



Impact of Gender Equality in Professional Education on Female Labor Force Participation: A Case of Major Cities of Pakistan.

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Abstract

The study estimates the effect of gender equality in Professional education (Medical and Engineering Education) on female labor force participation. The analysis is done for the major cities of Pakistan after taking into account the socio economic indicators like marital status of female, gender of the head of household, physical facilities, median income of the household, etc. Data is gathered from Pakistan Social Standard of Living Measurement (PSLM) Survey for the period of 2004-05 to 2011-12. Pseudo Panel approach is applied using cities and females in age group 25-65 as cohorts. Fixed effect technique is used for analyzing the issue. This study recommends that public expenditure on higher education should be increased. Media and government should participate actively in informing the uninformed parents about the importance of education in today's world. Hi-tech, professional and occupation oriented education facilities should be offered to the females. The government should also ensure the provision of childcare resources to support and encourage educated mothers to contribute in economic activities. Highly educated, hardworking and capable women should be encouraged to reach top level. This will be an incentive for other women to work.

Keywords: Gender Inequality, Professional Education, Pseudo Panel, Urbanizing Areas and Female labor force participation.

JEL Codes: I24, I23, C23, Z130, J21.

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1. Introduction

Like other developing nations, Pakistan, is grabbed into serious socio-economic problems of scarcity, unemployment, inflation, and poor health conditions. Education is believed to be the most efficient tool that overcome such crisis, leaving a cross cutting consequence on all aspects of human life. The Pakistani society is varied in income distribution and access to different levels of education to its masses. Given the limited access available to overall population the most vulnerable are female segment to the society and cultural norms restricting their accessibility. The access to education at all levels is easy in metropolitan regions especially in big metropolitans, while the professional education facility is mostly not accessible in rural areas and in smaller municipalities. Professional universities are situated in urban areas and the students have to move to big cities for acquiring professional education and in most of cases even for an undergraduate professional degree. Though Professional education in Pakistan is provided heavily by public sector. In Professional and Technical Universities, Colleges and Institutes and Teacher and Vocational Training the public education expenditure is only 5% and 2% respectively (Pakistan Education Statistics 2014). The data shows that from the estimated population of 193 million out of 38% only 6% of female have attained their engineering education; whereas out of 54% only 29% females have completed their MBBS. (PSLM 2012-13). Medical colleges in Pakistan are 94, of which 39 are public and 55 are private.

Further the recent catch phrase of ‘women decision making’ has spread in nearly every part of the world. For which again education has arguably become the leading free driver’s of female labor force participation and hence experiment to woman’s decision is though not just subjected to the achievement of education but other factors influencing the participation of individuals as well. In both developed and developing countries the increasing proportion of female in labor market has seen expansion. Globalization and its social effects have produced advance trend that include increasing preferences of women to become preferably economically active.

From the past few years in Pakistan the incidence of women work participation has remained low. Although the average annual growth rate of women work participation has risen slightly in Pakistan, which was 24.3% during the period 2009-10 and that has gone up to 24.8% during the period 2014-15(World Development Indicator 2015). But still women work participation is very low as compared to other South Asian countries.

A look at the literature available shows that in developing countries labor force participation of females has remained a debated the issue of many studies recently. Nagac (2016), Ntuli (2004), Kingdon and Unni (2001) and Pieters (2013) analyze the effect of education on female labor force participation. As more women have increased their education, positive selection effects have been reduced, contributing to falling labor force participation rates among the highly educated women. In initial stages of educational expansion, those with some education feel entitled to a white-collar job, and this attitude can persist long after a majority of the population has reached higher education levels. Until industrial jobs become more acceptable for educated persons, there is likely to be considerable resistance against women’s employment in white-collar jobs, as this would reduce the opportunities for men.

In case of Pakistan the Unemployment rate by education level across time can be analyzed from table 2. It shows that unemployment has increased as the level of education has increased. It increases more for females than males as fewer jobs are available for educated females in Pakistan.

Moreover generally speaking, Donaldson (2008) and Verboven (2014) found that due to lower socioeconomic status (SES) students tend to be underrepresented in higher education. In higher education students from disadvantaged environments contribute less because they are more sensitive to the costs of education. Their enrollment is low because of lower preferences for education. This preference effect captures the fact that disadvantaged students have lower tastes for education, higher indirect costs of studying or lower expectations about the returns of the investment. Students from disadvantaged backgrounds have lower academic ability when they graduate from high school, which makes them less likely to enroll. Azhar (2013), Kodde (1988), Ahmad et al (2010), Khattak (2012), Meer and Arif (2012) and Grave (2010) discovered the influences of parental socio-economic status and education on university students' academic progress. They concluded that the demand for higher education is affected by the awareness of higher education, age of students, marital status, parent's education, family income, access to education, and public expenditure on higher education. Moreover, the facilities and financial support from the parents had a significant effect on university students' academic performance.

Human capital and female labor force participation model for Pakistan were constructed by Nasir and Nazli (2000) and Faridi and Malik (2009). Nasir and Nazli (2000), Ejaz (2007), Ahmad and Hafeez (2007) and Faridi and Malik (2009) found that there exist favorable relationship between higher learning and higher salary. As the level of education raises females' participation in economic and business activities increases. Moreover, an affirmative and significant effect of better half's' employment is due to educated spouses.

