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A COMPARATIVE ANALYSIS OF EGYPT AND TUNISIA

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**Abstract**

This paper aims at examining the gender differences in time allocation between market, house and care work in Egypt and Tunisia, as well as analyzing the determinants of time allocated to each type of work across gender. This is done through relying on the data provided by the LMPS done in Egypt (2012) and in Tunisia (2014). Then, three Tobit equations are estimated simultaneously, each equation is for one type of work, using maximum simulated likelihood (MSL). The main empirical result shows that 'gender' is the most important determinant of time allocation, and that females tend to spend less time on market work, while they spend more time on both house and care work, compared to males.

**Keywords: Gender, time allocation, Egypt, Tunisia, tobit, ELMPS, TLMPS**

**JEL classification:** J01, J16, J22, J70

**ملخص**

تهدف هذه الورقة إلى دراسة الفروق بين الجنسين في تخصيص الوقت بين العمل بأجر والاعمال المنزلية ورعاية الأطفال وكبار السن في كل من مصر وتونس ، فضلا عن تحليل محددات الوقت المخصص لكل نوع من أنواع العمل بالنسبة للرجال والنساء. ويتم ذلك من خلال الاعتماد علي بيانات المسح التتبعي لسوق العمل مصر في (2012 ) و تونس (2014). تم تقدير ثلاث معادلات توبيت آنيا ، كل معادلة لنوع واحد من انواع العمل الثلاث، وذلك باستخدام أسلوب القيمة العظمي للاحتمال. وتبين النتيجة الرئيسية ان "النوع " هو أهم محدد لتخصيص الوقت بين انواع العمل الثلاث ، وان الإناث ينزعن إلى قضاء وقت اقل في العمل باجر ، في حين يقضون وقتا أطول في العمل في المنزل وفي الرعاية ، مقارنه بالذكور.

## 1. Introduction

Gender equality and women empowerment are among the major challenges facing several developing countries, especially those facing high levels of poverty and where the norms and traditions still favor males' dominance. Meanwhile, many of those countries try to adopt the United Nations Millennium Development Goals (MDGs), including gender equality and women empowerment, to achieve the goals of human development and poverty alleviation.

Achieving gender equality requires, among other things, eliminating the gender disparities in labor market and increasing women's employment opportunities. Enhancing and improving women's involvement in the economy would in turn promote development and economic growth. It is well known that if regular, full-time jobs, which offer clear career prospects, are available and easily accessed by women; this would enhance their empowerment and provides them with different interests and achievements compared to domestic and housework. Moreover, women's earnings are argued to affect their status and their decision-making power in the family and in the society as a whole. Nevertheless, there are some obstacles that face women's participation in the labor market and prevent them from obtaining better jobs, leading to the existing gender differences in the labor market outcomes (Robles, 2010).

This research focuses on one main dimension of gender differences in the labor market in both Egypt and Tunisia, specifically: time use. That is ***Time allocation*** between different types of work and leisure. Type of work in this context includes market, house, and care work. Recently, both researchers and policymakers have been concerned about time use and time scarceness (Williams et al., 2016).

There is a wide consensus that time as a resource is as significant as income in determining individual well-being[1], and that spending time in leisure, rest, and self-care would make the individual more productive (Saqib and Arif, 2012). Yet, workloads may push an individual to make trade-offs between different market and household activities. Studies discussed usages and restrictions of time, time use determinants and its impact on economic development of countries[2].

One important issue in this context is the gender disparities in time allocation. The allocation of time between leisure and work differs by individuals especially between men and women. Generally, how individuals allocate ***time*** between market, house, care work, and leisure is determined by numerous factors, including 1) issues related to seasonality and farm system 2) regional factors, like access to water and fuel, infrastructure availability, and distance to key social and economic services such as health centers, schools, markets and financial institutions, 3) household composition and life cycle matters (gender and age composition of household members), and social and cultural norms.

Social and cultural norms play a vital role in shaping the gender division of labor and consequently the disparities in time allocation among males and females (Blackden and Wodon, 2006). In general, social norms classify specific activities as more feminine or more

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[1] Vickery (1977), Douthitt (1994), Ilahi (2000,2001), Bardasi and Wodon (2006), Ribeiro and Marinho (2012).
[2] Blackden and Bhaun (1999), Gelb (2001), Newman (2002), Apps (2004), Ribeiro and Marinho (2012).

masculine than others. Unpaid house- and care work is usually carried out by women, and they usually spend excessively more time on this type of work than men. Accordingly, the allocation of time between leisure and work differs by individuals especially between men and women. Many studies provide evidence that women face competing claims on their time [1] hence they allocate more hours to work productive and nonproductive – compared to men - leaving them with very little time for rest or leisure. For example, a report by ILO (2009) mentioned that 10% of girls in the age group (5 – 14 years) perform household work for 28 hours or more per week, which represents almost twice the time spent by boys in the same age group. Furthermore, ILO (2009) showed that school attendance of this 10% of girls is 25% less than girls spending less than 14 hours per week on housework (Ferrant, 2014).

In developing countries, especially in rural areas, the situation is worse. Due to lack of basic infrastructure, the time constraints on women are more severe (Arora, 2014). Examining hours spent on paid and unpaid work shows the extent of the gender gaps in division of unpaid work. On average, men allocate longer hours to paid work, while women allocate longer time to unpaid work, such as subsistence production (including collection of water and firewood); household tasks; and care work for children and the elderly (Ferrant, 2014). Time allocated to this unpaid work leaves women and girls with less time for paid work, thus restraining their contribution to the economic welfare of their families. Besides, it limits their time available for education or political and social activities, which could help advance their status (ADB, 2015).

This gender inequality in time allocation between market and housework is argued to be the missing link that may explain gender gaps in labor market outcomes. The gender gap in unpaid housework has major effects on women's ability to participate in the labor market and on the type as well as the quality of employment opportunities available to them (Ferrant et al., 2014). In other words, the burden of housework on a woman limits the time she can allocate to market work and permits her to participate only in productive activities that suit her housework duties (Robles, 2010). Blackden and Wodon's (2006) study showed that gender-based division of labor, where men being more engaged in productive activities while women are more burdened by domestic tasks, is particularly significant in Africa.

Research on the determinants of gender inequalities regarding time allocation between market, household and care work, has been relatively scarce. Moreover, most of the available studies on time allocation have focused on developed countries; there are few studies that tried to tackle this subject in developing countries in general (most of these studies focused on African and Latin American countries). For the MENA region in particular this topic is relatively neglected. This is due to the limited availability of data on time use, despite the fact that over the past two decades many developed and developing countries initiated time use surveys (Ferrant, 2014).

In addition, many gender studies examining labor supply usually ignore the dimension of housework and care responsibilities and the tradeoffs between paid and unpaid activities. However, including this dimension of work in the analysis is crucial, since household chores, which are considered mostly as low-productive, time- and labor-intensive, are vital for

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[1] Tibaijuka (1984), Ngome (2003), Fafchamps et al. (2009), Sow (2010), Arora (2014).

family subsistence. Furthermore, it is vital for policymakers and development practitioners to focus on them unequivocally, as non-market work is of specific importance from a gender perspective, since the household economy is where women mainly work. Analyzing time use would help provide policymakers and development practitioners by a more comprehensive depiction of labor effort and employment, by highlighting the importance of nonmarket contributions, alongside market-based work (Blackden and Wodon, 2006).

This study, therefore, attempts to fill in these gaps by studying the gender differences in time allocation between market, housework and care work in two MENA counties particularly Egypt and Tunisia. This is done by exploring the gender differences in total workload for household members aged 6 and older in both countries and then analyzing the determinants of time allocated to market, household work and care work across gender. This research is expected to provide an enhanced understanding of labor supply in the two countries, by including the dimension of housework and care work in the analysis, which was often neglected in literature. The study makes use of data provided by the LMPS done in Egypt (2012) and in Tunisia (2014), which includes some questions on time use.

The paper is organized as follows. The second section after the introduction reviews the literature tackling time allocation. Section three describes the methodology adopted. The data and descriptive statistics are presented in part four. Part five displays estimated resulted and interpretation. Finally, section six concludes.

