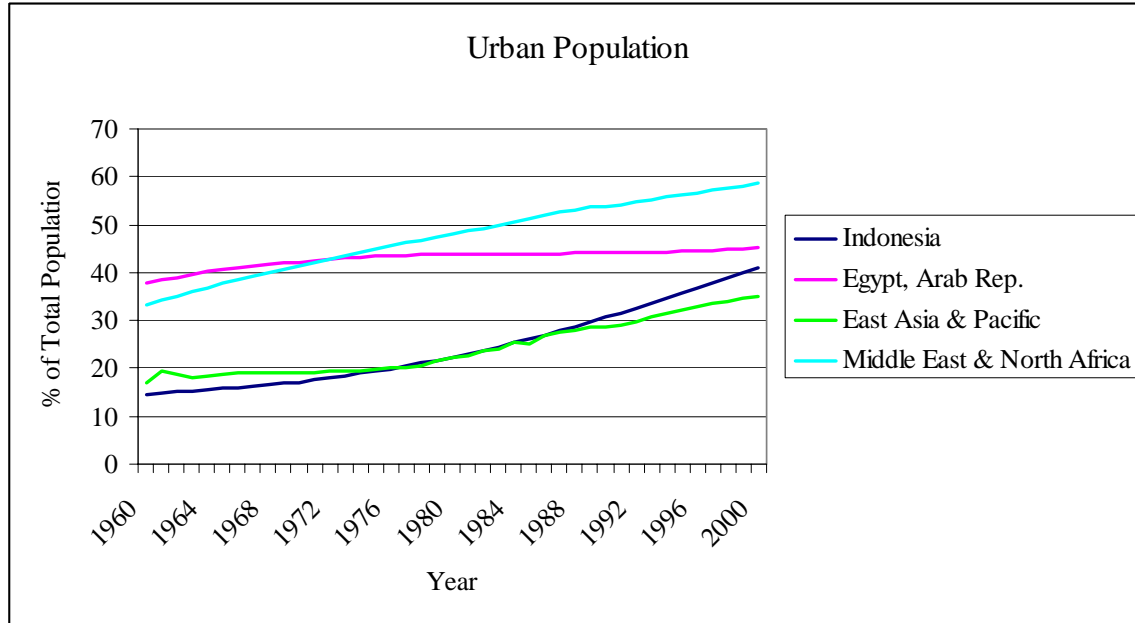
Key Insights: Until the late 1990's Egypt and the Middle East were much more urbanized than Indonesia and East Asia and the Pacific. However, since the early 1970s, urbanization in Indonesia has increased rapidly, while urban population growth in Egypt has nearly stagnated.

Graph 8

Agricultural Employment
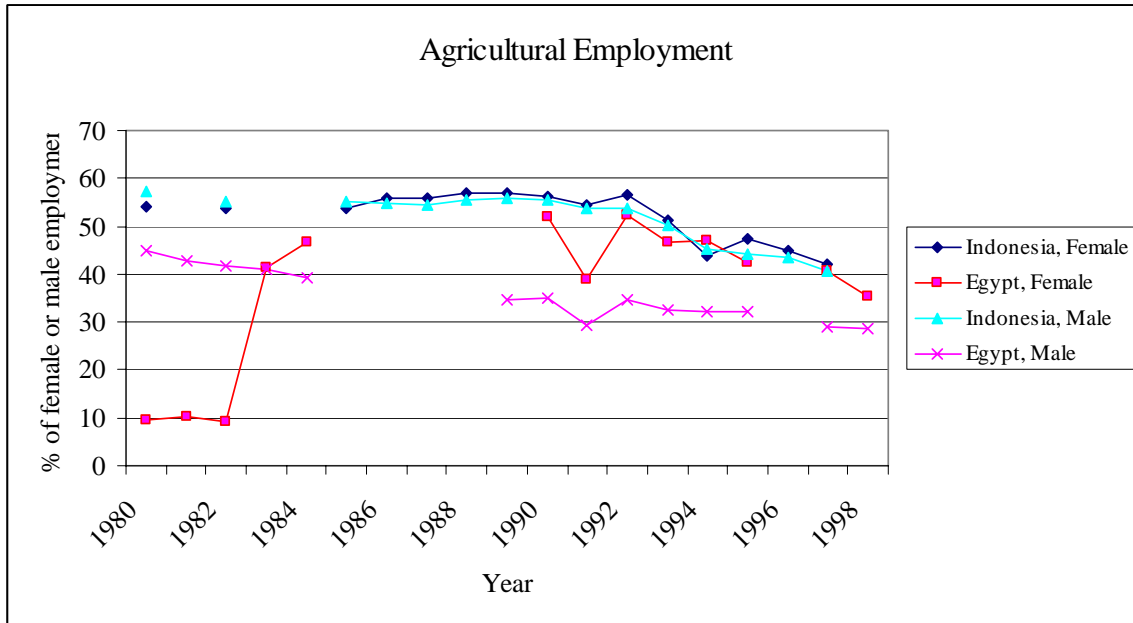
Key Insights: Agriculture has traditionally been a key source of both male and female employment in Indonesia (presumably largely in rice production) with both women and men participating evenly (as a percentage of total employment for each group). In contrast, the percentage of women employed in agriculture in Egypt drastically increased between 1982 and1983.

Graph 9

Employment in Industry
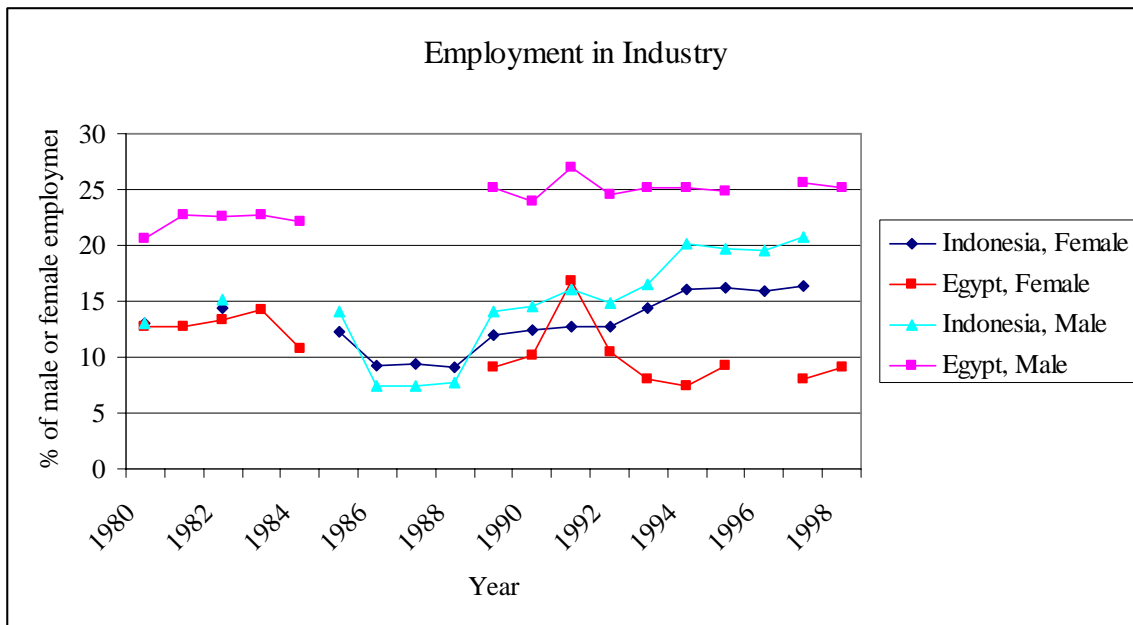
Key Insights: Industry constitutes a lower percentage of total employment in Indonesia than in Egypt. Industry's percentage of total employment is approximately even for

woman and men in Indonesia, while in Egypt industry is a much smaller percentage of total employment for women than for men.

Graph 10
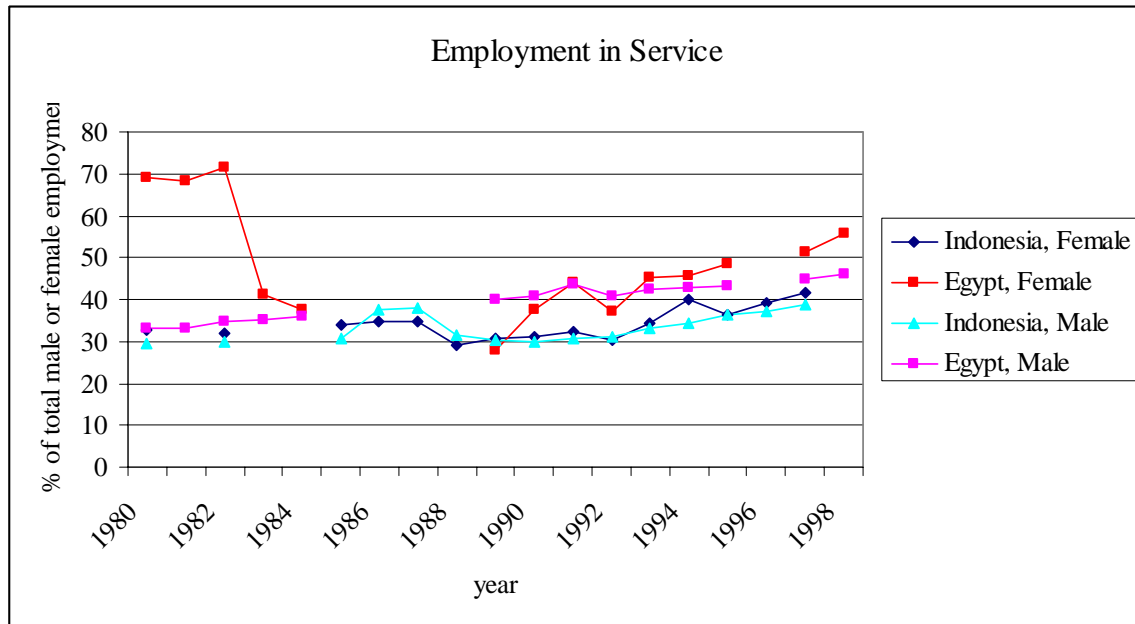
Key Insights: After 1984 the percentage of total employment in services is nearly even for men and women in both countries. Services provide a slightly higher percentage of employment in Egypt than in Indonesia. Between 1982 and 1983 there was a drastic shift in Egyptian female employment from services to agriculture.