1.1 Objectives of the study

The present study explores the effect of gender equality in Professional education and its effect on female labor force participation in major cities of Pakistan. Specifically, the study evaluates the effect of gender equality in Professional education by considering only degrees of Medical and Engineering on female labor force participation. The assessment is done for the major cities of Pakistan after taking into account the socio economic indicators. The determinants of female labor force participation explored here includes marital status of female, gender of the head of the household, physical facilities in the household, residential status of the household, household income, etc.

1.2 Organization of the study

This paper is organized as follows: section 2 consists of methodology; which provides the development of professional education equality index and explores the determinants of professional education equality and its impact on female labor force participation. Econometric methodology and Data sources are discussed in sections 3 and 4 respectively. The empirical results are displayed in section 5. Conclusion and policy implications are presented in section 6.

2. Methodology

2.1 Development of Professional Education Equality Index

In this study we have used professional education equality index along with pseudo panel technique for generalizing gender equality and factor influencing it in 14 major cities of

Pakistan. Specifically, the first step (after computing the index) is concerned to explain the determinants of Gender Equality Index. The second step is concerned to explain the impact of gender equality on female labor force participation. The gender equality index is estimated by using the approach presented in Human Development Report 2007-08. Hence the study is unique in a way as it not only assesses the equality in education using 14 major urbanizing areas of Pakistan. But it also provides in depth assessment of the factors causing the equality within the city and also its influence on female labor force participation.

The education attainment⁴ index for Professional education is defined as:

Male education attainment (MEA) = 1 if professional education attained by any individual male is >0

Female education attainment (FEA) = 1 if professional education attained by any individual female is >0

While Adult Literacy is defined as:

Male Professional Adult Literacy Index (MPALI) = 1 if any individual male can read or write

Female Professional Adult Literacy Index (FALI) = 1 if any individual female can read or write

MALI and FALI are the Adult literacy index for Professional education of male and female respectively. It is described “as the population aged 25– 65 that can read and write in any language divided by the total population aged 25 – 65 years multiplied by 100”. MEA and FEA are Professional Education attainment index of male and female respectively which is defined as “the persons who have completed their Professional education divided by the population who should have completed their Professional education”.

Male and Female professional education indices are then calculated as:

Male Professional education index (MPEI) = 2/3(MPALI) + 1/3*(MEA)*

Female Professional education index (FPEI) = 2/3(FPALI) + 1/3*(FEA)*

The male and female indices in each dimension are combined to create Professional Education Equally Distributed Index.

$$PEEI = \{[MPS] (MPEI)^{-1} + [FPS] (FPEI)^{-1}\}^{-1}$$

where MPS and FPS is the population share of male and female respectively

If PEEI is =1 then professional education is equally distributed

⁴ Education attainment index has been estimated instead of enrollment because further in this study effect of education attainment index on female labor force has to be estimated for the age group 15-65. In this cohort most of the females would have acquired their education or have been illiterate

If PEEI is < 1 then professional education is not equally distributed

2.2 Determinants of Professional Education Equality Index

After discussing the measurement of the gender equality through Professional Education Equally Distributed Index (PEEI) the section begins by presenting the relationship among female labor force participation, professional education equality index, socio economic and labor market factors. The specific form of the model generalizes the determinants of gender equality at professional level of education is tested as:

$$PEEI_{i,C,T} = f(HSZ_{C,T}, MW_{C,T}, SW_{C,T}, NCH_{C,T}, ADR_{C,T}, MEDU_{C,T}, MHH_{C,T}, EMHH_{C,T}, SDW_{C,T}, SCK_{C,T}, SLT_{C,T}, HINC_{C,T}) \quad (1)$$

Where C and T represent City and Time respectively.

PEEI *is the equally distributed professional education index.*

HSIZE *is the household size.*

MW *is the number of married women.*

SW *is the number of single women.*

NCH *is the number of children in a household under 15 years.*

ADR *is the adult dependency ratio.*

MEDU *is the average years of mother education.*

MHH *is the number of the household which have male head.*

MHEDU *is the education of the male head of a household*

SDW *is the source of drinking water.*

SCK *is the source of cooking (gas).*

SLT *is the source of lightning (electricity).*

HINC *is the level of household income. It could be the main factors, influencing parent's decision to invest in their children's human capital.*

For HSZ the study hypothesis that the impact could be positive or negative. The impact could be negative if the increase in family size leads parents to invest less on education of their

children especially girls due to low per capita income or high dependency ratio or both. Contrary to this rise in household size results in rise in number of earners as well then per capita income of a family will increase therefore the living opportunity to increase education level of both genders will be improved. The effect of marital status of the female being married on the professional education equality index may be negative. As married woman have household responsibilities, have to look after her offspring and in some cases are not allowed by their spouses to complete her education therefore professional education equality index decreases. The effect of female being single will increase professional education equality index as she does not have any household responsibilities, so she can achieve her desired education.