## 2. Conceptual Background and Literature Review

In recent years, a common area of research in labor economics and poverty has been dedicated to studying the significance of time use in economic analysis. Several studies about the labor market investigated uses of time, its determinants and restrictions, others focused on its impact on economic development of countries (Newman, 2002; Blackden and Bhaun, 1999; Gelb, 2001; Apps, 2004). In general, and especially in developing world, female participation in paid work is underestimated due to neglecting the time they devote to unpaid tasks such as housework, and care work. *In what follows we present a brief discussion of the literature that tackled time allocation with a special interest in the gender disparities aspects*.

The subject of time allocation in economics appeared a long time ago (Rosenstein-Rodan, 1934; Robbins, 1930). Robbins's (1930) standard labor/leisure model hypothesizes that paid work does not provide direct utility, hence paid work improves the worker's utility only through the goods obtained through the earned income (outcome utility). Whereas, all time devoted to leisure yields utility directly (process utility) (Kimmel and Connelly, 2007). Although this theoretical foundation seems reasonable for males, it is not for females who do the majority of housework, child and elder care work even if their paid work hours increased. This conventional labor supply model of consumption and leisure was extended by what came to be known as The New Home Economics models. These models were initiated by Becker (1965) in the early 1960s and later by Gronau (1977). They included home production as an additional activity that needs human labor (Ilahi, 2000). Hence, they

introduced household production[1] into the mainstream of economics, namely the neoclassical economic theory (Heckman, 2014; Mattila-Wiro, 1999; Pollak, 2002; Jankiewicz 2015).

The New Home Economics models recognized that a considerable share of time not spent in paid employment is home production time, not leisure (Kimmel and Connelly, 2007). As Gronau (1977) put it, considering the entire time spent by females outside market work as "leisure", overlooks the production activities she engages in at home. These activities are better termed "domestic production" (Hendy 2010). Gronau (1997) and Graham and Green (1984) divided time outside the labor market into home production and pure leisure (Kimmel and Connelly 2007).

The recognition of childcare as a different activity from leisure and/or home production is even more recent (Ribar, 1995). On one hand, childcare is similar to leisure in terms of the satisfaction it provides, and the time it consumes. Nevertheless, it shares with home production the large effort it requires and that it is not compensated. On the other hand, it differs from both types of time use, since it is not easily substituted in the market. Empirically, substantial differences between these alternative types of time use, as well as between the economic factors affecting them are confirmed. Hence, theoretically five categories of time use could be recognized (paid) market work, (unpaid) house work, child care, leisure and other. This last category "other" comprises personal investment time like sleep, personal care time, education, and job-seeking (Kimmel and Connelly, 2007).

Theoretically, there are three main perspectives that could be used to explain intra-household allocation of available time between paid work, non-paid housework including care work and leisure: (1) the ***time availability perspective***, (2) the ***relative resources perspective***, and (3) the ***gender perspective*** (Bianchi et al., 2000; Garcia-Mainar, 2009).

The ***time availability perspective*** supports that time is allocated according to the availability of household members, as well as to the amount of housework needed (Coverman, 1985; England & Farkas, 1986; Hiller, 1984). Hence, females' and males' time allocated to housework is determined according to *time constraints* faced by each of them as captured by time spent in market work and family composition. Shelton (1992) shows that those time constraints, as proxied by *employment status*, *marital status*, and *parental status*, explain a sizable amount of difference in housework. The correlation between these factors and housework differs significantly by gender; where women's time is more affected by those factors (Bianchi et al., 2000).

Within the ***relative resources perspective*** two main theoretical approaches can be recognized, namely the *efficiency approach* and the *game-theory approach*. The efficiency approach employs Becker's (1965) and Gronau's (1977) unitary model, according to which a household behaves as a single decision-making unit, maximizing its utility subject to a budget constraint (Becker, 1965; Garcia-Mainar, 2009). According to this model, households

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[1] The use of the term "household production", referring to nonmarket work performed in the context of seeking utility, also has a relatively long history (Kneeland, 1929; Kyrk, 1933; Mitchell, 1937; Reid, 1934). Yet, it was the work published in the 1960s by Becker (1965) that combined it in the mainstream economics back then.

allocate labor to maximize efficiency and output through specialization of partners. Spouses are skilled either in nonmarket or market work. Due to females' role as mothers they have a comparative advantage in house work, hence most of their time is allocate to unpaid work, while males' have a comparative advantage in wage earning as captured by higher levels of education or income, hence most of their time is allocated to market work. Accordingly, the higher the male's comparative advantage in market work, as reflected in higher levels of education or income, the less time he allocates to house work (Bianchi et al., 2000).

These Becker and Gronau unitary models were subject to considerable criticism. One main criticism was that, these models are "common preference" or "benevolent dictator" models, which do not consider intra household differences and the possibility of various decision makers in the same household (Ilahi, 2000). This lead to a reinterpretation of these models and the introduction of the collective models, that take into account several decision-makers in a household (Rathnayaka and Weerahewa, 2015). Those models assume that household consists of numerous individuals with distinct preferences. Each member makes decisions within his or her own scope, and responds to the other's decisions by changing the level of voluntary contribution to shared goods so that the intra-household decision process should result in Pareto-efficient allocations (Chiappori, 1988, 1992, 1997; Garcia-Mainar, 2009).

The second approach within the relative resources perspective is the *game-theory approach*. According to this approach, power relations between males and females determine the allocation of housework. Since power relations is determined by the amount of relative resources each member contribute to the household, the time allocated to housework by each partner depends on the amount of relative resources each of them contribute to the household (Blood & Wolf, 1960; Brines, 1994). For example, a higher level of education and income relative to the partner are translated into more power, which is used to escape doing housework. In this context, women are principally in charge of housework, since they are economically dependent on their husbands, and in turn cannot successfully bargain out of housework (Brines, 1994; Greenstein, 1996b; Weiss and Willis, 1985; Konrad and Lommerud, 1995; Manser and Brown, 1980; McElroy and Horney, 1981; Garcia-Mainar, 2009).

Finally, the **gender perspective** introduced by feminists strongly criticizes the time availability and relative resources perspectives and argues that the allocation of housework cannot be explained only through time availability and rational choice (Bianchi et al., 2000). This literature highlights the role of social roles and norms in allocation of time and argues that there is a large difference in male/female time use that is not explained by economic variables and can be related to gender social roles set by norms and traditions (Ferree, 1990; Greenstein, 1996b; South & Spitze, 1994; West & Zimmerman, 1987; Ilahi, 2000). This perspective stresses that allocation of housework among females and males in the household expresses gender relations. In other words, males and females within households present their "proper" gender roles through the quantity and kind of housework they do. Where these "proper" gender roles are in part shaped by gender ideology (Greenstein, 1996b). Accordingly, in patriarchal societies the roles of a wife and/or a mother are closely related to doing housework regardless of other types of work they are doing (Robinson & Milkie, 1998; Bianchi et al., 2000). Moreover, whenever an additional housework becomes

necessary, such as childcare work, it is the female who carry the burden for it. Therefore, males are more likely not to respond to their wives' restraints or to the demands of children (Bianchi et al., 2000). Consequently, it is argued that females are primarily doing household tasks, while males are mainly in paid work, because those are largely the roles society sets for them (Ilahi, 2000). Whereas, in more egalitarian views about males and females, labor division is expected to result in a more equal allocation of housework (Ferree, 1991; Shelton & John, 1996; Greenstein, 1996b; Bianchi et al., 2000).

According to the previous discussion, main determinants of time allocation under each perspective could be recognized. The *time availability perspective* identifies the effect of alternatives of time allocation on each other. Within the constraints of the 24-hour day an increase in time allocated for any of paid work, care work, housework or leisure is expected to reduce time allocated to the other three in all households (Bianchi et al., 2000). With regards to the *collective model for intra-household resource allocation*, time allocation choice of each partner is a factor of individual characteristics, household characteristics and a partner's time use decision (Rathnayaka and Weerahewa, 2015). For example, a higher absolute level of education may reduce housework because it increases a person's "comparative advantage" in market rather than in nonmarket work. As for the *gender perspective*, it predicts that females allocate more time to house and care work. Though, recognizing the effect of gender from that of marriage requires examining housework allocation across all types of households (South & Spitze, 1994; Bianchi et al., 2000).

On the empirical side, the international literature is rich with studies that tested the three perspectives in both developed and developing countries, particularly in Africa and Latin America, while that for the MENA region is still lacking behind. Generally, the analyses were limited to married couple households; however, some fewer studies examined the determinants of time use for males and females in all household types (Shelton, 1992; Bianchi et al., 2000).