Takeaways

From this analysis it appears that the main structural differences/trends between/in Egypt and Indonesia are a very high female unemployment rate in Egypt, comparatively higher female illiteracy rates in Egypt and MENA, a larger female-male illiteracy rate discrepancy in Egypt than in Indonesia, and a decreasing urbanization gap between Egypt and Indonesia. If female literacy can be shown to be highly correlated with FLFP, independent of other barriers to FLFP, then the solution to the low FLFP rates is simply to increase access to education for women. However, in addition to any cultural or socio-political factors it appears that the striking trend of higher unemployment rates in Egypt both for woman and overall is a significant inhibiting factor. This observation leads one to question to what extent low demand for workers (in combination some with socio-cultural factors) is the primary factor keeping woman out of the labor force in Egypt.

Regression Analysis

Note: Two regressions have been performed for each country due to the limited number of observations when including more independent variables.

Egypt

1) Y=FLFP, X1= GDP per capita (1995$), X2=urban pop %, X3=Year
Results: Taking year into account, neither GDP/capita nor urban population % is statistically significant.

Summary of Fit

RSquare	0.903102
RSquare Adj	0.895246
Root Mean Square Error	0.498071
Mean of Response	26.67683
Observations (or Sum Wgts)	41

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	3	85.547706	28.5159	114.9486
Error	37	9.178782	0.2481	Prob > F
C. Total	40	94.726488		<.0001

Parameter Estimates

Term	Estimate	Std Error	T Ratio	Prob>|t|
Intercept	-372.3703	123.0276	-3.03	0.0045
GDP per cap 1995$	-0.002979	0.002351	-1.27	0.2131
Urb pop%	-0.133852	0.129014	-1.04	0.3062
Year	0.2055392	0.065215	3.15	0.0032

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
GDP per cap 1995$	1	1	0.3981214	1.6048	0.2131
Urb pop%	1	1	0.2670302	1.0764	0.3062
Year	1	1	2.4641876	9.9332	0.0032

2) Y=FLFP, X1= GDP per capita (1995$), X2=urban pop %, X3=Year, X4=Adult Female Illiteracy Rate
Results: All independent variables are statistically significant except for GDP/capita.

Summary of Fit

RSquare	0.993303
RSquare Adj	0.992273
Root Mean Square Error	0.114349
Mean of Response	27.24677
Observations (or Sum Wgts)	31

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	4	50.426708	12.6067	964.1256
Error	26	0.339970	0.0131	Prob > F
C. Total	30	50.766677		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	2357.1947	119.2168	19.77	<.0001
GDP per cap 1995$	-0.000516	0.000633	-0.82	0.4221
Urb pop%	0.8384107	0.094717	8.85	<.0001
Year	-1.14363	0.058931	-19.41	<.0001
Adult Female Illiteracy Rate	-1.36424	0.056147	-24.30	<.0001

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
GDP per cap 1995$	1	1	0.0087002	0.6654	0.4221
Urb pop%	1	1	1.0245200	78.3526	<.0001
Year	1	1	4.9243297	376.5998	<.0001
Adult Female Illiteracy Rate	1	1	7.7196789	590.3808	<.0001

Indonesia

1) Y=FLFP, X1= GDP per capita (1995$), X2=urban pop %, X3=Year

Results: Both year and urban population % are statistically significant.

Summary of Fit

RSquare	0.995501
RSquare Adj	0.995136
Root Mean Square Error	0.312332
Mean of Response	34.42927
Observations (or Sum Wgts)	41

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	3	798.62848	266.209	2728.921
Error	37	3.60939	0.098	Prob > F
C. Total	40	802.23788		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-967.9458	36.9837	-26.17	<.0001
Year	0.509054	0.019011	26.78	<.0001
Urb pop%	-0.266646	0.043976	-6.06	<.0001
GDP per cap 1995$	0.0017074	0.001001	1.71	0.0965

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
Year	1	1	69.942263	716.9802	<.0001
Urb pop%	1	1	3.586489	36.7652	<.0001
GDP per cap 1995$	1	1	0.283800	2.9092	0.0965

2) Y=FLFP, X1= GDP per capita (1995$), X2=urban pop %, X3=Year, X4=Adult Female Illiteracy Rate

Results: Year and urban population % are statistically significant.

Summary of Fit

RSquare	0.999867
RSquare Adj	0.999847
Root Mean Square Error	0.039801
Mean of Response	36.37903
Observations (or Sum Wgts)	31

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	4	310.03168	77.5079	48927.85
Error	26	0.04119	0.0016	Prob > F
C. Total	30	310.07287		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-1403.411	145.6701	-9.63	<.0001

Term	Estimate	Std Error	t Ratio	Prob>|t|
Year	0.7322023	0.073328	9.99	<.0001
GDP per cap 1995$	0.000117	0.000146	0.80	0.4291
Adult Female Illiteracy Rate	-0.008482	0.033502	-0.25	0.8021
Urb pop%	-0.492938	0.040367	-12.21	<.0001

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
Year	1	1	0.15794912	99.7074	<.0001
GDP per cap 1995$	1	1	0.00102216	0.6452	0.4291
Adult Female Illiteracy Rate	1	1	0.00010153	0.0641	0.8021
Urb pop%	1	1	0.23622474	149.1198	<.0001

Note: While my data did not show a strong relationship between FLFP in Indonesia and female literacy, a study by Gallaway et. al on the relationship of occupational segregation, literacy, and gender in Indonesia found that "literacy is correlated with employment in certain occupations." The study also found that women tend to be under-represented in those occupations that are associated with high literacy and over-represented in occupations that are least correlated with literacy. These researchers also found literacy "to have an effect that is separate from occupational segregation, removing the barrier of illiteracy will improve labor market outcomes for women."

Takeaways

In Egypt, high female illiteracy as compared to males in the region may be one cause of the low FLFP. However, this factor does not provide a completely satisfactory explanation, pointing the analysis to research cultural and socio-political factors. In Indonesia, FLFP appears to be tied to urbanization and illiteracy (as described in Gallaway, 2004).

Data Source: All statistics are taken from the 2002 World Development Indicators CD-ROM.

Culture, Social Policies, and Labor Legislation

Several researchers have argued that state policies, social policies, labor legislation, and urban infrastructure can be important in explaining the FLFP and a woman's access to paid work (Moghadam 36). Moghadam argues that woman in MENA face several constraints in their ability to participate in the paid labor force. These factors include several causes included in the previous study such as declining but still high fertility rates, high illiteracy, inferior education and training of women for modern-sector jobs, large educational gaps between men and women, high unemployment of men, and economic stagnation, but also:

- Perception of women as less reliable workers
- Tendency to regard men as the real breadwinners and women as secondary earners
- Labor legislation: provisions prohibiting night work for women or requiring maternity leaves paid for by the employer

- Inequality of social insurance provisions such as retirement benefits and health insurance coverage
- Family laws: may discriminate against a woman's right to inheritance, travel, and employment
- Inadequate social policies to help women balance wage work and family responsibilities

(Moghadam 40)

This section attempts to identify some of the key differences in these areas that may explain the difference in FLFP rates between Egypt and Indonesia.

<u>Shari'ah: Islamic Family Law</u>

The Shari'ah regulates a Muslim's relationship with the state and within society, and, unlike western law it delineates a code of ethical behavior of praiseworthy and non-praiseworthy acts. Islamic family law governs issues such as divorce, polygamy, a woman's consent in marriage, and custody of children. It gives women the right to hold property in her own right, but in many societies it is interpreted to restrict the rights of women in other areas. There is no all-inclusive description of the lives of Islamic woman as guided by the values of the Shari'ah. The rules are laid out in the Shari'ah laws, but the principles are not applied everywhere in the same manner. The laws are frequently different between Muslim societies because of discrepancies in theological, legal, and customary practices. For example, "some [women] wear concealing clothing in public, most do not; for some, movement outside the home is restricted, for most not…for many, the private home and the public bath continue to be the centre of social interaction; for others, the world of employment and city life is an option" (Encyclopedia Britannica: Islamic World). While the laws frequently differ between societies, they have rarely been modified to fit changes of modern society because Muslims believe these laws are imposed on society from above and should not be adjusted.

Egypt

In Egypt, personal status laws are based primarily on Islamic law (Shari'ah), which is in contrast to the rest of the legal system based on French Civil law. While woman have equality under article 40 of Egypt's constitution, gender inequality persists due to other laws that violate these guarantees. For example, article 4 of ministerial decree No. 864 (1974) states that "an Egyptian woman may not be issued a passport without the prior written consent of her husband or his legal representative. The law also allows the husband to reverse this consent at any time" (Moghadam 40). This law enables the husband to prevent his wife from traveling, which may make paid employment or self-employment difficult. There was a recent proposal to change this law, but the provision was later dropped as a concession to conservatives. In addition to travel restrictions, studies have found that women struggle to own and operate businesses because of the reluctance of banks to lend to women and because training programs tend to be limited to

traditional types of self-employment such as garment-making or carpet-weaving (Moghadam 41).

It has been suggested that a strong patriarchal system took hold in the Middle East when oil prices were high[3]: "during the oil boom…the patriarchal gender contract was made possible and indeed financed by the regional oil economy, the wealth of the oil-producing states, and the high wages that obtained during the oil era" (Moghadam 37) The economy was so strong that woman did not need to work and traditional gender roles could be supported. While this is probably truer of the oil producing states than of Egypt, high oil prices improved prosperity in the region as a whole as well as the individual oil producing countries.