NCH is negatively related to professional education equality index. As the number of children increases professional education equality index will decrease because adult female have to stay at home to look after her sibling's inspite of obtaining education. ADR is positively related to professional education equality index because older people know the importance of education therefore they will encourage the adults especially girls in a family to achieve their desired education. MEDU is the main factor which influence professional education equality index since a mother plays an important character in the life of her offsprings. An educated mother knows the significance of education so she also educates her children and has greater affect in household decision making which may permit her to secure more possessions for her children. The study hypothesizes that as mother's years of education increases professional education equality index will also increase.

In our society most of the decisions are taken by the male head of the household. It will be positively related to professional education equality index because male heads in urban areas know the importance of education therefore household head if male will encourage adults especially girls to complete their education. Physical facilities show the household well being. If physical facilities are available then family members can concentrate on their studies hence professional education equality index will increase in a city. Further study hypothesizes that as income increases household will spend more on education either male or female. Hence professional education equality index will increase and vice versa.

2.3 The Effect of Professional Education Equality Index on Female labor force Participation

The specific form of the model which has been used to estimate the effect of gender equality on professional education on female labor force participation rate is as follows:

$$FLFP_{C,T} = f(PEEI_{l,C,T}, HSZ_{C,T}, MW_{C,T}, SW_{C,T}, MH_{HC,T}, CDR_{C,T}, SLT_{C,T}, RSD_{C,T}, FWG_{C,T}, SZS_{C,T}) \text{ _____ (2)}$$

Where FLFP is the female labor force participation rate in a city. C and T represent City and Time respectively.

PEEI_l *is the equally distributed professional education index. Where l represents the level of education. The professional education included in this study are Medical and Engineering education which are described in Pakistan Social Living Standard Measurement*

Survey.

| | |
|--------------|---|
| HSIZE | <i>is the household size.</i> |
| MW | <i>is the number of married women.</i> |
| SW | <i>is the number of single women.</i> |
| CDR | <i>is the child dependency ratio</i> |
| MHH | <i>is the number of the household which have male head.</i> |
| SCK | <i>is the source used for cooking (gas).</i> |
| SLT | <i>is the source of lighting (electricity).</i> |
| RSD | <i>is the residential status of an individual on rent</i> |
| FWG | <i>is the female median wages. It could be the main factor to encourage female to participate in the labor force.</i> |
| SZS | <i>is the size of sector. (Manufacturing, Trade and Services Sector)</i> |

PEEI is calculated for different levels of professional education as discussed earlier. Studies have shown that the level of education increases female labor force participation rate will also increase since education specifically professional education plays an important role in the life of individuals therefore labor market participation will also increase especially of females. Contrary to this as the level of education increases female labor force participation rate will decrease because labor market is male dominated and fewer opportunities are available for educated women. If females get appropriate jobs they are discriminated by wage differences, lower positions, late promotions and are strained by their bosses and male counterparts. Further educated female participation is restricted due to socio economic and civilized rituals.

The female being single has a positive impact on female labor force participation as a single female will participate in the labor market either to pursue her carrier, to support her family or just too spent time instead of sitting idle. Female being married may have a negative or positive impact on female labor force participation rate. It may be negative because some families do not allow females to work alongside man so females are not sanctioned to enter the formal job market or due to home responsibilities. It may be positive as some spouses encourage their wives to make use of their education. Moreover, married female may share financial burden of their spouse.

MHH here represents household headed by male. The male heads often discourages female labor force participation given the social culture that takes male as bread winner. Contrary to this now the trends of urban areas are changing therefore educated females (with professional degree) of the family may be encouraged to participate in labor force as the financial burden of the family could be shared and their education could be utilized. CDR is the child dependency ratio. It is the average number of children under the age 15 living in a city. The study hypothesizes that as the number of children in a household increases female labor force participation rate also increases due to economic reasons.

SCK and SLT are the source of cooking (gas) and lightning (electricity) in a household. If the physical facilities are increased then female labor force participation will be discouraged and vice versa since these facilities are indicators of household well being. RSD is the occupancy status hence rent of the household living in a city. The study hypothesizes that as the residential status of families on rent will increase female labor force participation rate will also increase to make both ends meet.

FWG are the average wages of females. It could be the main factor to encourage female to participate in the labor force. It will have positive relationship with female labor force participation rate as wages will increase more women will be attracted to participate in the labor market. SZS is the size of manufacturing, trade and services sector. As the size of these sectors increase opportunities for females will be produced to enter the labor market. Therefore the study hypothesizes that by increasing the sector size, participation rate of females will be encouraged.

3. Econometric Methodology

The estimation of pseudo panel is performed using fixed effect technique.

3.1 Pseudo Panel Technique

As stated before Cross section data of Pakistan Social Living Standard Measurement Survey for the years 2004-05, 2005-06, 2006-07, 2007-08, 2008-09, 2010-11 ,2011-12 and 2012-13 are pooled for the estimation. The Pseudo panel is used since it has the capacity to explain the past characteristics while simultaneously predicting the future behavior as compared to the simple cross section data. Further to this in a pseudo panel number of individual or household covered and the time period spanned are large over the repeated cross section. Panel data requires the assessment for the influence of gender equality on female labor force participation. Individuals or households that can be traced back over time in order to explore the changes in average wages of household, facilities available in house would be useful in getting the historical perspective about the female labor force participation. This is the only restriction this study faced.