Mostly, the empirical literature reached mixed empirical support for the three theoretical perspectives (Blair & Lichter, 1991; Coverman, 1985; Kamo, 1988; Presser, 1994; Bianchi et al., 2000). Yet, one robust finding is confirmed that is gender explains more variation than any other factor (Shelton & John, 1996; Bianchi et al., 2000). Irrespective of demographic or socioeconomic characteristics, available evidence confirms that females do more house work than males, despite the narrowing of gender differences in recent years in some cases, especially in the developed world[1]. Similarly, in developing countries in Africa and South Asia, evidence showed that there are substantial gender differences in time allocation. Females spend more hours on house work compared to males, while the opposite is witnessed for market work.  But, although females spend fewer hours in the labor market, the difference is very small compared to that in housework, which suggests that women are double burdened and perform both types of work at the expense of their leisure time, while men concentrate more on market work (Kimmel and Connelly, 2009; Gwozdz and Sousa-

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[1] Marini & Shelton (1993), Shelton & John (1996), Jankiewicz (2015), Berardo, Shehan & Leslie (1987), Gershuny & Robinson (1988), Hochschild (1989), Marini & Shelton (1993), Nock & Kingston (1988), Shelton & John (1996), Coverman (1985), Shelton (1992), Robinson & Godbey (1997), Habimana (2011), South and Spitze (1994), Gupta (1999), Brines (1994).

Poza, 2010; Burda et al., 2013; Ilahi, 2000; Evers and Walters, 2001; Sow, 2010; Rathnayaka and Weerahewa, 2015).

In general, studies provided support for the *time availability perspective* in the case of females, but not in that of males. This could be explained by the role of norms and culture as argued by the feminist perspective. Studies showed that females' paid work is negatively correlated with time allocated to housework (Brines, 1994; Gershuny & Robinson, 1988; Robinson, 1993; Robinson & Converse, 1972; Shelton, 1990; Shelton & John, 1996; Vanek, 1974; Walker, 1969). Contrasting with females, whether males are employed or not, this did not affect their time spent in house work (Coverman 1985; Shelton, 1990; Shelton & John, 1996). But, how much time females allocate to work was found to be negatively correlated with house work hours (Coltrane & Ishii-Kuntz, 1992; Coverman, 1985; Haddad, 1994; Kamo, 1988; South & Spitze, 1994; Blair and Lichter, 1991; Rones, Ilg & Gardner, 1997).

Few studies focused on the determinants of care work in specific and separated it from housework[1]. Evidence showed that more time spent on paid work decreases own time allocated to childcare and increases time of the partner. But this applies only for males and not for females. Hence, the increased females' paid work leads to a decrease in time devoted to leisure and house work, but not for childcare[2]; while in contrast, males sustained their time in paid work and decreased the time allocated to childcare and to housework. Thus, their evidence suggests that childcare time is treated differently from both house work and leisure[3].

Studies examining the *relative resources perspective* confirmed the role of factors capturing resources on time allocation, but again they pointed out that the effect of these factors varies by gender. Some studies found that females' education is negatively correlated with house work (Berardo, Shehan & Leslie, 1987; Bergen, 1991; Brines, 1994; Shelton & John, 1996; South & Spitze, 1994). However, when separating house work and care work, females' education was found to have a positive correlation with paid work and primary childcare in most cases (Alderman and Chishti, 1991; Khandker, 1988; Ilahi and Grimard, 2000; Ilahi and Jafarey, 1998; Kalenkoski, Ribar and Stratton 2005; Rathnayaka and Weerahewa, 2015; Robles, 2010)[4]. For males, evidence implied a positive relationship between males'

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[1] Determinates of time allocated to childcare has been relatively surprisingly neglected in the empirical literature in developing countries versus that for the developed world probably due to unavailability of data measuring that type of time use separately (Ilahi, 2000).

[2] Nock and Kingston (1988) found that even if mother's employment reduced their childcare time, the reductions were mostly in secondary activities with children (Kimmel and Connelly, 2007).

[3] Howie et al. (2006), Bianchi (2000) and (2005), Reimers (2002), Sandberg and Hofferth (2001), Bryant and Zick (1996), Kimmel and Connelly (2007), Kalenkoski and Stratton (2005), Hallberg and Klevmarken (2003), Korenman, Liao, and O'Neill (2008), Kimmel and Connelly (2007), Sayer, Bianchi, and Robinson (2004), Bianchi and Raley (2005), Sandberg and Hoffert (2001), Howie, et al (2006), Kalenkoski, Ribar, and Stratton (2011).

[4] Some studies for developing countries found that females' education is negatively correlated with paid work and in many cases it raises their leisure (Alderman and Chishti, 1991; Khandker, 1988; Skoufias, 1993; Ilahi and Grimard, 2000; Ilahi and Jafarey, 1998). Although this might be unexpected, but it is explainable, since most time-use data used in those studies are from rural areas, where the returns to education through employment are less than in urban areas. Moreover, typically richer households are those that usually invest in education, and given that members of these households also tend to consume more leisure than those in poorer ones, this explains the deceitful negative association between education and paid work. Furthermore,

education and time allocated to house work (Berardo, Shehan & Leslie 1987; Bergen, 1991; Brayfield, 1992; Brines, 1994; Presser, 1994; South & Spitze, 1994; Shelton & John, 1996). Nevertheless, Shelton (1992) showed that this relationship is nonlinear, where males with high school degrees or some college education allocate more time to house work than males who are high school dropouts or males with a college education.

The evidence for the impact of changes in own and cross wages on females' and males' time-use also differs by gender. Several studies[1] confirmed that, for females as wages increase they put more time into paid work, but for males it leads to a slight income effect as they put more time into leisure and self-care. As for the cross effects of wage changes, the empirical evidence reached that, while female's wage is positively correlated to male's time in housework, an increase in male's wage decreases female's time in paid work and increases leisure (Skoufias, 1993; Newman and Gertler, 1994; Ilahi and Grimard, 2000; Khandker, 1988; Ilahi and Grimard, 2000). With regards to the effect of earnings on care work, results showed that, generally for males, higher wages increase the time their partners allocate to child care, but for females', own wages did not affect their child care time nor their partner's child care time. (Kooreman and Kapteyn, 1987; Korenman, Liao, and O'Neill, 2008; Van den Brink and Groot, 1997; Hallberg and Klevmarken, 2003; Kalenkoski, Ribar, and Stratton, 2013).

Marital status also affects time use, and the effects again vary by gender. Married females, as compared to not married, spend more time on house work. While for males, most studies found little or no effect of marriage on their household labor time (Shelton & John, 1996; South & Spitze, 1994). Yet, few studies found that males in couple households reduced their time in housework (Gupta, 1999; Robles, 2010).

The presence of children in the household is another important determinant of time use. Many studies showed that the presence of children in the household positively affect time allocated to house work and child care work for both males and females, though the impact seems to be more stronger for women (Brines, 1994; Haddad, 1994; Presser, 1994; Sanchez & Thomson, 1997; Shelton, 1992; South & Spitze, 1994; Kimmel and Connelly, 2007; Garcia-Mainar, 2009; Robles, 2010; Craig & Bittman, 2008; Gimenez-Nadal et al., 2012). However, few studies showed no effect (Ross, 1987) or negative effect for males (Pleck, 1983).

The availability of childcare facilities and/or the informal care[2] are factors that are expected to impact the effect of presence of children on time allocation. Not many studies examined that effect. Evidence confirmed that the availability of those alternatives positively affects paid work (Deutsch, 1998; Lokshin, 1999; Wong and Levine, 1992; Connelly et al., 1996; Johnson and Lo Sasso, 2006; Latif, 2006; Maurer-Fazio et al., 2011; Sasaki, 2002; Wakabayashi and Donato, 2005; Rathnayaka and Weerahewa, 2015; Robles 2010). Fewer

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studies that used data for urban areas reached the conventional positive relationship between education and time in paid work (Ilahi, 1999).

[1] Skoufias (1993), Khandker (1988), Ilahi and Jafarey (1998), Ilahi and Grimard (2000), Ilahi (1999), Kimmel and Connelly (2007).

[2] Informal care refers to children and adults who take over from the mother when she leaves like parents or in-laws.

studies examined the effect of the availability and cost of child care facilities or informal care on childcare time. As expected, childcare time was found to be negatively correlated to the presence of other adult women in the household (World Bank, 1999; Ilahi, 2000).