Indonesia

Islamic law has been interpreted less strictly in most areas of Indonesia than in Egypt because of the diversity of cultural influences in Indonesia throughout its history and out of the need for survival. Islamic beliefs in Indonesia have been strongly influenced by Hinduism, Buddhism, and older pagan and animistic beliefs as well as other Indian, East Asian, Arab, and European influences (Encyclopedia Britannica: Indonesia, People and Religion). In a comparative study of rice production in Java versus Bangladesh Hart describes the economic need for women's participation that established their place in the work force:

> The pressure to which Javanese peasant households were subject had profound effects on their productive and reproductive strategies. In particular, the deployment of female and child labor to the direct production of subsistence became critical to the household's capacity to survive. …while the practice of Islam is more orthodox in Bangladesh than in Java, the differing patterns of female labor deployment in the two countries thus have well-defined material bases. Sustained poverty of a large portion of the rural population has perpetuated these patterns.[4]

Historically, the comparative prosperity of the Bangladeshi peasantry helped underwrite the system of patriarchy, whereas the Javanese simply could not afford the same degree of male dominance. In this case, the need for sustenance weakened the inhibitive power of Muslim beliefs on FLFP. This is probably one of the most critical differences between Egypt and Indonesia.

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[3] The patriarchal gender contract is defined as "as a set of relationships between men and women predicated upon the male breadwinner/female homemaker roles, in which the male has direct access to wage employment or control over the means of production, and the female is largely economically dependent upon male members of her family." (Moghadam 37.)

[4] Hart 1983, 1040. Referenced from White 1974, White 1976 and Hart 1978.

Labor Legislation

Selections from Egypt's labor laws are outlined in appendix 5. In Egypt, non-agricultural female employees are granted generous maternity leave benefits. Public-sector female employees receive three months of paid leave and up to two years of unpaid leave without a loss of seniority. Non-agricultural female employees are entitled to fifty days of paid leave and up to one year of unpaid leave for up to 3 childbirths throughout her employment. In addition, employers must allow nursing breaks and must provide nursery facilities if the firm employs over one hundred women. As one would expect most women take full advantage of these rights even though employers are opposed to these leaves. A 1995 government study found: "...there seems to be implicit discrimination against female employment, especially in the private sector, mainly because of women's work discontinuity due to child-bearing and rearing" (Moghadam 111). Anti-discrimination laws do exists, but they apparently are not enforced and employers are able to implicitly discriminate against woman who they view as "expensive labor" by practices such as deliberately hiring fewer than 100 women.

As of 1998, the labor laws were being reviewed for revision so that public sector benefits would be more in line with private sector benefits. While these revisions include a reduction of maternity benefits of woman employed in the public sector, they may benefit women by helping to get rid of the perception of woman (especially working mothers) as uncommitted workers, while maintaining some social rights to maternity leave and childcare (Moghadam 43).

A Measurement Issue?

Research by Anker et. al has found that FLFP data is often underestimated, especially in developing countries. A report specifically of FLFP data in Egypt found that national labor force data from decennial population census often under reported female labor force participation when the interviews used key phrases such as "main occupation", "economic activity", "work," and "job" without clarifying definitions or probing questions. Anker found that FLFP data from pre-1983 labor force surveys was under reported FLP especially in agriculture and occupations where informal, family-based activities were common. Data collection methods from the time of this study have improved significantly and these improved data collection methods primarily find increases in FLFP in part time agricultural employment. Therefore, while data collection may be a source of error in statistics, FLFP rates overall and especially in full-time paid employment remain much lower than that of men in Egypt.

Conclusions

Lower female labor force participation rates in Egypt can be attributed to:

- A patriarchal gender contract enabled by the oil boom, relative economic prosperity, and more Orthodox Islamic interpretations in Egypt and the Middle East

- Post oil-boom decline in wages causing men to take on second and third jobs in the private sector and informal economy, crowding women out of the labor force
- Low productivity and labor market inefficiencies, high unemployment, rapid labor force growth, and poor economic growth
- High female illiteracy rates
- Lack of extensive training programs for women

Culture, labor laws, and social policy tell part of the story of a patriarchal gender contract in the Middle East causing low FLFP, but it is more than traditional Islamic beliefs that have led to low FLFP rates. It is the interaction of these beliefs with the oil dependent economies of the Middle East, and the country's historic and current economic and labor market situations.

Part 4: Conclusions and Implications for the Region

While analyzing the factors specific to the Middle East and North Africa that have led to its low FLFP rates in the past, I have also pointed out that female labor force participation rates are beginning to increase. While FLFP in MENA is still lower than that of any other region in the world, one must ask what is changing in MENA that is leading to increased FLFP rates and what is the role of woman in MENA's economic future?

A Changing Socio-cultural Environment

The regression analysis suggests that MENA's low level of FLFP is not a reflection of low GDP per capita, high illiteracy rates, or low levels of urbanization in the past. Rather is suggests that there are some other attributes of the region that have discouraged women to participate in the labor force. The case study of Egypt and Indonesia suggests that much of the low FLFP rates can be attributed to orthodox interpretations of the Qur'an regarding the role of women and a patriarchal gender contract. More than any other factor, it appears that a change in these socio-cultural norms is the most significant factor that is contributing to increased rates of labor force participation in MENA. While it is hard to observe this change through hard data because changes on this front are just beginning to be made, it can be observed through the growing number of groups formed to advocate the rights of women in the Arab and Muslim world or through debates on gender issues in MENA.[5] For example, in June of last year a "national dialogue" on the role of women took place in Saudi Arabia (probably the most Orthodox Islamic country) in which the participants considered issues such as whether or not woman should be allowed to drive cars or travel alone ("Leaders: their time has come"). While big issues that would demonstrate radical change, such as a woman's right to vote, are rarely brought up in national gender debates of the most conservative Muslim countries and despite the fact that many rights that would appear natural to western democratic nations are still being debated, the fact that intense debate is bubbling is an indicator of change.

Role of Women in MENA's Economic Future

There is widespread sentiment that countries in the Middle East and North Africa face significant challenges in creating a successful economic future. Researchers at the World Bank suggest that "the region's economic future lies in making productive use of [its] resources—human, financial, and physical" (Claiming the Future, V). They suggest that the approximately 80 million workers forecasted to join the labor force between 2000 and 2020 could be a demographic gift—that the low dependency ratio offers MENA the chance to increase its speed of economic growth through faster accumulation of factors of production. Could woman in fact the "most important untapped potential in the region" (CTF, World Bank) as some economists claim?

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[5] See http://www.islamfortoday.com/women.htm,
http://www.guardian.co.uk/Archive/Article/0,4273,4314573,00.html, or
http://www.themuslimwoman.com/herrights/womensrights.htm for a few examples.

While many studies have argued that FLFP has significantly augmented the economic growth a country, this is not likely to be the case in MENA, at least for now. For women to add to economic output and increase GDP growth there must be unsatisfied demand for labor and ways to productively put the labor to use. Currently, unemployment in MENA is high and total factor productivity is very low. This situation suggests that the economies in this region are not producing enough employment and labor opportunities to support the current labor force. Until demand for workers increases, it will hard by hard for woman to gain a strong foothold in the labor force, at least not without displacing their male counterparts.

Part 5: Appendices

Appendix 1: Data Sources and Definitions

Note: All data comes from the World Development Indicators Database. Definitions of key terms and WDI sources are listed below.

MENA: regional aggregate (does not include high-income economies).
The economies included are: Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Tunisia, United Arab Emirates, West Bank and Gaza, Yemen

East Asia and the Pacific: regional aggregate (does not include high-income economies).
The economies included are: American Samoa, Cambodia, China, Fiji, Indonesia, Kiribati, Korea, Dem. Rep., Lao PDR, Malaysia, Marshall Islands, Micronesia, Fed. Sts. Mongolia, Myanmar, Northern Mariana Islands, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Thailand, Timor-Leste, Tonga, Vanuatu, Vietnam

Fertility rate, total (births per woman)
Definition: Total fertility rate represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with prevailing age-specific fertility rates.
Source: World Bank staff estimates from various sources including census reports, the United Nations Statistics Division's Population and Vital Statistics Report, country statistical offices, and Demographic and Health Surveys from national sources and Macro International.

Illiteracy rate, adult female (% of females ages 15 and above)
Definition: Adult illiteracy rate is the percentage of people ages 15 and above who cannot, with understanding, read and write a short, simple statement on their everyday life.

Labor force, female (% of total labor force)
Definition: Female labor force as a percentage of the total shows the extent to which women are active in the labor force. Labor force comprises all people who meet the International Labour Organization's definition of the economically active population.
Source: International Labour Organization.

Unemployment, total (% of total labor force)
Definition: Unemployment refers to the share of the labor force that is without work but available for and seeking employment. Definitions of labor force and unemployment differ by country.
Source: International Labour Organization, Key Indicators of the Labour Market database.

Urban population (% of total)
Definition: Urban population is the share of the total population living in areas defined as urban in each country.
Source: United Nations, World Urbanization Prospects.

Appendix 2: Regression Analysis

1960

Whole Model

Actual by Predicted Plot

Predicted P<.0001 RSq=0.35
RMSE=9.0557
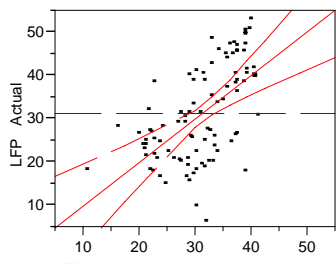
Summary of Fit

RSquare	0.351893
RSquare Adj	0.323088
Root Mean Square Error	9.05565
Mean of Response	31.18632
Observations (or Sum Wgts)	95

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	4	4007.240	1001.81	12.2165
Error	90	7380.433	82.00	Prob > F
C. Total	94	11387.672		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	45.208004	6.878488	6.57	<.0001
GDP per capita (constant 1995 US$)	0.0004586	0.000315	1.46	0.1489
Urban population (% of total)	-0.324679	0.050662	-6.41	<.0001
Fertility rate, total (births per woman	-1.174096	0.856442	-1.37	0.1738
MENA [0]	3.3467732	2.390897	1.40	0.1650

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
GDP per capita (constant 1995 US$)	1	1	173.8394	2.1199	0.1489
Urban population (% of total)	1	1	3368.0538	41.0714	<.0001
Fertility rate, total (births per woman	1	1	154.1169	1.8794	0.1738
MENA	1	1	160.6831	1.9594	0.1650