However, Deaton (1985) found that pseudo panels do not suffer from attrition problem that genuine panels have, and are usually available over longer time periods as compared to genuine panels. Deaton (1985) introduce the use of cohort i.e. estimating the empirical relationships by using some common characteristics like sex, date of birth, region etc shared by the group of individuals, known as cohort. This technique also helps in reducing the problem of heterogeneity that usually arises in cross sectional data. Following Deaton the study used cities and female in age group 25-65 as cohorts by applying Pseudo Panel technique.

In order to estimate study starts by considering the following simple model

$$Y_{it} = \alpha_i + \beta X_{it} + \varepsilon_{it} \quad t = 1 \dots T \quad \text{_____} \quad (3)$$

Where “ X_{it} is a $(K \times 1)$ vector of explanatory variables” which is assumed to be exogenous, i is an index of individuals and t is the time periods. By using Deaton (1985) technique cohorts C based on the city are identified, such that each individual i is a member of one and only one cohort for each t . Averaging over the cohorts gives:

$$\bar{y}_{ct} = \bar{\alpha}_{ct} + \beta \bar{x}_{ct} + \varepsilon_{ct} \quad C = 1 \dots C \quad \text{_____} \quad (4)$$

It is supposed that if the size of the group c at time t is n_{ct} then the mean value of all analyzed X_{it} 's in the cohort c at time t can be given as:

$$\bar{x}_{ct} = n_{ct}^{-1} \sum_{i \in c}^{s=t} x_{is} \quad \text{_____} \quad (5)$$

Over T periods and C cohorts this data is now a pseudo panel of iterated observations.

Overall 112 observations of 14 urban cities are obtained from the eight cross section data periods of time. The pseudo panel is constructed by computing cohorts/cells average for each available cross section, where the cells are defined as city codes for the female age 25-65. After making pseudo panel fixed effect regression model is applied to analyze the determinant of gender equality and female labor force participation.

3.2 Fixed Effect Technique⁵

Deaton (1985) recommended the use of fixed effect model to estimate the pseudo panel. The sample average presents a reliable estimator of the time-invariant inhabitants mean when the sizes of cohorts are large. The larger n_c , means the errors-in-variables dilemma caused by probable time discrepancy in $\bar{\alpha}_{ct}$ is ignorable and standard estimators like the fixed effect (within) estimators can be used.

Our research falls into this category as well because the standard cohort size is reasonably substantial. Therefore, the determinants of female labor force participation are estimated by the standard fixed effect estimator on the cohort means that eliminates any unobserved differences between individual cohorts.

The objective of most empirical studies in economics is to explain the relationship between a dependent variable, Y, and one or more explanatory variables (X_1, X_2, \dots, X_k). If X_i has an effect on Y, then direction and size of the effect should be known. If X_i influences on Y, then direction and size of the effect should be known. To attain an unbiased reckon, observable and unobservable confounding variables are required to be restricted.

A multiple classical linear regression model is used to organize for recognizable confounding variables. A fixed effect regression model is used to organize unobservable confounding variables that vary across units, but is time invariant. The fixed effect regression model is an annex of the multiple classical linear regression models. However, for using a fixed effect regression model, panel (longitudinal) data is required.

The equation given below is fixed effect model (FEM) and is represented as:

$$Y_{it} = \beta_{1i} + \beta_2 X_{it} + \beta_3 X_{3it} + u_{it} \quad \text{_____} \quad (6)$$

⁵ The data does not have an endogeneity problem as it has been checked through Hausman test.

Where the subscript i refer to different individuals and t refers to different gauges within individuals, i.e. the same variable evaluated at different points in time.

Fixed effect model is time invariant because intercept may differ across individuals and each individual's intercept does not vary over time. By applying the fixed effect techniques it is possible to organize for all probable features of the entities even without calculating approximately them so long as those features do not modify over time. By applying ordinary least squares linear regression the fixed effect techniques can easily be implemented if the dependent variable is quantitative. To controls for the fixed effect model all time-invariant dissimilarities between the characters, evaluates the coefficients of the fixed effect models which are not inclined because of excluded time-invariant characteristic (like customs, religion, gender, race, etc)

The affiliation between analyst and consequence variables is investigated by fixed effect within an entity. Individual characteristics of each entity might or might not manipulate the predictor variables. It is implicated that something within the entity may influence or discriminate the forecasted variables and it is needed to be controlled by using fixed effect. The conjecture behind this validation is the correspondence between individual's inaccuracy and forecast variables. Fixed effect eradicates the consequence of those times invariant characteristics that can be appraised by the net consequence of the predictors on the outcome variable. By using Panel data regression, the fixed effect technique is used to estimate the effect of gender equality in professional education on female labor force participation rate for 14 major urban areas of Pakistan.