Some studies examined the ***gender perspective*** and confirmed the effect of gender roles and norms as important determinants of time use, such that ignoring them would lead to bias in time use equations. Accordingly, gender differences in time allocation may not be completely explained by gender, the time availability, and/or the relative resources perspective, as captured by differences in the price of time, intra-family bargaining or spousal complementarity. But part of it could be attributed to social norms (Bittman et al., 2003; de Laat and Sevilla-Sanz, 2006; Seguino, 2007; Fafchamps and Quisumbing, 1998; Cunningham, 1999; Kevane and Wydick, 1998). Variables reflecting norms used by those studies include dummy variables of the social status of the individual in the household (Fafchamps and Quisumbing, 1998; Cunningham, 1999) and dummies for ethnicity to explain the role of ethnic social roles on time-use (Kevane and Wydick, 1998).

Finally, it is worth noting that in developing countries, especially in rural areas, lack of roads and other transport infrastructure as well as the infrastructure for the provision of water and energy limits the ability of females to move to make activities related to house work production and paid work (Agenor and Canuto, 2013). It also increases the time devoted to house work to obtain these basic needs either from community sources (such as wells or taps) or open access areas (such as forests and rivers), where in many cases this is done by females (Ilahi, 2000). This triggered some studies to examine the effect of the availability of infrastructure on time allocation. Results showed that lack of access to infrastructure is a significant limitation on women's time allocated to paid work, while it increased time allocated to house work (Ilahi, 2001; Agenor and Canuto, 2013; Kumar and Hotchkiss, 1988; Ilahi and Jafarey, 1998; Ilahi and Grimard, 2000; Ilahi, 1999).

For the MENA region, it is worth noting that at the outset mostly all the available empirical literature is in the context of examining female labor force participation and not time allocation as per se. There exists a relatively huge literature that provides both theoretical and empirical investigation and explanation of male and female labor supply and labor force participation, (Assaad, 2008; Assaad et al., 2000; Awad, 2003; El Ehwany and El-Laithy, 2000; El-Megharbel, 2007; Fawzy, 2002; Nassar, 2011; Radwan, 2002; Ibrahim, 2013; Hassan and Sassanpour, 2008; Dessus and suwa-Eisenmann, 1999 and Assaad and Zouari, 2003).

While very few include "non-market" activities such as house work and care work as a dependent variable Of the very few studies that explored time use for females in MENA countries, Hendy (2010) used available Egyptian time-use data for females, in the Egyptian Labor Market and Panel Surveys of 1998 and 2006, to explore main features of Egyptian females' time allocation and estimated a Propensity Score Matching model to examine the effect of marriage on the female paid and unpaid work. Results showed that marriage and children decreased a woman's time allocated to paid work and increased her time allocated to house unpaid work. Diamond-Smith et al. (2015) studied the effect of the presence of a disabled mother in law on women's work, work time, and leisure time. They used data on

time allocation in Egypt from a survey from 548 women with a living mother-in-law, of which 291 living with their mother-in-law and 257 not. Results showed that living with a disabled mother-in-law is correlated with decreased probabilities of women being in paid work and lower working time per day. Leisure time is found to be not correlated with living with a mother-in-law or with her disability status. Factors capturing couples' relationships and the woman's views on gender norms are also found to affect women being in paid work.

Accordingly, time use, and its determinants are rather neglected topics in the empirical labor economics literature in the MENA region. This could be mainly due to a lack of micro data describing time allocation of both females and males among pay work, house work, care work and leisure (Bardasi and Woden, 2006). To our knowledge no documented empirical study incorporating both males and females in MENA region exists. Most of the literature on the issue focuses on female time-use. Of those rare empirical studies examining time use in the MENA region, none was able to consider the time men spend in household tasks, mainly due to data limitations. However, for the purposes of gender-based analysis it is more interesting to investigate the determinants of time-use for both men and women (Ilahi, 2000).

In this context, the main aim of the study is to fill in this gap in the empirical literature for the MENA region by analyzing this dimension of gender disparities in Egypt and Tunisia: particularly time allocation between paid work, housework and care work for both males and females. Furthermore, the study examines the determinants of time allocation. The paper contributes to the literature by including both males and females in the analysis of time use. We are aware, that estimation based on cross section data can be affected by unobserved heterogeneity and preferably panel data should be used to control for this. However available data on males for both Egypt and Tunisia only allow a cross section analysis and not panel analysis[1]. Since our analysis is interested in gender disparities in time use and time poverty, we cannot limit our sample to females only.

In light of the previous review for existing theoretical and empirical literature, we propose the following main hypotheses, to test their validity through our empirical model:

- ***H1: Gender perspective:*** *gender explains variation in time allocation between market, house and care work.*

    o <u>H1.1</u>: Females spend more hours on house and care work compared to males while the opposite is expected for market work.

- ***H2: Time availability or time constraints:*** *time allocated to house and care work is strongly associated with time constraints measured by employment status, marital status, and parental status.*

    o <u>H2.1</u>: For females, paid work is negatively correlated with time spent in housework but not in care work. For males, whether they are employed or not do not affect time spent in housework or childcare.

    o <u>H2.2</u>: Married female compared to not married, increases time devoted to house work and childcare. While, for males, marriage is irrelevant to their

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[1] It is worth noting that panel data in Egypt is available but only for females and males of the age 6-17 years old.

household labor time.

- o <u>H2.3</u>: The presence of children affects positively time spent on household labor and childcare for both males and females.

- **H3: The *relative resources perspective*:** *time allocated to market, house and care work is strongly associated with the relative resources of the individual measured by education and income.*

- o <u>H3.1</u>: For females, education is positively associated with paid work and childcare, and negatively correlated with household labor time. For males, there is a positive association between males' education, and time spent in market. For housework, the relationship is nonlinear, where males with high school degrees or some college education perform more housework than males who are high school dropouts or males with a college education.

- o <u>H3.2</u>: Household wealth and number of durables decrease females' time in paid work and house work. While, for males, it decreases time in paid work and is irrelevant for house work.

- **H4: Access to infrastructure,** *measured by the availability of sewerage facilities and piped water, increases women market work and decreases house work. While these factors are irrelevant for males' time allocation.*

## 3. Methodology

The paper examines gender inequalities in allocating time to market, household and caring work, in addition to investigating the main determinants of time allocation across gender. To this end, we draw upon the data of household members aged 6 and older provided by the Labor Market Panel Surveys (LMPS) conducted by the ERF in Egypt (ELMPS2012) and Tunisia (TLMPS2014). Since we are interested in housework which includes activities that are not paid, such as animal husbandry and processing of dairy products for household consumption. And since individuals practicing this housework are considered not employed under the market definition of labor force (Assaad and Krafft, 2013), Thus, we adopt the extended market definition[1].

The ELMPs 2012 and the TLMPS 2013 are used to investigate the determinants of time allocation among the three types of work; market, household and care work by gender. ***Household work[2]*** represents all unpaid work done to maintain family members and/or a

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[1] Assaad and Krafft (2013) differentiate between Market Labor Force that includes all individuals either performing economic activity for market exchange or those seeking such work, and the Extended Labor Force that includes individuals producing and processing primary products regardless it is for the market, for barter or for their own consumption, individual producing all other goods and services for the market and for households producing such goods and services for the market, the corresponding production for their own consumption.
[2] For household members, both the Egyptian and the Tunisian Labor Market Panel surveys record the number of hours spent, during the seven days prior to the date of interview, in subsistence work and domestic activities, including: 1) agricultural activities, raising poultry/livestock, producing ghee/butter/cheese, 2) shopping for food, clothing, household items, accompanying family members to their activities, 3) maintenance activities or helping in construction work for the household, 4) cooking, washing dishes, doing laundry and ironing, cleaning house, 5) collecting water, collecting firewood or other fuel, for the purpose of own household

home. As for ***care work***[1], it includes those activities related to childcare and caring for the sick or the elderly. Finally, ***market work***[2] includes all activities and tasks that result in producing goods and services and add to the national wealth and economic growth (Hendy, 2010). Accordingly we have three dependent variables each of them represents the number of hours spent by the individual in each of three types of work.

The hours spent in each type of work are estimated using **Tobit models**, where gender is included as an explanatory variable. Tobit models are econometric models in which the dependent variable is not always observed because it is truncated or censored. Since in our sample there are men and women who do not participate in market or household or caring work, our dependent variables are censored at value zero. Thus, Tobit specification is preferable to the Ordinary Least Squares (OLS), as the latter yields inconsistent parameter estimates with censored data.