Residual by Predicted Plot

1970

Whole Model

Actual by Predicted Plot

Predicted P<.0001 RSq=0.38
RMSE=8.7107
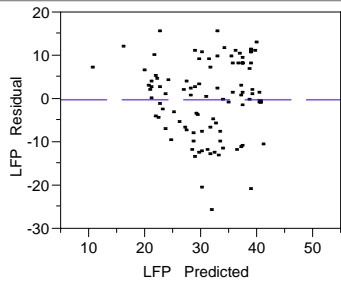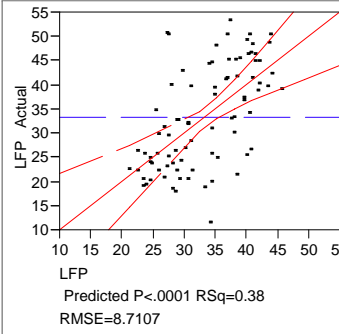
Summary of Fit

RSquare	0.377333
RSquare Adj	0.337418
Root Mean Square Error	8.710746
Mean of Response	33.42619
Observations (or Sum Wgts)	84

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	5	3586.5282	717.306	9.4535
Error	78	5918.4141	75.877	Prob > F
C. Total	83	9504.9424		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	39.903321	7.723427	5.17	<.0001
GDP per capita (constant 1995 US$)	0.0004797	0.0006	0.80	0.4267
Illiteracy rate, adult female (% of fem	0.1445396	0.05162	2.80	0.0064
Urban population (% of total)	-0.233174	0.071374	-3.27	0.0016
Fertility rate, total (births per woman	-1.954841	1.023292	-1.91	0.0598
MENA [0]	4.8670417	2.229812	2.18	0.0321

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
GDP per capita (constant 1995 US$)	1	1	48.44374	0.6384	0.4267
Illiteracy rate, adult female (% of fem	1	1	594.89818	7.8403	0.0064
Urban population (% of total)	1	1	809.81821	10.6728	0.0016
Fertility rate, total (births per woman	1	1	276.90741	3.6494	0.0598
MENA	1	1	361.49681	4.7642	0.0321

Residual by Predicted Plot

33

1980

Whole Model

Actual by Predicted Plot

Predicted P<.0001 RSq=0.37
RMSE=7.7722
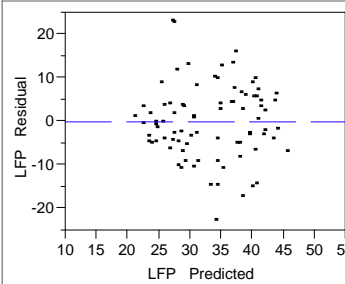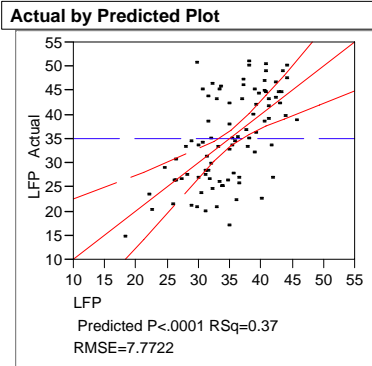
Summary of Fit

RSquare	0.366678
RSquare Adj	0.328526
Root Mean Square Error	7.772154
Mean of Response	35.16629
Observations (or Sum Wgts)	89

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	5	2902.8291	580.566	9.6110
Error	83	5013.7297	60.406	Prob > F
C. Total	88	7916.5589		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	34.92439	5.976931	5.84	<.0001
GDP per capita, PPP (current internatio	0.000768	0.000621	1.24	0.2196
Illiteracy rate, adult female (% of fem	0.1374242	0.051481	2.67	0.0091
Urban population (% of total)	-0.181239	0.062455	-2.90	0.0047
Fertility rate, total (births per woman	-1.151425	0.852612	-1.35	0.1805
MENA [0]	6.0858122	1.677863	3.63	0.0005

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
GDP per capita, PPP (current internatio	1	1	92.44099	1.5303	0.2196
Illiteracy rate, adult female (% of fem	1	1	430.44482	7.1258	0.0091
Urban population (% of total)	1	1	508.67971	8.4210	0.0047
Fertility rate, total (births per woman	1	1	110.16692	1.8238	0.1805
MENA	1	1	794.70708	13.1560	0.0005

Residual by Predicted Plot

1990

Whole Model

Actual by Predicted Plot

Predicted P<.0001 RSq=0.26
RMSE=7.5276
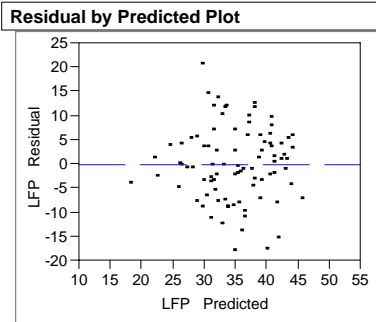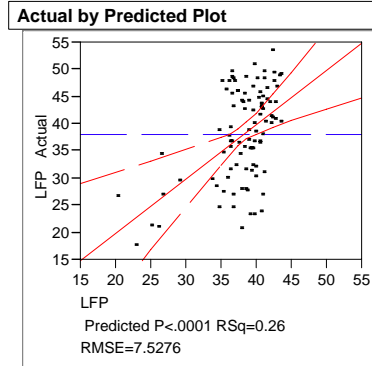
Summary of Fit

RSquare	0.256644
RSquare Adj	0.216244
Root Mean Square Error	7.527642
Mean of Response	38.22347
Observations (or Sum Wgts)	98

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	5	1799.8604	359.972	6.3526
Error	92	5213.2156	56.665	Prob > F
C. Total	97	7013.0760		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	36.290835	5.581316	6.50	<.0001
GDP per capita, PPP (current internatio	0.000382	0.000322	1.19	0.2380
Illiteracy rate, adult female (% of fem	0.0227888	0.049106	0.46	0.6437
Urban population (% of total)	-0.12908	0.060106	-2.15	0.0344
Fertility rate, total (births per woman	0.0041435	0.881586	0.00	0.9963
MENA [0]	6.2795935	1.617161	3.88	0.0002

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
GDP per capita, PPP (current internatio	1	1	79.94292	1.4108	0.2380
Illiteracy rate, adult female (% of fem	1	1	12.20378	0.2154	0.6437
Urban population (% of total)	1	1	261.34103	4.6120	0.0344
Fertility rate, total (births per woman	1	1	0.00125	0.0000	0.9963
MENA	1	1	854.42631	15.0785	0.0002

Residual by Predicted Plot

34

2000

Whole Model

Actual by Predicted Plot

Predicted P<.0001 RSq=0.24
RMSE=6.2755
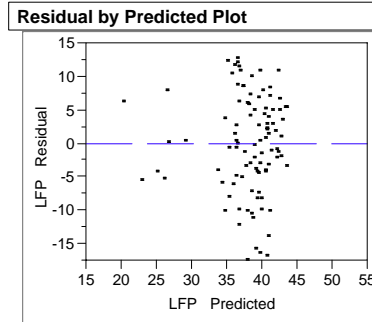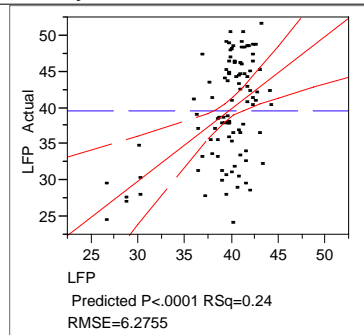
Summary of Fit

RSquare	0.239222
RSquare Adj	0.198755
Root Mean Square Error	6.275543
Mean of Response	39.576
Observations (or Sum Wgts)	100

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	5	1164.0529	232.811	5.9115
Error	94	3701.9495	39.382	Prob > F
C. Total	99	4866.0024		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	40.836907	3.832073	10.66	<.0001
GDP per capita, PPP (current internatio	-0.000089	0.000153	-0.59	0.5595
Illiteracy rate, adult female (% of fem	0.0306966	0.042338	0.73	0.4702
Urban population (% of total)	-0.072438	0.044628	-1.62	0.1079
Fertility rate, total (births per woman	-0.840951	0.701875	-1.20	0.2339
MENA [0]	5.7819666	1.326552	4.36	<.0001

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
GDP per capita, PPP (current internatio	1	1	13.51042	0.3431	0.5595
Illiteracy rate, adult female (% of fem	1	1	20.70257	0.5257	0.4702
Urban population (% of total)	1	1	103.75929	2.6347	0.1079
Fertility rate, total (births per woman	1	1	56.53587	1.4356	0.2339
MENA	1	1	748.17807	18.9978	<.0001

Residual by Predicted Plot
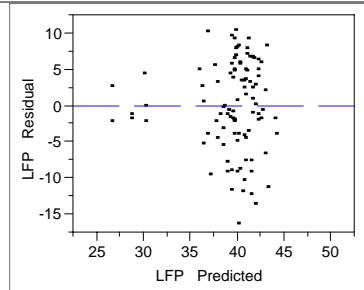
Appendix 3: Regression Analysis Using several binomial country variables

1960

Actual by Predicted Plot

Predicted P<.0001 RSq=0.55
RMSE=7.7556
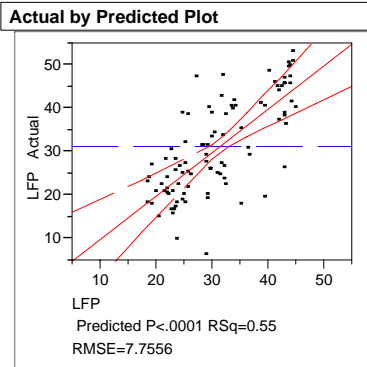
Summary of Fit

RSquare	0.551038
RSquare Adj	0.503501
Root Mean Square Error	7.755552
Mean of Response	31.18632
Observations (or Sum Wgts)	95

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	9	6275.042	697.227	11.5917
Error	85	5112.630	60.149	Prob > F
C. Total	94	11387.672		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	39.014171	9.948094	3.92	0.0002
GDP per capita (constant 1995 US$)	0.0002604	0.000295	0.88	0.3793
Urban population (% of total)	-0.189965	0.055956	-3.39	0.0010
Fertility rate, total (births per woman	-0.779961	0.878281	-0.89	0.3770
MENA [0]	3.3231372	2.628025	1.26	0.2095
EA&P [0]	0.988464	2.143603	0.46	0.6459
Eur and Cent Asia [0]	-1.75497	4.222831	-0.42	0.6788
LA & Carr [0]	3.0208556	1.631643	1.85	0.0676
S. Asia [0]	1.1335455	2.516837	0.45	0.6536
SSA [0]	-4.461207	1.99286	-2.24	0.0278