4. Data Sources

To scrutinize the influence of gender equality on professional education and female labor force participation for major cities of Pakistan the present research pooled cross section data of Pakistan Social Living Standard Measurement Survey for the time span of 2004-2005 to 2012-2013. The Sampling technique and questionnaire of Pakistan Social Living Standard Measurement Survey has gone through many changes since its inception for example after 2004-05 Pakistan Social Living Standard Measurement Survey is reporting district wise data. However, for the year 2005-06 and 2007-08 the district level data are not available. For these two periods the sampling covers 14 large cities, Urban Divisions and Rural District. As the assessment is based on major urbanizing areas of Pakistan (large cities) the estimation remains unaffected by the changes. Further limitation that study faced using the Pakistan Social Living Standard Measurement Survey data is that the data sets consist of repeated cross sections since each year different households are surveyed. To overcome the limitations Pseudo Panel technique is applied here

5. Results and Discussion

The results of Professional education equality index are discussed in table 3 and 4 whereas its determinants are discussed in table 6.

5.1 Professional Education Equality Index

Changes in gender equality of professional education by time and city are discussed in table 3 and 4 respectively. Change in female labor force participation by time and city is discussed in table 5 and its determinants are discussed in table 7.

Table 3: Gender Equality in Engineering Education by Time and City

| City | 2004 | 2005 | 2006 | 2007 | 2008 | 2010 | 2011 | 2012 |
|------------|-------|---------|-------|-------|-------|-------|-------|-------|
| Islamabad | 0.602 | 0.511 | 0.617 | 0.482 | 0.605 | 0.590 | 0.534 | 0.514 |
| Rawalpindi | 0.520 | 0.494 | 0.525 | 0.474 | 0.541 | 0.556 | 0.564 | 0.566 |
| Sargodha | 0.458 | 0.518 | 0.487 | 0.509 | 0.468 | 0.512 | 0.520 | 0.581 |
| Faisalabad | 0.462 | 0.487 | 0.507 | 0.450 | 0.518 | 0.522 | 0.560 | 0.555 |
| Gujranwala | 0.476 | 0.529 | 0.484 | 0.544 | 0.527 | 0.552 | 0.564 | 0.558 |
| Sialkot | 0.513 | 0.489 | 0.518 | 0.529 | 0.537 | 0.522 | 0.519 | 0.574 |
| Lahore | 0.509 | 0.575 | 0.512 | 0.514 | 0.545 | 0.527 | 0.518 | 0.554 |
| Multan | 0.361 | 0.394 | 0.456 | 0.538 | 0.463 | 0.469 | 0.493 | 0.608 |
| Bahawalpur | 0.448 | 0.601 | 0.400 | 0.574 | 0.508 | 0.508 | 0.606 | 0.593 |
| Sukkur | 0.419 | 0.534 | 0.475 | 0.541 | 0.374 | 0.397 | 0.456 | 0.543 |
| Hyderabad | 0.421 | 0.498 | 0.434 | 0.498 | 0.498 | 0.499 | 0.472 | 0.608 |
| Karachi | 0.541 | 0.465 | 0.551 | 0.571 | 0.563 | 0.560 | 0.576 | 0.579 |
| Peshawar | 0.374 | 0.36951 | 0.332 | 0.337 | 0.345 | 0.288 | 0.369 | 0.565 |
| Quetta | 0.427 | 0.388 | 0.370 | 0.454 | 0.382 | 0.303 | 0.400 | 0.648 |

Source: Author's own estimation

Table 4: Gender Equality in Medical Education by Time and City

| City | 2004 | 2005 | 2006 | 2007 | 2008 | 2010 | 2011 | 2012 |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Islamabad | 0.595 | 0.512 | 0.619 | 0.483 | 0.607 | 0.594 | 0.528 | 0.515 |
| Rawalpindi | 0.523 | 0.496 | 0.529 | 0.473 | 0.542 | 0.555 | 0.571 | 0.567 |
| Sargodha | 0.465 | 0.522 | 0.493 | 0.508 | 0.476 | 0.514 | 0.519 | 0.582 |
| Faisalabad | 0.464 | 0.493 | 0.508 | 0.451 | 0.519 | 0.522 | 0.563 | 0.555 |
| Gujranwala | 0.482 | 0.529 | 0.485 | 0.545 | 0.529 | 0.553 | 0.565 | 0.562 |
| Sialkot | 0.513 | 0.493 | 0.516 | 0.531 | 0.538 | 0.521 | 0.520 | 0.573 |
| Lahore | 0.511 | 0.575 | 0.514 | 0.515 | 0.546 | 0.529 | 0.522 | 0.557 |
| Multan | 0.362 | 0.393 | 0.457 | 0.539 | 0.462 | 0.471 | 0.497 | 0.608 |
| Bahawalpur | 0.449 | 0.603 | 0.401 | 0.571 | 0.508 | 0.508 | 0.602 | 0.593 |
| Sukkur | 0.419 | 0.534 | 0.475 | 0.542 | 0.374 | 0.398 | 0.456 | 0.543 |
| Hyderabad | 0.423 | 0.499 | 0.441 | 0.497 | 0.506 | 0.504 | 0.472 | 0.608 |
| Karachi | 0.541 | 0.465 | 0.554 | 0.571 | 0.564 | 0.560 | 0.578 | 0.576 |
| Peshawar | 0.376 | 0.371 | 0.335 | 0.340 | 0.348 | 0.290 | 0.381 | 0.567 |
| Quetta | 0.429 | 0.387 | 0.374 | 0.459 | 0.384 | 0.303 | 0.404 | 0.645 |