Moreover, since the decisions of time allocation between market, house and care work are interdependent, we estimate three Tobit equations simultaneously, each equation representing one type of work, using maximum simulated likelihood (MSL). This is done in Stata using the mvtobit command. The framework of this method is that we may often want to jointly estimate two or more equations with relations among their error processes. In other words, these are independent equations with correlated errors. This method is preferable to the Ordinary Least Squares (OLS), because if there are meaningful correlations between the error processes, the MSL estimates, taking account of those correlations, will be more efficient than those derived from single-equation OLS regressions. In addition, the main issue here is the importance of estimating the equations together, using a system approach.

Under this method, for each observation, a likelihood contribution is calculated for each replication, and the simulated likelihood contribution is the average of the values derived from all the replications. The simulated likelihood function for the sample as a whole is then maximized using standard methods (Maximum Likelihood in this case). Under standard conditions, the MSL estimator is consistent as the number of observations and the number of draws tend to infinity. Moreover, the estimator is asymptotically equivalent to the true maximum likelihood estimator as the ratio of the square root of the sample size to the number of draws tends to zero. Thus, other things equal, the more draws, the better. Hence, the maximum likelihood approach to estimating these three equations as a system, rather than as a three-step estimator, has clear benefits and potential efficiency gains.

On the other hand, a proper modeling of the intra-household allocation of time, require an adequate theoretical framework. The study adopts the efficiency approach, which, by incorporating both the unitary and collective models, allows us to address the question under investigation. Accordingly, and based on the data available**,** the set of explanatory variables

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consumption. Total number of hours spent on housework is obtained as the sum of the hours spent by each individual on all these activities.

[1] The surveys record for each household member the number of hours spent, in the past seven days, on childcare and caring for the sick or the elderly (in case no other chores are done by the individual, as well as in case the individual was doing other activities).

[2] For those who were engaged in any kind of productive activities during the reference period, the survey records, the total number of hours spent in all jobs.

used in our model includes individual socio-economic characteristics, household characteristics and community level characteristics.

Individual characteristics include in addition to gender, which is the main regressor, human capital and other individual characteristics (age, age square, levels of education, dummies for marital, household head and employment status). Higher education levels are expected to increase market work for both females and males, ever married (widowed, divorced or married) is expected to decrease market work and increase house and care work for females while it is excepted to increase market work for males.

Household characteristics include variables reflecting household composition namely household size, share of infants, share of children, share of senior people, share of adult females in the household, as well as wealth quintiles of the household. Share of children and the elders are expected to decrease market work for females and increase care and housework while for males the effect is ambiguous. The share of adult females in the household is expected to increase hours of market work for females and decrease their time allocated to care and housework, while it is expected to have the opposite effect on males' time allocation. Rich households are expected to spend less time on market work and maybe more time on care work compared to poor households while the effect on housework is ambiguous. Moreover, we include household level factors other than household composition, which are believed to influence the number of hours spent in each type of work, mainly variables capturing household standard of living and variables reflecting the access to basic infrastructure resources. Variables capturing household standard of living include type of ownership, number of persons per room and number of durables owned by household. While variables reflecting the access to basic infrastructure include connection to sewerage network and connection to public water networks. It is argued that the lack of access to basic infrastructure affect the individual's ability to engage in market work, especially for women who tend to engage more in house and caring work (Agénor and Canuto, 2012; Lawson, 2007).

Furthermore, social norms are considered crucial determinants for time use. For this purpose, the model included two variables at the governorate level to capture social context; urbanization level measured as the share of urban population from total population by governorate and share of unemployed measured as the ratio of unemployed to the labor force by governorate. In addition, region dummies are included, to capture the regional geographical differences in social contexts (Spierings and Smits, 2007). Descriptive statistics for all variables used in the model for Egypt and Tunisia are reported in tables (1) and (2) respectively in the appendix.

## 4. Data and Descriptive Statistics

This paper makes use mainly of the ELMPS (2012) data carried out by the Economic Research Forum (ERF) in cooperation with Egypt's Central Agency for Public Mobilization and Statistics (CAPMAS), in addition to the TLMPS (2014) carried out also by the Economic Research Forum (ERF) in cooperation with Tunisia's Statistical office. The LMPS is considered the first and most comprehensive source of publicly available micro data on the subject.

The LMPSs are wide-ranging, nationally representative surveys that contain novel information which makes it possible to study time use, and its determinants for both males and females. The surveys include a whole separate section on time use of females and males of the age 6 years and above. It distinguishes time spent not only in market and subsistence work but also domestic work and childcare. The data also covers topics needed in our analysis as individual demographic characteristics for each respondent like age, education, occupation, work status, spouse's education and a lot of information regarding parents' background, fertility, marriage costs etc. It also contains rich information at the household level like household composition, dwelling ownership and access to infrastructure.

For Egypt, our research focuses on 38,107 individuals, in 11,496 households, aged between 6 and 64 years old, with an average age of 29 years old, and 50.3% females. Around 56% of the sample is ever married, and 27% are heads of their households. For Tunisia, the sample consists of 12,879 individuals in 3,974 households, aged between 6 and 64 years old, with a higher average age than Egypt (32.6 years) and a relatively close female share to that in Egypt (53%). The ratio of ever married individuals is around 50% which is less than in Egypt, similarly the ratio of individuals who are heads of their household is 24.7% which is less than in Egypt.

The average work hours for the three types of work are less in Tunisia than in Egypt. In Tunisia the average work hours are 11.3 hours, 1.6 hours and 7.3 hours for market work, care work and housework respectively while in Egypt they are 17.1, 4.5 and 9.6.

As excepted **figure (1)** shows that in both countries comparing males and females average market work hours are greater for males than females while average care work hours and housework hours are greater for females than males. Generally average number of hours allocated by both males and females to the three types of work is higher in Egypt than in Tunisia. For males time allocation is pretty similar in both countries. Males allocate the highest number of hours to market work followed by housework then care work. While for females the two countries differ; as in Egypt females allocate the highest number of hours to housework followed by care work then market work while in Tunisia females allocate more time to market work than to care work.  It is worth noting that –as will be shown in what follows- this pattern of time allocation among the three types of work by males versus females persist even when we take into consideration other characteristics like marital status, age, education…etc.

Looking at time allocation for males and females by marital status (**figure 2**), the same general pattern persists, male allocate more time than female to market work while females allocate more time to house and care work this is true for both single and ever married individuals.  In both countries average hours allocated for the three type of work by males is higher for ever married males compared to single ones. While for females the picture is different in the two countries.  In Egypt, the time allocated to market work is less for ever married females than single ones while the time allocated to house work and care work is higher. In Tunisia we notice a different pattern in case of market work. As the time allocated to market work is slightly higher for ever married females compared to single ones. While for the other two types of work, female time allocation by marital status is similar to that in

Egypt. This may suggest that in Egypt marriage decreases market work for females while it is not the case for Tunisia.

**Figure (3)** reveals that for both countries no matter the age group, comparing time allocation for males versus females follows the same pattern we saw earlier. But time allocation for each gender across age groups is different in the two countries. For Egypt older males (49 to 64 years old) allocate slightly less time to market work and to care work, and more time to housework compared to young males (15 to 49). While older females allocate more time to market work and less time to care and housework. This could be due to the decrease in domestic responsibilities faced by females in the older age group compared to the younger one. For Tunisia, older males allocate significantly less hours to market work and significantly more hours to housework compared to males in the younger group. While older females allocate less hours to market and care work and more hours to housework.

For time allocation by education status, **figure (4)** shows that in both countries no matter the education level the general pattern is repeated; the majority of males' time is allocated to market work while for females more work is allocated to housework compared to market work. In Egypt market work for illiterate males is relatively high while for males who can read and write it is very low, it then increases up to post-secondary level however it decreases for those with university and post university education to be less than that for males with basic education. Illiterate males also allocate higher time to housework compared to those with higher level of education. For females, Illiterate women allocate more time to the three types of work compared to those who can read and write and those with basic education. Starting from the read and write level of education time allocated to the three types of work increase with higher level of education. For all education levels, except the university and above, women allocate more time to housework then care work then market work. For women with university and above level of education time allocated to market work exceed that allocated to care work. In Tunisia the picture looks different. For males, those in the middle education levels (from read and write to post-secondary education) time allocated to different types of work does not seem to differ significantly with levels of education. While the illiterate and university and above levels of education seem to matter. Males in both education levels allocate less time to market work compared to other education levels. For females, the time allocated to market work increases with the level of education similar to Egypt. However, the time allocated to care work and housework does not seem to vary by female's education level with the exception of the illiterate where they allocate more time to housework compared to females with higher levels of education. This may suggest that in Egypt middle education levels do matter for market work for both males and females, while the university degree and above matter more for females than males. Whereas in Tunisia, middle education levels role is weaker for males but important for females together with the university and above level.