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
GDP per capita (constant 1995 US$)	1	1	46.97193	0.7809	0.3793
Urban population (% of total)	1	1	693.22332	11.5252	0.0010
Fertility rate, total (births per woman	1	1	47.43559	0.7886	0.3770
MENA	1	1	96.17518	1.5990	0.2095
EA&P	1	1	12.78964	0.2126	0.6459
Eur and Cent Asia	1	1	10.38862	0.1727	0.6788
LA & Carr	1	1	206.17465	3.4278	0.0676
S. Asia	1	1	12.20094	0.2028	0.6536
SSA	1	1	301.42312	5.0113	0.0278

1970

Actual by Predicted Plot

Predicted P<.0001 RSq=0.61
RMSE=7.1631
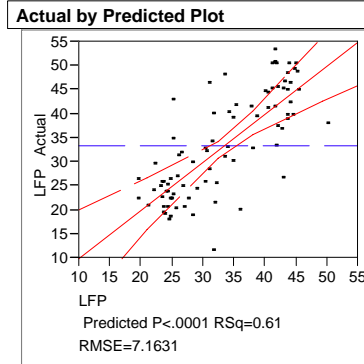
Summary of Fit

RSquare	0.605924
RSquare Adj	0.551941
Root Mean Square Error	7.163138
Mean of Response	33.42619
Observations (or Sum Wgts)	84

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	10	5759.2725	575.927	11.2243
Error	73	3745.6699	51.311	Prob > F
C. Total	83	9504.9424		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	38.943274	9.910219	3.93	0.0002
GDP per capita (constant 1995 US$)	0.0010677	0.00064	1.67	0.0995
Illiteracy rate, adult female (% of fem	0.0796822	0.053929	1.48	0.1438
Urban population (% of total)	-0.135929	0.069242	-1.96	0.0534
Fertility rate, total (births per woman	0.2730706	1.054196	0.26	0.7963
MENA [0]	3.2827348	2.568553	1.28	0.2053
EA&P [0]	-1.866192	2.390213	-0.78	0.4375
Eur and Cent Asia [0]	-10.15198	2.664552	-3.81	0.0003
LA & Carr [0]	1.0332817	2.010483	0.51	0.6088
S. Asia [0]	0.5918065	2.642125	0.22	0.8234
SSA [0]	-4.482459	2.160111	-2.08	0.0415

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
GDP per capita (constant 1995 US$)	1	1	142.84336	2.7839	0.0995
Illiteracy rate, adult female (% of fem	1	1	112.01740	2.1831	0.1438
Urban population (% of total)	1	1	197.74178	3.8538	0.0534
Fertility rate, total (births per woman	1	1	3.44281	0.0671	0.7963
MENA	1	1	83.81101	1.6334	0.2053
EA&P	1	1	31.27852	0.6096	0.4375
Eur and Cent Asia	1	1	744.83490	14.5162	0.0003
LA & Carr	1	1	13.55325	0.2641	0.6088
S. Asia	1	1	2.57430	0.0502	0.8234
SSA	1	1	220.94648	4.3061	0.0415

1980

Actual by Predicted Plot

Predicted P<.0001 RSq=0.59
RMSE=6.4847
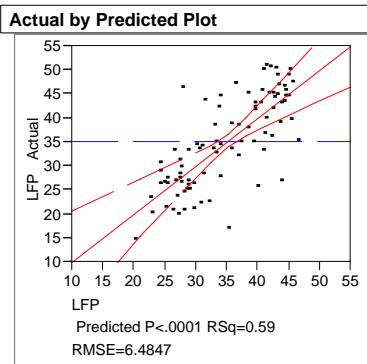
Summary of Fit

RSquare	0.585674
RSquare Adj	0.532555
Root Mean Square Error	6.484732
Mean of Response	35.16629
Observations (or Sum Wgts)	89

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	10	4636.5224	463.652	11.0258
Error	78	3280.0365	42.052	Prob > F
C. Total	88	7916.5589		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	36.293558	7.70729	4.71	<.0001
GDP per capita, PPP (current internatio	0.0005036	0.000629	0.80	0.4258
Illiteracy rate, adult female (% of fem	0.1012596	0.051058	1.98	0.0509
Urban population (% of total)	-0.108204	0.059096	-1.83	0.0709
Fertility rate, total (births per woman	-0.72369	0.864106	-0.84	0.4049
MENA [0]	5.4971447	1.981737	2.77	0.0069
EA&P [0]	-0.925763	2.022845	-0.46	0.6485
Eur and Cent Asia [0]	-5.993509	1.958929	-3.06	0.0030
LA & Carr [0]	1.9175821	1.589433	1.21	0.2313
S. Asia [0]	2.697456	2.288471	1.18	0.2421
SSA [0]	-2.741986	1.856454	-1.48	0.1437

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
GDP per capita, PPP (current internatio	1	1	26.94725	0.6408	0.4258
Illiteracy rate, adult female (% of fem	1	1	165.40045	3.9333	0.0509
Urban population (% of total)	1	1	140.97748	3.3525	0.0709
Fertility rate, total (births per woman	1	1	29.49546	0.7014	0.4049
MENA	1	1	323.56872	7.6945	0.0069
EA&P	1	1	8.80761	0.2094	0.6485
Eur and Cent Asia	1	1	393.64870	9.3611	0.0030
LA & Carr	1	1	61.20795	1.4555	0.2313
S. Asia	1	1	58.42542	1.3894	0.2421
SSA	1	1	91.73737	2.1815	0.1437

1990

Actual by Predicted Plot

Predicted P<.0001 RSq=0.57
RMSE=5.8737
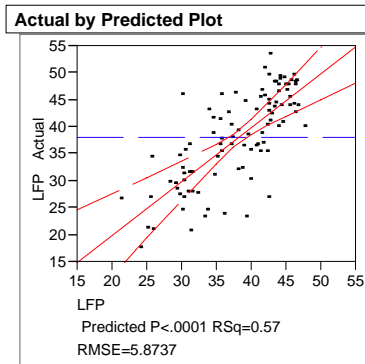
Summary of Fit

RSquare	0.572011
RSquare Adj	0.522816
Root Mean Square Error	5.873692
Mean of Response	38.22347
Observations (or Sum Wgts)	98

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	10	4011.5536	401.155	11.6276
Error	87	3001.5225	34.500	Prob > F
C. Total	97	7013.0760		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	34.58886	6.91649	5.00	<.0001
GDP per capita, PPP (current internatio	0.0003565	0.000383	0.93	0.3545
Illiteracy rate, adult female (% of fem	0.0353808	0.042239	0.84	0.4045
Urban population (% of total)	-0.055979	0.050485	-1.11	0.2706
Fertility rate, total (births per woman	0.6258985	0.828065	0.76	0.4518
MENA [0]	5.738641	1.952054	2.94	0.0042
EA&P [0]	-1.943576	1.965059	-0.99	0.3254
Eur and Cent Asia [0]	-5.940666	1.673876	-3.55	0.0006
LA & Carr [0]	2.167845	1.74512	1.24	0.2175
S. Asia [0]	1.4418448	2.170983	0.66	0.5084
SSA [0]	-2.077465	1.813473	-1.15	0.2551

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
GDP per capita, PPP (current internatio	1	1	29.90093	0.8667	0.3545
Illiteracy rate, adult female (% of fem	1	1	24.20684	0.7016	0.4045
Urban population (% of total)	1	1	42.41784	1.2295	0.2706
Fertility rate, total (births per woman	1	1	19.71068	0.5713	0.4518
MENA	1	1	298.16506	8.6424	0.0042
EA&P	1	1	33.75003	0.9783	0.3254
Eur and Cent Asia	1	1	434.55634	12.5957	0.0006
LA & Carr	1	1	53.23879	1.5431	0.2175
S. Asia	1	1	15.21761	0.4411	0.5084
SSA	1	1	45.27596	1.3123	0.2551

2000

Actual by Predicted Plot

Predicted P<.0001 RSq=0.55
RMSE=4.9697
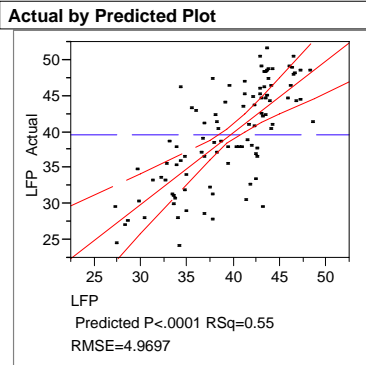
Summary of Fit

RSquare	0.548271
RSquare Adj	0.497515
Root Mean Square Error	4.969698
Mean of Response	39.576
Observations (or Sum Wgts)	100

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	10	2667.8896	266.789	10.8021
Error	89	2198.1128	24.698	Prob > F
C. Total	99	4866.0024		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	35.551763	5.403739	6.58	<.0001
GDP per capita, PPP (current internatio	-0.000159	0.000187	-0.85	0.3985
Illiteracy rate, adult female (% of fem	0.023919	0.03608	0.66	0.5091
Urban population (% of total)	-0.043844	0.038831	-1.13	0.2619
Fertility rate, total (births per woman	-0.391818	0.787455	-0.50	0.6200
MENA [0]	6.3878279	1.566271	4.08	<.0001
EA&P [0]	0.0111253	1.48358	0.01	0.9940
Eur and Cent Asia [0]	-3.013377	1.516347	-1.99	0.0500
LA & Carr [0]	3.4491841	1.352414	2.55	0.0125
S. Asia [0]	3.04893	1.698943	1.79	0.0761
SSA [0]	-0.270354	1.425572	-0.19	0.8500