Source: Author's own estimation

Results indicate that Gender equality in engineering and medical education has increased in almost all the cities. The equality in engineering education was prominent in Islamabad, Karachi and Lahore in 2004 but after 2004 trends have changed. The equality has become prominent in Bahawalpur, Multan, Sukkur and Quetta. Similarly the equality in medical education in 2004 was prominent in Islamabad, Karachi and Lahore. But after 2004 the change has become more prominent in Bahawalpur, Gujranwala, Hyderabad, Sukkur and Quetta.

Female Labor Force Participation by Time and City

Changes in female labor force participation across time and city is discussed in table 5

Table 5: Female Labor Force Participation by Time and City

| City | 2004 | 2005 | 2006 | 2007 | 2008 | 2010 | 2011 | 2012 |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Islamabad | 14.00 | 18.161 | 10.4 | 16.089 | 14.689 | 17.012 | 8.75 | 11.283 |
| Rawalpindi | 8.333 | 12.044 | 6.866 | 7.220 | 5.043 | 8.745 | 6.557 | 9.742 |
| Sargodha | 5.149 | 8.481 | 7.302 | 10.662 | 3.478 | 7.563 | 8.481 | 5.143 |
| Faisalabad | 8.847 | 14.61 | 5.860 | 19.256 | 7.483 | 6.439 | 12.935 | 6.218 |
| Gujranwala | 6.728 | 7.447 | 2.687 | 8.242 | 3.172 | 3.874 | 5.848 | 6.274 |
| Sialkot | 5.714 | 8.947 | 5.911 | 7.447 | 3.875 | 5.449 | 11.358 | 7.789 |
| Lahore | 7.958 | 6.667 | 7.492 | 5.263 | 8.836 | 8.758 | 20.789 | 9.787 |
| Multan | 18.594 | 23.889 | 10.873 | 15.205 | 10.349 | 15.317 | 17.441 | 11.351 |
| Bahawalpur | 17.822 | 11.806 | 16.109 | 16.552 | 16.667 | 8.3070 | 7.173 | 14.765 |
| Sukkur | 8.192 | 7.043 | 10.027 | 6.776 | 5.808 | 5.371 | 4.032 | 7.692 |
| Hyderabad | 6.984 | 15.094 | 10.628 | 12.914 | 7.166 | 6.022 | 12.636 | 16.901 |
| Karachi | 7.799 | 7.017 | 6.716 | 11.428 | 7.159 | 5.996 | 6.632 | 7.106 |
| Peshawar | 6.856 | 9.669 | 6.175 | 7.692 | 5.972 | 5.143 | 6.452 | 5.676 |
| Quetta | 5.326 | 5.369 | 4.382 | 4.558 | 5.64 | 3.689 | 8.709 | 4.938 |

Source: Author's own estimation

The above table indicates that female labor force participation has increased in all the cities but the change is more prominent in Bahawalpur, Multan and Hyderabad.

5.2 Determinants of Gender Equality in Professional Education

This section is based on the estimation of equation 1. Table 6 presents the outcomes.

Table 6: Determinants of Gender Equality in Professional Education

| Variables | Coefficients of Engineering Education Equality | Coefficients of Medical Education Equality |
|-------------------------------------|--|--|
| Household size | 0.001 (0.19) | 0.002 (0.22) |
| Married Female | -0.640 ^{***} (-1.85) | -0.635 ^{***} (-1.86) |
| Single Female | -0.541 (-1.81) | -0.554 (-1.46) |
| Children under 15 years | -2.66E-04 [*] (-3.00) | -2.77E-04 [*] (-3.17) |
| Adult Dependency ratio | 0.007 ^{**} (2.03) | 0.006 ^{**} (2.05) |
| Average mother years of education | 0.008 ^{**} (2.13) | 0.008 ^{**} (2.22) |
| Male head of household | -8.8E-05 (-1.08) | -8.6E-05 (-1.07) |
| Education of Male head of household | 0.058 [*] (4.10) | 0.059 [*] (4.25) |
| Drinking water | -4.79E-06 ^{***} (-1.86) | -4.97E-06 [*] (-1.96) |

| | | |
|--------------------------------|----------------------|----------------------|
| Gas used for cooking | 6.02E-05* (2.73) | 6.03E-05** (2.77) |
| Electricity used for lightning | -8.82E-06 (-0.55) | -7.33E-06 (-0.46) |
| Household income | 0.018** (2.21) | 0.017** (2.19) |
| Constant | 0.708*** (1.88) | 0.717*** (1.93) |
| Number of observations | 112 | 112 |
| R ² within | 0.599 | 0.609 |
| R ² between | 0.644 | 0.636 |
| R ² overall | 0.604 | 0.606 |
| F- statistics (12,72) | 8.98(0.000)* | 9.37(0.000)* |

Note: *, **, *** Significant at 1%, 5% and 10% respectively. The values in the parentheses represent the t statistics.