Time allocation by male head of the household compared to not head is pretty much similar in the two countries (**figure 5**). Being the head is associated by more time allocated to the three types of work. For females, in Egypt female heads allocate more time to market work and housework and less to care work compared to not head. While in Tunisia female heads allocate more time for the three types of work compared to not head. Still in both countries

the overall general pattern is confirmed, no matter head or no head males allocate more time to market work than to the other two types of work while it is the opposite for females.

**Figure (6)** suggests that time allocation for Egyptian males do not seem to be significantly different according to the region where they live. While for females, region do matter, time allocated to market work is less in Upper Egypt compared to the other regions. In Tunisia time allocated to the three types of work by both males and females differ by region. Males' time allocated to market work is highest in Northwest and lowest in center west, while time allocated to housework and care work is lowest in North and highest in Southwest. For females, average hours of market work is less in center west and the south compared to center east and the north, while it is the opposite for house and care work. This may imply that geographical location matters more for time allocation in Tunisia than in Egypt and for females in Egypt than for males.

Looking at time allocation and share of females in the household.  Generally, **figures (7a)** and (**7b**) suggest that the association is higher in Egypt than in Tunisia.  For both males and females, the higher the share of females in the household the higher the time allocated to market work and the less the time allocated to care work however it seems that the association is higher for females than males in the case of care work. For housework the figure does not support association neither for males nor for females. In Tunisia, no association appears between market or care work and the share of females in the household for males. But for females time allocated to market work increases with the share of female sin the household while time allocated to care work decreases. Finally, similar to the Egyptian case the figure shows no association with housework either for males or females.

**Figures (8a)** and (**8b**) show that in Egypt the higher the share of males in the household the higher the time allocated to market work by males while the association is less announced for females. For care work a negative association appears in case of females only. For housework a weak positive association appears for females. For Tunisia, it appears that share of males in the household is not related with time allocation for females. For males it is only associated with time allocated to market work as the higher the share of males in the household the higher the time allocated to market work by males, while it is not associated with the other two types of work for males. In sum, the figure suggests that for males, male share in the household is positively associated with time allocated to market work only in both countries.

While for females it is negatively associated with time allocated to care work and positively associated to time allocated to housework in Egypt, whereas in Tunisia there is no association.

Finally, **figures (9a)** and (**9b**) show that in general in both countries, the share of children in the household is negatively associated with market work for both males and females and with housework for females only. It is worth noting that in Egypt the association with market work is less pronounced for females than for males

## 5. Empirical Results and Analysis

**Table (3)** in the appendix shows the regression results of the tobit models for each type of work (market, house and care work) for the whole sample (both females and males) in Egypt and Tunisia respectively. As it is shown from the tables most of the regressors are statistically significant (mostly at 5% significance level) with the expected signs. The main regressor of interest is the *female* variable, which is found to be significant in all models of both countries. The results show that females tend to spend less time on market work, while they spend more time on both house and care work, compared to males, keeping all other variables constant at the means. This result supports our derived hypothesis previously mentioned that gender explains variation in time allocation between market, house and care work, and that females spend more hours on house and care work compared to males while the opposite is expected for the market work. Concerning the other individual and household characteristics, the results are mostly similar in Egypt and Tunisia, with some few differences between the two countries, and also some variables seem to have no significant impact.

As was confirmed by the raw data in the descriptive statistics section, the effect of different individual and household characteristics on time allocation may vary by gender. That is why it is better to study the effect of these different determinants for females and males separately. We conducted separate models for the two subsamples (females and males). Below, we present and compare the results of these models in both Egypt and Tunisia.

**Table (4)** and **(5)** show the results of the tobit models for each type of work by gender in Egypt and Tunisia respectively. For *individual characteristics*, the results show that – in Egypt and Tunisia - as *age* increases, the number of hours spent on all types of work increases, but with a decreasing rate for both females and males. with the exception of market work by females in Tunisia where age has no significant effect.

Concerning the *educational level*, in Egypt, in general, the higher the level of education, the less time spent by both females and males on **market work** compared to illiterate counterparts. This applies to females with any educational level, except literate females, where the effect is insignificant, and it applies only for literate males, and those with university and above educational level. In Tunisia, only females and males with university and above educational level tend to allocate less time to market work compared to illiterate counterparts, while other educational levels have no significant effect.

In addition, in Egypt, males with any educational level spend less time on house work compared to illiterate males, with the exception of males with post-secondary education, where the effect is insignificant. For females, those who can read and write allocate less time to house work, while those with basic education allocate more time to house work, compared to illiterate females. On the other hand, in Tunisia, only males with post-secondary education allocates more time to house work compared to illiterate males. For females, education is positively associated with time spent on house work, except for females with post-secondary and university and above educational levels, where the effect is insignificant.

Moreover, in Egypt and Tunisia, in general, both females and males with any educational level tend to spend more time on care work compared to illiterate counterparts, with the

exception of literate females in Egypt. Since this effect is negative and significant for literate ones compared to illiterate females. This general positive association between time allocated to care work and education can be related to the role of education in raising awareness concerning the importance of care work.

These results contradict with the hypotheses derived from the literature concerning the positive association between education and time spent in market work for both females and males. Also, they differ from the hypotheses related to the negative correlation between education and housework for females and the nonlinear relationship between the two variables for males. However, our results support the hypothesis related to the positive association between education and time spent on childcare for females.

Regarding the impact of *marital status*, in both countries, surprisingly it has no significant effect on time allocated to market work by both females and males. However, ever-married females and ever-married males (married, or divorced, or widowed) spend more time on house and care work compared to unmarried counterparts, yet this effect is insignificant for time spent by males on house work in Egypt. This could possibly be explained by the presence of more gender equality in Tunisia compared to Egypt, thus ever-married males in Tunisia may take part with females in doing the house work tasks, and hence they tend to allocate more time to house work. These results support the previously derived hypothesis concerning the positive association between marriage and time allocated to house and care work for females, and the irrelevant relation between marriage and the household labor time for males.

Furthermore, the results show that, in both countries, female *head of the household* tends to allocate less time to market work. Yet, only in Tunisia, male head tends to spend more time on market work compared to non-heads. In addition, the male head of the household in Egypt tends to allocate more time for house work compared to non-head males, holding all other variables unchanged. In Tunisia, this variable shows no significant effect on house work labor time for both genders. Besides, the results show that females in Egypt and males in Tunisia tend to allocate less time for care work if they are the head of the household compared to non-head counterparts, keeping all other variables constant. But, this effect is insignificant for males in Egypt, as well as females in Tunisia.

Regarding the *employment status*, in Egypt, **out of labor force** females tend to allocate more time to **care work**, while out of labor force males tend to allocate less time to house and care work, compared to public wage workers counterparts. In Tunisia, out of labor force females spend more time on house work, while males tend to allocate less time to house work, compared to public wage workers counterparts. But, the effect was insignificant for care work for both females and males.

As for private wage workers, in Egypt, both males and females tend to spend more hours in the market compared to public wage workers, while in Tunisia this is true for females only as the effect is insignificant for males. Only in Egypt, private wage workers females and males tend to allocate less time to house work compared to public wage workers, since in Tunisia the effect is insignificant for females and weakly positively significant for males. Also, a

private male wage worker in Egypt tends to spend fewer hours on care work compared to a public male wage worker.

For self-employed or employers, in both countries, males and females tend to allocate more time to market and house work compared to public wage workers, except for females in Egypt, where they tend to allocate less time to market work and females in Tunisia where the effect is insignificant.

On the other hand, in Egypt and Tunisia, unpaid family workers spend less time on market work and more time on house and care work, compared to public wage workers, holding all other variables constant. This applies for both females and males, with the exception of females' care work time in Tunisia, where the effect is insignificant.

For unemployed females, they allocate more time to house work in both countries, and also females in Egypt tend to spend more time on care work, compared to female public wage workers. For males, the effect is insignificant for all types of work in Egypt, but in Tunisia unemployed males tend to allocate less time to market work and more time to care work, compared to male public wage workers.