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
GDP per capita, PPP (current internatio	1	1	17.77595	0.7197	0.3985
Illiteracy rate, adult female (% of fem	1	1	10.85435	0.4395	0.5091
Urban population (% of total)	1	1	31.48684	1.2749	0.2619
Fertility rate, total (births per woman	1	1	6.11471	0.2476	0.6200
MENA	1	1	410.80181	16.6331	<.0001
EA&P	1	1	0.00139	0.0001	0.9940
Eur and Cent Asia	1	1	97.53710	3.9492	0.0500
LA & Carr	1	1	160.64717	6.5045	0.0125
S. Asia	1	1	79.54215	3.2206	0.0761
SSA	1	1	0.88827	0.0360	0.8500

Appendix 4: Bivariate Second Degree Polynomial Fit

1960

Fit Y by X Group

Bivariate Fit of LFP By GDP per capita (constant 1995 US$)

Linear Fit

LFP = 32.059219 - 0.0003141 GDP per capita (constant 1995 US$)

Summary of Fit

RSquare	0.017854
RSquare Adj	0.007406
Root Mean Square Error	10.99126
Mean of Response	31.04792
Observations (or Sum Wgts)	96

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	206.433	206.433	1.7088
Error	94	11355.926	120.808	Prob > F
C. Total	95	11562.360		0.1943

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	32.059219	1.362693	23.53	<.0001
GDP per capita (constant 1995 US$)	-0.000314	0.00024	-1.31	0.1943

Polynomial Fit Degree=2

LFP = 32.694845 - 0.0008926 GDP per capita (constant 1995 US$) + 5.6291e-8 (GDP per capita (constant 1995 U-32)^2

Summary of Fit

RSquare	0.051352
RSquare Adj	0.030951
Root Mean Square Error	10.86011
Mean of Response	31.04792
Observations (or Sum Wgts)	96

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	593.751	296.876	2.5171
Error	93	10968.608	117.942	Prob > F
C. Total	95	11562.360		0.0862

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	32.694845	1.39137	23.50	<.0001
GDP per capita (constant 1995 US$)	-0.000893	0.000398	-2.24	0.0272
(GDP per capita (constant 1995 U-32)^2	5.6291e-8	3.106e-8	1.81	0.0732

Bivariate Fit of LFP By Urban population (% of total)

Linear Fit

LFP = 39.327085 - 0.2193829 Urban population (% of total)

Summary of Fit

RSquare	0.259179
RSquare Adj	0.251298
Root Mean Square Error	9.545877
Mean of Response	31.04792
Observations (or Sum Wgts)	96

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	2996.725	2996.73	32.8863
Error	94	8565.635	91.12	Prob > F
C. Total	95	11562.360		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	39.327085	1.741693	22.58	<.0001
Urban population (% of total)	-0.219383	0.038256	-5.73	<.0001

Polynomial Fit Degree=2

LFP = 37.897317 - 0.300892 Urban population (% of total) + 0.0069471 (Urban population (% of total) -37)^2

Summary of Fit

RSquare	0.42637
RSquare Adj	0.414034
Root Mean Square Error	8.444964
Mean of Response	31.04792
Observations (or Sum Wgts)	96

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	4929.839	2464.92	34.5627
Error	93	6632.520	71.32	Prob > F
C. Total	95	11562.360		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	37.897317	1.565108	24.21	<.0001
Urban population (% of total)	-0.300892	0.037289	-8.07	<.0001
(Urban population (% of total) -37)^2	0.0069471	0.001334	5.21	<.0001

Bivariate Fit of LFP By Fertility rate, total (births per woman)

Linear Fit

LFP = 26.932734 + 0.7831814 Fertility rate, total (births per woman)

Summary of Fit

RSquare	0.015687
RSquare Adj	0.005103
Root Mean Square Error	10.97849
Mean of Response	31.18632
Observations (or Sum Wgts)	95

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	178.635	178.635	1.4821
Error	93	11209.037	120.527	Prob > F
C. Total	94	11387.672		0.2265

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	26.932734	3.670998	7.34	<.0001
Fertility rate, total (births per woman)	0.7831814	0.643311	1.22	0.2265

Polynomial Fit Degree=2

LFP = 25.062046 + 1.0106008 Fertility rate, total (births per woman + 0.2073106 (Fertility rate, total (births p-5.)^2

Summary of Fit

RSquare	0.017537
RSquare Adj	-0.00382
Root Mean Square Error	11.02762
Mean of Response	31.18632
Observations (or Sum Wgts)	95

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	199.702	99.851	0.8211
Error	92	11187.970	121.608	Prob > F
C. Total	94	11387.672		0.4432

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	25.062046	5.813589	4.31	<.0001
Fertility rate, total (births per woman	1.0106008	0.846235	1.19	0.2355
(Fertility rate, total (births p-5.)^2	0.2073106	0.498085	0.42	0.6782

Oneway Analysis of LFP By MENA

1970

Fit Y by X Group

| Bivariate Fit of LFP By GDP per capita (constant 1995 US$) | Bivariate Fit of LFP By Illiteracy rate, adult female (% of females a | Bivariate Fit of LFP By Urban population (% of total) | Bivariate Fit of LFP By Fertility rate, total (births per woman) | Oneway Analysis of LFP By MENA |

By GDP per capita (constant 1995 US$)

Linear Fit
LFP = 35.609227 - 0.001778 GDP per capita (constant 1995 US$)

Summary of Fit

RSquare	0.072934
RSquare Adj	0.061629
Root Mean Square Error	10.36628
Mean of Response	33.42619
Observations (or Sum Wgts)	84

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	693.2372	693.237	6.4511
Error	82	8811.7052	107.460	Prob > F
C. Total	83	9504.9424		0.0130

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	35.609227	1.420568	25.07	<.0001
GDP per capita (constant 1995 US$)	-0.001778	0.000464	-2.54	0.0130

Polynomial Fit Degree=2

LFP = 37.725556 - 0.0039423 GDP per capita (constant 1995 US$) + 5.0557e-7 (GDP per capita (constant 1995 U-18)^2

Summary of Fit

RSquare	0.209018
RSquare Adj	0.189488
Root Mean Square Error	9.634195
Mean of Response	33.42619
Observations (or Sum Wgts)	84

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	1986.7078	993.354	10.7022
Error	81	7518.2346	92.818	Prob > F
C. Total	83	9504.9424		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	37.725556	1.436817	26.26	<.0001
GDP per capita (constant 1995 US$)	-0.003942	0.000857	-4.60	<.0001
(GDP per capita (constant 1995 U-18)^2	5.0557e-7	1.354e-7	3.73	0.0004

By Illiteracy rate, adult female (% of females)

Linear Fit
LFP = 25.866518 + 0.1421589 Illiteracy rate, adult female (% of fem

Summary of Fit

RSquare	0.173463
RSquare Adj	0.163383
Root Mean Square Error	9.788112
Mean of Response	33.42619
Observations (or Sum Wgts)	84

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	1648.7577	1648.76	17.2091
Error	82	7856.1847	95.81	Prob > F
C. Total	83	9504.9424		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	25.866518	2.112207	12.25	<.0001
Illiteracy rate, adult female (% of fem	0.1421589	0.034268	4.15	<.0001

Polynomial Fit Degree=2

LFP = 22.135754 + 0.1435362 Illiteracy rate, adult female (% of fem + 0.0037658 (Illiteracy rate, adult female (-53)^2

Summary of Fit

RSquare	0.236829
RSquare Adj	0.217985
Root Mean Square Error	9.463311
Mean of Response	33.42619
Observations (or Sum Wgts)	84

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	2251.0478	1125.52	12.5681
Error	81	7253.8945	89.55	Prob > F
C. Total	83	9504.9424		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	22.135754	2.497963	8.86	<.0001
Illiteracy rate, adult female (% of fem	0.1435362	0.033136	4.33	<.0001
(Illiteracy rate, adult female (-53)^2	0.0037658	0.001452	2.59	0.0113

By Urban population (% of total)

Linear Fit
LFP = 42.140924 - 0.2406839 Urban population (% of total)

Summary of Fit

RSquare	0.268534
RSquare Adj	0.259613
Root Mean Square Error	9.207994
Mean of Response	33.42619
Observations (or Sum Wgts)	84

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	2552.3956	2552.40	30.1036
Error	82	6952.5467	84.79	Prob > F
C. Total	83	9504.9424		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	42.140924	1.879419	22.42	<.0001
Urban population (% of total)	-0.240684	0.043867	-5.49	<.0001

Polynomial Fit Degree=2

LFP = 41.98176 - 0.3271236 Urban population (% of total) + 0.0062703 (Urban population (% of total) -36)^2

Summary of Fit

RSquare	0.391541
RSquare Adj	0.376517
Root Mean Square Error	8.449828
Mean of Response	33.42619
Observations (or Sum Wgts)	84

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	3721.5759	1860.79	26.0616
Error	81	5783.3665	71.40	Prob > F
C. Total	83	9504.9424		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	41.98176	1.72512	24.34	<.0001
Urban population (% of total)	-0.327124	0.045572	-7.18	<.0001
(Urban population (% of total) -36)^2	0.0062703	0.00155	4.05	0.0001

By Fertility rate, total (births per woman)

Linear Fit
LFP = 24.371092 + 1.6243717 Fertility rate, total (births per woman

Summary of Fit

RSquare	0.061205
RSquare Adj	0.049756
Root Mean Square Error	10.43166
Mean of Response	33.42619
Observations (or Sum Wgts)	84

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	581.7477	581.748	5.3460
Error	82	8923.1947	108.819	Prob > F
C. Total	83	9504.9424		0.0233

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	24.371092	4.07837	5.98	<.0001
Fertility rate, total (births per woman	1.6243717	0.70254	2.31	0.0233

Polynomial Fit Degree=2

LFP = 14.496287 + 2.915099 Fertility rate, total (births per woman + 1.0209108 (Fertility rate, total (births p-5.)^2

Summary of Fit

RSquare	0.123662
RSquare Adj	0.102024
Root Mean Square Error	10.1407
Mean of Response	33.42619
Observations (or Sum Wgts)	84

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	1175.3986	587.699	5.7150
Error	81	8329.5438	102.834	Prob > F
C. Total	83	9504.9424		0.0048

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	14.496287	5.71047	2.54	0.0130
Fertility rate, total (births per woman	2.915099	0.868907	3.35	0.0012
(Fertility rate, total (births p-5.)^2	1.0209108	0.424904	2.40	0.0186