As explained earlier a number of variables were explored influencing gender equality mainly emphasizing on female own characteristics. First, the number of married female in a city has significant and negative effect on gender equality in medical and engineering education. An increase in the number of married females in the city by 1% will decrease the gender equality in engineering education equality and medical education equality by 64% and 63% respectively. Unfavorable and significant effect of Children less than 15 years has been observed on gender equality in engineering and medical education as the number of children increases gender equality in engineering and medical education of adult female will decrease, since adult female will be forced to stay at home and look after her siblings rather than achieving her desired education. Precisely 1% increase in the children age below 15 will decrease gender equality in engineering and medical education by 0.026% and 0.027% respectively.

Adult dependency ratio has positive and significant effect on gender equality in Engineering and Medical Education as the number of older person increase in a household they will promote adult's education especially females since they are aware of the importance of education. One percent increase in the presence of older person will increase gender equality in engineering and medical education by 0.7% and 0.6% respectively. Average years of mother education also show a favorable and noteworthy impact on gender equality of professional education. We hypothesize that an educated mother knows the benefits of education so she will take special steps to educate her children especially girls. An educated mother's has an immense affect in domestic negotiations which may permit her to secure more resources for her children. The result confirms our hypothesis. The result shows that 1% increase in the average years of mother education will increase the gender equality of professional education by 0.8%.

Education of the Male head of the household has an affirmative impact on gender equality in professional education as most of the decisions of the house are taken by the head of the household in our society so an educated male always encourage his household members to achieve their desired education especially female's. The result shows that 1% raise in the education of the Male head of the household will enhance the gender equality of engineering education by 5.8% and medical education by 5.9%. Availability of gas used for cooking is used as an indicator of household well-being which shows positive and slightly considerable effect on gender equality in professional education. Drinking water and Electricity used for lighting shows negative and slightly considerable effect on gender equality in professional education. Positive and significant impact of household income on gender equality in

engineering and medical education has also been observed i.e. as increase in household income will diminish the gender gap in professional education. The result shows that 1% increase in household income will increase the gender equality in engineering education by 1.8% and gender equality in medical education by 1.9%.

5.4 Determinants of Female labor force participation on Professional Education

This section is based on the estimation of equation 2. Table 7 presents the results. Gender equality of professional education has unfavorable and significant impact on female labor force participation. Klasen (2013) and Verick (2014) studied that in poorer economies majority of unqualified women contribute in survival pursuit and unofficial service but if they have additional qualification than a secondary school education, higher remuneration urge them to enter the workforce, particularly if suitable professions are accessible while women who are highly qualified might bear to stay out of the workforce. It is also evident from table 2 as the level of education increases unemployment rate of females' increases rapidly than males. The result of this study shows that 1% increase in gender equality of professional education decreases female labor force participation rate by 28%.

Table 7: Determinants of FLFP in Professional Education

| Variables | Coefficients for Engineering Education Equality | Coefficients for Medical Education Equality |
|------------------------------------|--|--|
| Engineering/Medical Equality Index | -27.778* (-2.95) | -27.866* (-2.94) |
| House hold Size | -0.117 (-0.23) | -0.118 (-0.23) |
| Married Female | -86.510* (-2.97) | -86.250* (-2.96) |
| Single Female | -45.419 (-1.41) | -45.740 (-1.42) |
| Male Head of the Household | 0.018** (2.34) | 0.018** (2.36) |
| Child Dependency Ratio | 0.058 (0.81) | 0.056 (0.78) |
| Gas as a source of cooking | -0.002 (-1.17) | -0.003 (-1.20) |
| Electricity as source of Lighting | -0.002 (-1.48) | -0.002 (-1.45) |
| Residential Status on Rent | 0.008* (2.77) | 0.008* (2.75) |
| Size of Manufacturing Sector | 0.098 (1.65) | 0.096 (1.62) |
| Size of Trade Sector | 0.015 (0.48) | 0.015 (0.45) |
| Size of Services Sector | 0.140** (2.32) | 0.141** (2.32) |
| Female Median Wages | 1.55E-07** (2.24) | 1.59E-07** (2.30) |
| Constant | 81.733** (2.60) | 81.944** (2.60) |
| Number of observations | 112 | 112 |
| R ² within | 0.481 | 0.480 |

| | | |
|------------------------|--------------|--------------|
| R ² between | 0.005 | 0.006 |
| R ² overall | 0.144 | 0.149 |
| F- statistics (13,71) | 5.06(0.000)* | 5.05(0.000)* |

Note: *, **, *** Significant at 1%, 5% and 10% respectively. The values in the parentheses represent the t statistics.

Married female in a city have an unfavorable influence on female labor force participation. As the number of married females who have acquired professional education increases in city female labor force participation will decline due to the household responsibilities. More precisely 1% increases in the proportion of married females in the city decreases the female labor force participation by 86%. According to our hypothesis we expected a negative relationship between male head of the household and female labor force participation but now the trends of urban areas are changing therefore females of the family are seen to be encouraged to participate in labor force as the financial burden of the family could be shared. Male head of the household in a city has an affirmative and momentous effect on female labor force participation. The result shows that 1% rise in the number of household headed by male will raise the female labor force participation by 1.8%.