These results regarding the impact of employment status goes in line with our derived hypothesis related to the negative association between paid work and time spent in housework but not in care work. However, our results contrast the hypothesis that males, whether they are employed or not, time spent in housework or childcare is not affected, since it was shown that house and care work time is affected by the employment status of male in both countries.

Concerning **household characteristics**, the results show that, in Egypt, *share of adult females* in the household is associated with more time allocated to market work by females only, while this variable - surprisingly - has a negative significant impact on time spent on market work by males. For house work, in both Egypt and Tunisia, share of adult females in the household is associated with less time allocated to house work by both females and males. As for care work, only in Egypt, as the share of adult females in the household increases, time spent on care work by both females and males decreases. Yet, this effect is insignificant for both genders in Tunisia. This is expected and could be explained by the possibility that house and caring tasks will be divided between more females, if the share of adult females in the household increases, and thus, the female could allocate more time to market work and less time to house and care work.

Furthermore, results reveal that – in Egypt - as *household size* increases, the time allocated to market work by females increases, holding all other variables constant. This could be explained by the need of the female who is a member of a large household to spend more time in market work, to be able to gain more earnings to satisfy her needs and maybe to spend on her family members as well. On the other hand, household size is negatively associated with time spent by females on house work in both countries, and positively associated with care work time by females only in Tunisia. For males, in both countries, as household size increases, time spent on care work decreases, keeping all other variables unchanged.

Regarding the *share of infants in the household,* the empirical results reveal that females in Egypt tend to spend fewer hours on market work if they have more infants. This variable has no significant effect on time spent on market work by males in Egypt, as well as time spent on market work by both females and males in Tunisia. This insignificant result for Tunisia could be due to that the majority of the males (85.2%) and females (85.3%) has zero infants' share. Also, females in Egypt and males in Tunisia tend to spend fewer hours on house work if they have more infants.

As for the *share of children in the household*, in both countries, females and males tend to spend fewer hours on house work, and only males tend to spend less time on market work, if the share of children in the household increases. Although this last result is unexpected, it could be interpreted by the possibility that in some cases, when the share of children in the household increases, males may spend less time on market work and they use their children to gain more money through pushing them to work instead.

The *share of seniors in the household* has no statistical significant effect on time spent on market and house work for both genders in Egypt and Tunisia, except for males in Egypt, where they tend to allocate more time to house work if the share of seniors in the household increases.

Finally, all these three variables (the share of infants, share of children and share of seniors in the household), as expected, have a positive significant effect on time spent by both females and males on care work, except for the effect of the share of seniors in the household for males in Tunisia, since it is statistically insignificant. In general, these results are not surprising since with more infants and children in the household, individuals (both females and males) would likely allocate more time to care work rather than to market or house work. This goes in line with previous literature and our derived hypothesis, regarding the positive association between the share of infants, or children or seniors and time spent on care work, since care work includes those activities related to childcare and caring for the sick or the elderly.

Concerning *house ownership*, in Egypt, the time allocated to market work by males living in new rented or furnished houses is higher - on average – than that of males living in their owned houses. This could be interpreted by the urgency to spend more time at work to finance the rent of furnished houses they are living in. Moreover, both females and males living in old rented, or in condominium or granted houses tend to allocate more time for house work, while those living in furnished or new rented houses tend to allocate more time to care work, compared to their counterparts living in their owned dwellings.

In Tunisia, house ownership has no significant effect on time allocation by females. For males, any type of house ownership is associated with more time allocated to market work, compared to living in owned houses. However, none of the house ownership categories has a significant effect on the time spent on house or care work by males, except those living as tenants, where they allocate more time to care work compared to those living in their owned dwellings.

As for the *access to basic infrastructure* resources, in Egypt and Tunisia, results show that both females and males spend less time on market work if they are connected to any form of

*sewerage facility*, compared to those non-connected to such facility. But this effect is more significant in Tunisia than in Egypt. In addition, in both countries, as expected results show that both females and males spend less time on house work, if they are connected to any form of sewerage facility. Only females, in both countries, spend more time on care work, if they are connected to any form of sewerage facility, compared to those with no access. Again, this effect is more significant for females in Tunisia than in Egypt. Furthermore, sewerage facility access has no significant effect on time spent on care work by males in both countries, except for those who have shared toilet connected to a sewerage network in Egypt, where they allocate less time to care work compared to those with no access to such facility.

Moreover, having a *public water network in the housing unit* is associated with less house and care work for females in Egypt and less market work for females and housework for males in Tunisia. Nevertheless, this variable has no other significant effect on time allocation in both Egypt and Tunisia. These results are partly in contrast with our derived hypothesis that access to infrastructure measured by availability of sewerage facilities and piped water increases women market work and decreases housework, while these factors are irrelevant for males' time allocation.

Besides, as the *number of durables owned by the household* increases, the hours spent by both females and males on house work declines in Egypt. Yet, this variable has no significant effect on time allocated to house work by both females and males in Tunisia. In addition, there is a positive association between number of durables owned by the household and market work for both females and males only in Tunisia. Also, only females, in both countries, allocate less time to care work if the number of durables owned by the household increases, holding all other variables constant.

It is worth mentioning that these results, regarding lower time spent on house work in case of having access to basic infrastructure and owing more durables, can be interpreted by the fact that the access to such facilities and goods allows individuals – and specially females - to spend less time in doing the house work tasks such as fetching water and wood...etc. This also goes in line with the results of previous literature (Agénor and Canuto, 2012; Lawson, 2007) that the lack of access to basic infrastructure will lead individuals, especially women, to engage more in house work.

Regarding the impact of household's wealth on time allocation, in Egypt, for females it has no significant impact on time spent in market work while females in the second and third wealth quintiles, tend to allocate more time to house and care work compared to females belonging to the first wealth quintile. For males, wealth is positively associated with time allocated to market work. Yet, males in the upper wealth quintiles (fourth and fifth) tend to allocate more time to house work compared to lowest wealth quintile (first). In Tunisia, wealth has no significant effect on time allocation for both females and males, with the exception of females in the fourth wealth quintile, where they spend more time on care work compared to females in the first wealth quintile. Though, this effect is only significant at 10% significance level. These unexpected results contradict with the derived hypothesis that wealth decrease females' time in market work and housework. While, for males, it decreases

time in market work and is irrelevant for housework. One possible explanation could be that the LMPS surveys do not include households at the end of the wealth distribution.

Concerning **community variables**, the *regional dummies* have significant effect on time allocation for females and males in both countries. In Egypt, generally speaking compared to greater Cairo females living in other regions spend less time in the three types of work. However urban areas seem somehow different as living in urban areas is insignificant for market work while females living in urban lower areas allocate more time to housework and is not significant for care work. For males, those living in Lower Egypt allocate more time to market work, while those living in Upper Egypt allocate less time to care work, and males living in any region allocate less time to housework compared to those living in Greater Cairo. In Tunisia, for market work, females and males living in North West, as well as females living in Center East tend to allocate more time to market work, compared to those living in the North. On the other hand, females living in South East and males living in Center East and South West spend fewer hours on market work compared to their counterparts living in the North. As for house work, the regional dummies tend to affect time allocated to house work by females and males in the same way. Living in any regional area, leads to more time spent on house work by both females and males compared to those living in the North region, with the exception of females living in North West, since the effect is insignificant. For care work, females living in Center East and South East as well as males living in South West tend to spend more time on care work compared to those living in the North region.

*Urbanization* seems to have positive significant effect on time allocated to market work by males in Egypt and females in Tunisia. Also, the increase in the share of urban population leads to more time allocated to house work by females in both Egypt and Tunisia, while it leads to less time allocated to house work by males in Tunisia only. Moreover, urbanization have no significant effect on time allocated to care work in both Egypt and Tunisia. As for *unemployment*, in Egypt, it has a negative significant effect on time allocated for market, house and care work by females and males, except for house work by females, where the effect is insignificant. On the other hand, in Tunisia, unemployment has no significant effect on time allocation for females. Whereas, it has negative significant effect on market work time and positive significant effect on care work time for males. The dissimilar results, regarding the community variables in the two countries, could reflect the difference in values and norms, as well as social contexts, which may affect females' and males' decision concerning the time allocated to each type of work.