1980

Fit Y by X Group

| Bivariate Fit of LFP By GDP per capita, PPP (current international $) | Bivariate Fit of LFP By Illiteracy rate, adult female (% of females a | Bivariate Fit of LFP By Urban population (% of total) | Bivariate Fit of LFP By Fertility rate, total (births per woman) | Oneway Analysis of LFP By MENA |

By GDP per capita, PPP (current international $)

Linear Fit
LFP = 38.151964 - 0.001143 GDP per capita, PPP (current internatio

Summary of Fit

RSquare	0.075103
RSquare Adj	0.064472
Root Mean Square Error	9.173929
Mean of Response	35.16629
Observations (or Sum Wgts)	89

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	594.5536	594.554	7.0645
Error	87	7322.0053	84.161	Prob > F
C. Total	88	7916.5589		0.0094

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	38.151964	1.485755	25.68	<.0001
GDP per capita, PPP (current internatio	-0.001143	0.00043	-2.66	0.0094

Polynomial Fit Degree=2

LFP = 39.715329 - 0.002984 GDP per capita, PPP (current internatio + 6.3491e-7 (GDP per capita, PPP (current in-26)^2

Summary of Fit

RSquare	0.226786
RSquare Adj	0.208805
Root Mean Square Error	8.436625
Mean of Response	35.16629
Observations (or Sum Wgts)	89

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	1795.3681	897.684	12.6121
Error	86	6121.1908	71.177	Prob > F
C. Total	88	7916.5589		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	39.715329	1.418369	28.00	<.0001
GDP per capita, PPP (current internatio	-0.002984	0.000598	-4.99	<.0001
(GDP per capita, PPP (current in-26)^2	6.3491e-7	1.546e-7	4.11	<.0001

By Illiteracy rate, adult female (% of females)

Linear Fit
LFP = 31.844021 + 0.0741765 Illiteracy rate, adult female (% of fem

Summary of Fit

RSquare	0.050526
RSquare Adj	0.040425
Root Mean Square Error	9.768651
Mean of Response	35.14167
Observations (or Sum Wgts)	96

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	477.3383	477.338	5.0022
Error	94	8970.0950	95.427	Prob > F
C. Total	95	9447.4333		0.0277

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	31.844021	1.779883	17.89	<.0001
Illiteracy rate, adult female (% of fem	0.0741765	0.033166	2.24	0.0277

Polynomial Fit Degree=2

LFP = 29.95506 + 0.0507133 Illiteracy rate, adult female (% of fem + 0.0032484 (Illiteracy rate, adult female -44)^2

Summary of Fit

RSquare	0.099787
RSquare Adj	0.080428
Root Mean Square Error	9.562865
Mean of Response	35.14167
Observations (or Sum Wgts)	96

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	942.7333	471.367	5.1545
Error	93	8504.7000	91.448	Prob > F
C. Total	95	9447.4333		0.0075

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	29.95506	1.933827	15.49	<.0001
Illiteracy rate, adult female (% of fem	0.0507133	0.034092	1.49	0.1403
(Illiteracy rate, adult female -44)^2	0.0032484	0.00144	2.26	0.0264

By Urban population (% of total)

Linear Fit
LFP = 42.656152 - 0.182689 Urban population (% of total)

Summary of Fit

RSquare	0.167697
RSquare Adj	0.158842
Root Mean Square Error	9.146055
Mean of Response	35.14167
Observations (or Sum Wgts)	96

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	1584.3039	1584.30	18.9396
Error	94	7863.1295	83.65	Prob > F
C. Total	95	9447.4333		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	42.656152	1.962857	21.73	<.0001
Urban population (% of total)	-0.182682	0.041977	-4.35	<.0001

Polynomial Fit Degree=2

LFP = 42.437175 - 0.2424962 Urban population (% of total) + 0.0054183 (Urban population (% of total) -41)^2

Summary of Fit

RSquare	0.261579
RSquare Adj	0.245699
Root Mean Square Error	8.692986
Mean of Response	35.14167
Observations (or Sum Wgts)	96

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	2471.2535	1235.63	16.3513
Error	93	6976.1798	75.01	Prob > F
C. Total	95	9447.4333		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	42.437175	1.859846	22.82	<.0001
Urban population (% of total)	-0.242496	0.04339	-5.59	<.0001
(Urban population (% of total) -41)^2	0.0054183	0.001576	3.44	0.0009

By Fertility rate, total (births per woman)

Linear Fit
LFP = 32.899393 + 0.4523848 Fertility rate, total (births per woman

Summary of Fit

RSquare	0.007531
RSquare Adj	-0.00303
Root Mean Square Error	9.987379
Mean of Response	35.14167
Observations (or Sum Wgts)	96

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	71.1460	71.1460	0.7133
Error	94	9376.2873	99.7477	Prob > F
C. Total	95	9447.4333		0.4005

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	32.899393	2.843954	11.57	<.0001
Fertility rate, total (births per woman	0.4523848	0.535654	0.84	0.4005

Polynomial Fit Degree=2

LFP = 32.203459 + 0.4709718 Fertility rate, total (births per woman + 0.166738 (Fertility rate, total (births p-4.)^2

Summary of Fit

RSquare	0.011337
RSquare Adj	-0.00992
Root Mean Square Error	10.02166
Mean of Response	35.14167
Observations (or Sum Wgts)	96

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	107.1028	53.551	0.5332
Error	93	9340.3306	100.434	Prob > F
C. Total	95	9447.4333		0.5885

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	32.203459	3.081639	10.45	<.0001
Fertility rate, total (births per woman	0.4709718	0.538389	0.87	0.3839
(Fertility rate, total (births p-4.)^2	0.166738	0.278666	0.60	0.5511

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1990

Fit Y by X Group

| Bivariate Fit of LFP By GDP per capita, PPP (current international $) | Bivariate Fit of LFP By Illiteracy rate, adult female (% of females a | Bivariate Fit of LFP By Urban population (% of total) | Bivariate Fit of LFP By Fertility rate, total (births per woman) | Oneway Analysis of LFP By MENA |

— Linear Fit
— Polynomial Fit Degree=2

GDP per capita column

Linear Fit
LFP = 38.915432 - 0.0001642 GDP per capita, PPP (current internatio

Summary of Fit
RSquare 0.006246
RSquare Adj -0.00411
Root Mean Square Error 8.520362
Mean of Response 38.222347
Observations (or Sum Wgts) 98

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	43.8062	43.8062	0.6034
Error	96	6969.2698	72.5966	Prob > F
C. Total	97	7013.0760		0.4392

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	38.915432	1.23866	31.42	<.0001
GDP per capita, PPP (current internatio	-.0000164	0.000211	-0.78	0.4392

Polynomial Fit Degree==2
LFP = 39.627083 - 0.0006899 GDP per capita, PPP (current internatio + 9.0698e-8 (GDP per capita, PPP (current in-42)^2

Summary of Fit
RSquare 0.046731
RSquare Adj 0.026662
Root Mean Square Error 8.388808
Mean of Response 38.22347
Observations (or Sum Wgts) 98

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	327.7260	163.863	2.3285
Error	95	70.372		Prob > F
C. Total	97	7013.0760		0.1030

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	39.627033	1.269951	31.20	<.0001
GDP per capita, PPP (current internatio	-.000069	0.000334	-2.06	0.0418
(GDP per capita, PPP (current in-42)^2	9.0698e-8	4.515e-8	2.01	0.0474

Illiteracy rate column

Linear Fit
LFP = 37.762139 + 0.0086761 Illiteracy rate, adult female (% of fem

Summary of Fit
RSquare 0.000806
RSquare Adj -0.00796
Root Mean Square Error 8.719776
Mean of Response 38.0569
Observations (or Sum Wgts) 116

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	6.9923	6.9923	0.0920
Error	114	8667.9322	76.0345	Prob > F
C. Total	115	8674.9245		0.7623

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	37.762139	1.265005	29.85	<.0001
Illiteracy rate, adult female (% of fem	0.0086761	0.02861	0.30	0.7623

Polynomial Fit Degree==2
LFP = 36.736926 - 0.0473736 Illiteracy rate, adult female (% of fem + 0.0036582 (Illiteracy rate, adult female (-33)^2

Summary of Fit
RSquare 0.074962
RSquare Adj 0.05859
Root Mean Square Error 8.427007
Mean of Response 38.0569
Observations (or Sum Wgts) 116

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	650.2926	325.146	4.5786
Error	113	8024.6319	71.014	Prob > F
C. Total	115	8674.9245		0.0122

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	36.736926	1.269099	28.95	<.0001
Illiteracy rate, adult female (% of fem	-0.047374	0.033336	-1.42	0.1580
(Illiteracy rate, adult female (-33)^2	0.0036582	0.001215	3.01	0.0032

Urban population column

Linear Fit
LFP = 43.701997 - 0.1223305 Urban population (% of total)

Summary of Fit
RSquare 0.098256
RSquare Adj 0.091355
Root Mean Square Error 8.27906
Mean of Response 38.0569
Observations (or Sum Wgts) 116

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	861.0415	861.041	12.5621
Error	114	7813.8830	68.543	Prob > F
C. Total	115	8674.9245		0.0006

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	43.701997	1.768519	24.71	<.0001
Urban population (% of total)	-0.122331	0.034515	-3.54	0.0006

Polynomial Fit Degree==2
LFP = 43.043408 - 0.1436308 Urban population (% of total) + 0.0033094 (Urban population -46)^2

Summary of Fit
RSquare 0.144037
RSquare Adj 0.128887
Root Mean Square Error 8.106273
Mean of Response 38.0569
Observations (or Sum Wgts) 116

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	1249.5071	624.754	9.5075
Error	113	7425.4173	65.712	Prob > F
C. Total	115	8674.9245		0.0002

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	43.043408	1.752666	24.56	<.0001
Urban population (% of total)	-0.143631	0.034911	-4.11	<.0001
(Urban population (% of total) -46)^2	0.0033094	0.001361	2.43	0.0166