Occupancy status is used as an indicator of household economic status. If household's occupancy status is on rent then female labor force participation will be encouraged, in this order the economic burden will be shared. 1% increase in occupancy status of a household will increase female labor force participation rate by 0.8%. This variable illustrates that females are participating in the labour market only to support their family financially. Favorable and significant impact of the size of service sector have been observed on female labor force participation which shows that if the size of services sector increases then female labor force participation will be encouraged. More precisely 1% expansion in the services sector will encourage the female labor force participation rate by 14% showing that females in the urban areas prefer services sector for employment. Positive and significant impact of females remuneration have been observed on female labor force participation which shows that if the female remuneration in a city improves then female labor force participation will be encouraged.

6. Conclusion and Policy Recommendations

The results of this study are based on the effect of gender equality in professional education on female labor force participation. Results indicate that gender equality in engineering and medical education has increased in almost all the cities but it has shown development especially in Sargodha, Sialkot, Faisalabad, Multan, Bahawalpur, Sukkur, Hyderabad, Peshawar and Quetta. Based on the results study shows that by increasing the education of mother and male head of the household, a positive and significant impact on gender equality in professional education attainment of adults can be observed. Moreover, married female has an unfavorable effect on gender equality in professional education as married female has to fulfill her household responsibilities and raise her offsprings rather than completing her desired education. Household well being plays an imperative role in improving gender equality in professional education. Availability of physical facilities in a house will increase gender equality in education and its shortage or non availability will decrease gender equality in professional education. Household income has an affirmative and noteworthy effect on gender equality of professional education. Therefore gender gap is reducing rather than widening.

The study has also estimated simultaneously the effect of socioeconomic and labor market factors on female labor force participation. In a male dominated society participation of married females in cities is discouraged by their spouses because they are financially stable

or due to home responsibilities and to raise her offsprings. Most of the married females leave their profession due to non cooperative behavior of spouse or in laws or due to tough working conditions. Usually they have to leave their profession after having children because in most of the institutes there is no or lower facility of day care centre. An educated male knows the importance of female contribution in the labor market therefore he encourages females to enter the labor market to make most of their education. Size of services sector and wage has an affirmative and significant effect on participation of female workers. By increasing the opportunities and wages of females in these sectors labor market participation rate of females has increased.

It is suggested to increase public expenditure on higher education, commence immense campaigns regarding awareness of higher education and provision of easy access to higher education institutions to harvest the fruits of higher education. Media and government should participate actively in informing the uninformed parents about the importance of education in today's world. Parental education is significant for best student's academic performance.

The government should ensure the provision of childcare resources to support and encourage mothers to contribute in economic activities. Given that the rate of female labor force participation appears initially to increase with age and then decrease, older educated women should be encouraged to participate by providing benefits such as social security, annual increments and pensions.

Through our analysis it is recommended that there should be strategies to promote women's organization's and secure their civil liberties which would be an essential step to work in healthier environment. There should be appropriate law and legislation which is ought to be imposed to recover the laboring environment and stipulation of sustainable amenities for women who are already employees. Additionally, the firm implementation of laws should abolish the discrimination in labor market through earnings and occupation segregation. From this study it is suggested that as the level of education enhances, female's share in economic and business activities also enhances. More education facilities should be offered to the females, especially, hi-tech, professional and occupation oriented education. The costs of discrimination toward women in education and employment not only harm the women concerned, but impose a cost for the entire society. There is a need to plan such strategies that assist in the most favorable employment of proficient human resources of the nation. This analysis suggests that highly educated, hardworking and capable women should be encouraged to reach top level. This will be an incentive for other women

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Appendix

Table 1: Province Wise Medical and Engineering Universities

| Province | Medical Universities | Engineering Universities |
|--------------------|----------------------|--------------------------|
| Punjab | 32 | 17 |
| Sindh | 27 | 13 |
| Khyber Pakhtonkhwa | 13 | 05 |
| Baluchistan | 02 | 02 |

Source: www.hec.gov.pk

Table 2: Unemployment rate by educational attainment (in %)

| Level of Education | 2009-10 | 2010-11 | 2012-13 |
|---------------------|---------|---------|---------|
| Primary | | | |
| Male | 3.7 | 4.1 | 4.5 |
| Female | 9.5 | 10.3 | 10 |
| Middle | | | |
| Male | 4.5 | 5.2 | 7.6 |
| Female | 12.1 | 14.8 | 15.1 |
| Matric (SSc) | | | |
| Male | 5 | 6.4 | 6.7 |
| Female | 18 | 22.2 | 20.7 |
| Inter (HSc) | | | |
| Male | 5.8 | 8.3 | 7.5 |
| Female | 23.9 | 26.8 | 24.3 |
| Graduation | | | |
| Male | 5.8 | 6.3 | 7.6 |
| Female | 19.5 | 19.3 | 22.1 |

Source: Pakistan Employment Trends 2013