Fertility rate column

Linear Fit
LFP = 36.97433 + 0.2588698 Fertility rate, total (births per woman

Summary of Fit
RSquare 0.002904
RSquare Adj -0.00584
Root Mean Square Error 8.710616
Mean of Response 38.0569
Observations (or Sum Wgts) 116

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	25.1941	25.1941	0.3320
Error	114	8649.7304	75.8748	Prob > F
C. Total	115	8674.9245		0.5656

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	36.97433	2.045373	18.08	<.0001
Fertility rate, total (births per woman	0.2588698	0.449242	0.58	0.5656

Polynomial Fit Degree==2
LFP = 34.500256 + 0.0852002 Fertility rate, total (births per woman + 0.9874567 (Fertility rate, total (births p-4.)^2

Summary of Fit
RSquare 0.101808
RSquare Adj 0.085911
Root Mean Square Error 8.303825
Mean of Response 38.0569
Observations (or Sum Wgts) 116

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	883.1788	441.589	6.4042
Error	113	7791.7457	68.954	Prob > F
C. Total	115	8674.9245		0.0023

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	34.500256	2.072162	16.65	<.0001
Fertility rate, total (births per woman	0.0852002	0.431083	0.20	0.8437
(Fertility rate, total (births p-4.)^2	0.9874567	0.279935	3.53	0.0006

2000

Fit Y by X Group

| Bivariate Fit of LFP By GDP per capita, PPP (current international $) | Bivariate Fit of LFP By Illiteracy rate, adult female (% of females a | Bivariate Fit of LFP By Urban population (% of total) | Bivariate Fit of LFP By Fertility rate, total (births per woman) | Oneway Analysis of LFP By MENA |

— Linear Fit
— Polynomial Fit Degree=2

GDP per capita column

Linear Fit
LFP = 40.50133 - 0.0001543 GDP per capita, PPP (current internatio

Summary of Fit
RSquare 0.017852
RSquare Adj 0.00783
Root Mean Square Error 6.983315
Mean of Response 39.576
Observations (or Sum Wgts) 100

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	86.8663	86.8663	1.7813
Error	98	4779.1361	48.7667	Prob > F
C. Total	99	4866.0024		0.1851

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	40.50133	0.984051	41.16	<.0001
GDP per capita, PPP (current internatio	-.0000154	0.000116	-1.33	0.1851

Polynomial Fit Degree==2
LFP = 41.144884 - 0.0004888 GDP per capita, PPP (current internatio + 3.734e-8 (GDP per capita, PPP (current in-59)^2

Summary of Fit
RSquare 0.061193
RSquare Adj 0.041836
Root Mean Square Error 6.862597
Mean of Response 39.576
Observations (or Sum Wgts) 100

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	297.7638	148.882	3.1613
Error	97	4568.2386	47.095	Prob > F
C. Total	99	4866.0024		0.0468

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	41.144884	1.013704	40.59	<.0001
GDP per capita, PPP (current internatio	-.0000489	0.000195	-2.51	0.0137
(GDP per capita, PPP (current in-59)^2	3.734e-8	1.764e-8	2.12	0.0369

Illiteracy rate column

Linear Fit
LFP = 39.591891 + 0.0063134 Illiteracy rate, adult female (% of fem

Summary of Fit
RSquare 0.000514
RSquare Adj -0.00841
Root Mean Square Error 7.025975
Mean of Response 39.7614
Observations (or Sum Wgts) 114

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	2.8453	2.8453	0.0576
Error	112	5528.8049	49.3643	Prob > F
C. Total	113	5531.6502		0.8107

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	39.591891	0.965166	41.02	<.0001
Illiteracy rate, adult female (% of fem	0.0063134	0.026297	0.24	0.8107

Polynomial Fit Degree==2
LFP = 39.312122 - 0.0563065 Illiteracy rate, adult female (% of fem + 0.0031318 (Illiteracy rate, adult female (-26)^2

Summary of Fit
RSquare 0.05992
RSquare Adj 0.042982
Root Mean Square Error 6.844603
Mean of Response 39.7614
Observations (or Sum Wgts) 114

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	331.4570	165.728	3.5375
Error	111	5200.1932	46.849	Prob > F
C. Total	113	5531.6502		0.0324

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	39.312122	0.946166	41.55	<.0001
Illiteracy rate, adult female (% of fem	-0.056307	0.034861	-1.62	0.1081
(Illiteracy rate, adult female (-26)^2	0.0031318	0.001183	2.65	0.0093

Urban population column

Linear Fit
LFP = 44.47235 - 0.0929958 Urban population (% of total)

Summary of Fit
RSquare 0.090588
RSquare Adj 0.082468
Root Mean Square Error 6.701912
Mean of Response 39.7614
Observations (or Sum Wgts) 114

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	501.1002	501.100	11.1565
Error	112	5030.5500	44.916	Prob > F
C. Total	113	5531.6502		0.0011

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	44.47235	1.543777	28.81	<.0001
Urban population (% of total)	-0.092996	0.027842	-3.34	0.0011

Polynomial Fit Degree==2
LFP = 43.957352 - 0.0997545 Urban population (% of total) + 0.0016869 (Urban population -50)^2

Summary of Fit
RSquare 0.100064
RSquare Adj 0.093011
Root Mean Square Error 6.663297
Mean of Response 39.7614
Observations (or Sum Wgts) 114

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	603.3026	301.651	6.7940
Error	111	4928.3476	44.400	Prob > F
C. Total	113	5531.6502		0.0016

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	43.957352	1.571968	27.96	<.0001
Urban population (% of total)	-0.099754	0.028038	-3.56	0.0006
(Urban population (% of total) -50)^2	0.0016869	0.001112	1.52	0.1321

Fertility rate column

Linear Fit
LFP = 38.558526 + 0.3566586 Fertility rate, total (births per woman

Summary of Fit
RSquare 0.006658
RSquare Adj -0.00221
Root Mean Square Error 7.004349
Mean of Response 39.7614
Observations (or Sum Wgts) 114

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	36.8295	36.8295	0.7507
Error	113	5494.8207	49.0609	Prob > F
C. Total	113	5531.6502		0.3881

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	38.558526	1.535516	25.11	<.0001
Fertility rate, total (births per woman	0.3566586	0.411645	0.87	0.3881

Polynomial Fit Degree==2
LFP = 37.955361 - 0.4119328 Fertility rate, total (births per woman + 1.2581476 (Fertility rate, total (births p-3.)^2

Summary of Fit
RSquare 0.196198
RSquare Adj 0.181715
Root Mean Square Error 6.329077
Mean of Response 39.7614
Observations (or Sum Wgts) 114

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	1085.2988	542.649	13.5469
Error	111	4446.3514	40.057	Prob > F
C. Total	113	5531.6502		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	37.955361	1.39248	27.26	<.0001
Fertility rate, total (births per woman	-0.411933	0.401152	-1.03	0.3067
(Fertility rate, total (births p-3.)^2	1.2581476	0.24592	5.12	<.0001

Appendix 5: Egyptian Labor Laws

Labor law number 137, of 1981 (repeal in 2003)[6]

- Article 151: "All provisions regulating the employment of workers are applicable to women workers without any discrimination between them in the same work."
- Article 152: "It is impermissible to employ women between 8.00 p.m. and 7.00 a.m., except in situations, jobs and occasions which are stated in a resolution issued by the Minister of State for Manpower and Training."
- Article 153: It is impermissible to employ women in jobs which are harmful to health or morals, and in strenuous jobs or other work decided by the Minister of State for Manpower and Training."
- Article 154:
    a. A Woman worker who had spent six months in the service of an employer is entitled to have a maternity leave of fifty fully paid days that include the period before delivery and the period after it, on condition that she presents a medical report that shows the probable day of delivery."
    b. A woman worker is entitled to this leave no more than three times during the period of her service.
    c. It is impermissible to employ the woman worker within forty days after delivery.
- Article 155: Within 18 months after delivery, a woman worker who nurses her child is entitled, in addition to the normal break, to have two other breaks for this purpose each of which is no less than half an hour. The women worker has the right to combine both breaks together. The two extra breaks are counted within the work hours and therefore there will be no reduction in the wage.
- Article 156: In establishments of 50 workers or more, a woman worker is entitled to have an unpaid leave for a period of no more than one year to care for her child. She is granted this leave three times during her employment.
- Article 157: When employing one or more woman worker, an employer should post a copy of the women employment regulation.
- Article 158:
    a. Employers who employ one hundred or more women workers in one place, should establish a nursery or entrust a nursery to accommodate the children according to the conditions and situations decided by the Minister of State for Manpower and Training.
    b. Establishments employing less than one hundred women workers in one area should be committed to join efforts to execute the commitment stated in the previous paragraph, in accordance with the conditions and situations stated in a decision issued by the Minister of State for Manpower and Training.
- Article 159: Women who work specifically in agriculture are excluded from the application of provisions of this chapter.

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[6] Muhammed Abu Harthiyyeh & Advocate Farid Qawwas. "A Comparative Study of Women Rights in Arab Labor Legislation". 1997. Translated by Khalil Touma. Center of Democracy and Workers' Rights in Palestine. http://www.dwrc.org/studies/womenrights.pdf

Labor law revisions of July 21, 2003[7]:

- Decree No. 121 of 2003 concerning nursery schools: Establishes, inter alia, an obligation that an employer engaging one hundred female workers or more shall establish a nursery school for the female workers' children.
- Decree No.183 of 2003 organizing the employment of women in night work shifts: Provides that women should not be employed in industrial establishments for night work shifts and sets forth certain exceptions.
- Decree concerning rules on inspection of places of work at night and at other than official working hours (No. 111 of 2003): Regulates night inspection as well as inspection during other than official working hours. Such inspections shall inter alia comprise the following: establishments running three shifts if inspection takes place at night and during other than official working hours; establishments that by their nature operate at night; establishments employing juveniles and women; establishments authorised to employ women at night after 7 p.m.; inspection on break hours, and at times of night closure, weekly closure, and weekly rest hours and days; and establishments undertaking seasonal work of industries; and inspection of meals at night. In event of sudden danger to health and safety of workers, inspector shall be called in at night or other than official working hours.
- Decree of the Ministry of Manpower and Emigration determining works for which women may not be employed (No. 155 of 2003).

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[7] ILO: NATLEX

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