## 6. Conclusion

In societies in the MENA region, women are oftenly disadvantaged due to gender division of labor. Women are expected to be the sole household member responsible for house and care work regardless of their market work status. This place double burden of work on women, which negatively impact their well-being and their capability to develop their skills and abilities. This highlights the importance of examining patterns of time allocation by men and women in addition to its determinants. This would help in formulating proper policies to

enable changes in existing household labor time allocation patterns in order to improve women's well being.

This research is a step in this direction. The study examined the gender differences in time allocation between market, housework and care work in two MENA counties particularly Egypt and Tunisia. This is done by analyzing the determinants of time allocated to the three types of work across gender and exploring the gender differences in total workload for household members aged 6 and older in both Egypt and Tunisia, and then comparing the results.

For both countries the results show that females tend to spend less time on market work, while they spend more time on both house and care work, compared to males.

Findings suggest that education is generally associated with lower hours of market and higher care work in both countries for both males and females. Contrary to expectations effect of education on household work is moderate with some education levels having insignificant effects and the impact being most significant for males in Egypt. Moreover, in Egypt and Tunisia, in general, both females and males with any educational level tend to spend more time on care work.

Surprisingly, in both countries marital status has no effect on time allocated to market work by both females and males. While, there is a gender-based division of labor across spouses for housework in Egypt as married women tend to work longer hours in the household, which is not the case for Egyptian men or for neither men nor women in Tunisia. This may reflect presence of more gender equality in Tunisia compared to Egypt.

It appears that the share of adult females in the household relieves women of part of their housework burden in both countries this help them allocate more time to market work only in Egypt.  Generally, the results confirmed the negative impact of access to infrastructure on time allocated to housework by females as it decreased the burden of housework on females in both countries.

Finally, variables at the community level play an important and different role it time allocation for males and females. Moreover, results were different for Egypt and Tunisia. The dissimilar results, regarding the community variables in the two countries, could reflect the difference in values and norms, as well as social contexts, which may affect females' and males' decision concerning the time allocated to each type of work.

In sum, this paper shows that 'gender' is the most important determinant of time allocation. This result reflects and confirms the inflexibility of patriarchal norms in these societies that define and establish a pattern for gender division of labor that is accepted by majority of women. Accordingly, policies aiming at enhancing women status and empowerment should implement programs to raise awareness of both men and women of women's equal rights and the critical role they can play in meeting basic needs of human survival and well-being.

Another policy intervention is related to the availability and access to infrastructure. The results confirmed the importance of availability and access to infrastructure by women to decrease the burden of housework and enable them to allocate more time to market work.

This suggests focusing on action plans and more efforts to achieve equal and universal availability and access of basic infrastructure.

# References

Agénor P.-R., and Canuto, O. (2012). "Access to Infrastructure and Women's Time Allocation: Evidence and a Framework for Policy Analysis." Working Paper No. 45, Development Policies, Fondation Pour Les Études Et Recherches Sur Le Développement International.

Alderman, H. and Chishti, S. (1991). "Simultaneous Determination of Household and Market- oriented Activities of Women in Rural Pakistan." *Research in Population Economics*, 7, 245- 265.

Apps, P. (2004). "Gender, Time Use, and Models of the Household." Policy Research Working Paper Series: 3233, World Bank, Washington, D. C.

Arora, D. (2014). "Gender Differences in Time Poverty in Rural Mozambique." Department of Economics Working Paper Series No.: 2014-05, University of Utah, May 2014.

Asian Development Bank (ADB) (2015). *Balancing the burden? Desk review of women's time poverty and infrastructure in Asia and the Pacific*. Manila, available at: http://digitalcommons.ilr.cornell.edu/intl/483.

Assaad, R. (2008). "Labor Supply, Employment and Unemployment in The Egyptian Economy: 1988-2006." ERF Working Paper no. 0701, Economic Research Forum, Cairo, Egypt.

Assaad, R. and Zouari, S. (2003). "*The Timing of Marriage, Fertility, and Female Labor Force Participation in Morocco."* Paper presented at the Ninth Annual Conference of the Economic Research Forum, UAE.

Assaad, R., F. El-Hamidi and A. Ahmedet (2000). "The Determinants of Employment Status in Egypt." Discussion Paper, 88, Food Consumption and Nutrition Division (FCND), International Food Policy Research Institute, Washington, D.C.

Awad, I., (2003). "Economic Reform, Employment, and Employment Policy in Egypt." Aspects of Structural Reform with Special Reference to the Egyptian Economy, Department of Economics 8th Conference, Cairo, Egypt.

Bardasi, E., and Wodon, Q. (2006). "Measuring Time Poverty and Analyzing Its Determinants: Concepts and Application to Guinea." *Economics Bulletin*, 10 (10): 1-7.

Becker, GS. (1965). "A theory of the allocation of time." The Economic Journal 75(299): 493–517.

Berardo, D. H., Shehan C. L., and Leslie G. R. (1987). "A Residue of Tradition: Jobs, Careers, and Spouses' Time in Housework." Journal of Marriage and the Family 49:381-90.

Bergen, E. (1991). "The Economic Context of Labor Allocation." Journal of Family Issues 12:140-57.

Bianchi, S, and Raley, S. (2005). "Time Allocation in Families". In Suzanne Bianchi, Lynne

Casper and Rosalind King, eds. *Work; Family, Health, and Well- Being*. pp. 21-42, Mahwatz, NJ: Lawrence Erlbaum Associates.

Bianchi, S. (2000). "Maternal Employment and Time with Children: Dramatic Change or Surprising Continuity?" Demography 37(4):401-14.

Bianchi, S. M., Milkie, M. A., Sayer, L. C., & Robinson, J. P. (2000). "Is anyone doing the housework? Trends in the gender division of household labor." *Social forces*, *79*(1), 191-228.

Bianchi, S., Wight V., and Raley S. (2005). "Maternal Employment and Family Caregiving: Rethinking Time With Children in the ATUS." In *ATUS early results conference* (pp. 5-6).

Bittman, M., England, P., Sayer L., Folbre N., and Matheson G. (2003). "When Does Gender Trump Money? Bargaining and Time in Household Work." *American Journal of Sociology* 109(1): 186-214.

Blackden, C. M., and Wodon, Q. (2006). "Gender, Time Use, and Poverty in Sub-Saharan Africa." Working Paper 73, World Bank, Washington, DC.

Blackden, M., and Bhanu, C. (1999). Gender, Growth and Poverty Reduction: Special Program of Assistance for Africa, 1998 Status Report on Poverty in Sub-Saharan Africa. World Bank Technical Paper 428, The World Bank.

Blair, S. L., and. Lichter. D.T. (1991). "Measuring the Division of Household Labor: Gender Segregation of Housework among American Couples." Journal of Family Issues 12:91- 113.

Blood, R. 0., and Wolfe D. M. (1960). Husbands and Wives: The Dynamics of Married Living. Free Press.

Brayfield, A. (1992). "Employment Resources and Housework in Canada." Journal of Marriage and the Family 54:19-30.

Brines, J. (1994). "Economic Dependency, Gender, and the Division of Labor at Home." American Journal of Sociology 100:652-88.

Bryant, W. K., and Zick, C. (1996). "An Examination of Parent-Child Shared Time." Journal of Marriage and the Family 58(l).

Burda, M., Hamermesh, D. S., & Weil, P. (2013). "Total work and gender: facts and possible explanations." *Journal of Population Economics*, *26*(1), 239-261.

Chiappori, P-A. (1988). "Rational Household Labor Supply." *Econometrica* 56: 63-89.

Chiappori, P-A. (1992). "Collective labor supply and welfare." Journal of Political Economy 100(3): 437–467.

Chiappori, P-A. (1997). "Introducing Household Production in Collective Models of Labor Supply." *Journal of Political Economics* 105: 191-209.

Coltrane, S., and Ishii-Kuntz, M. (1992). "Men's Housework: A Life course Perspective." Journal of Marriage and the Family 54:43-57.

Connelly, R., Graff D. and Levison, D. (1996). "Women's Employment and Child Care in Brazil." *Economic Development and Cultural Change*, 619-656.

Coverman, S. (1985). "Explaining Husbands' Participation in Domestic Labor." Sociological Quarterly 6:81-97.

Craig, L., & Bittman, M. (2008). The incremental time cost of children: an analysis of children's impact on adult time use in Australia. Feminist Economics 14(2): 59-88.

Cunningham, W., (1998) "Breadwinner versus Caregiver: Labor Force Participation and Sectoral Choice over the Mexican Business Cycle." The World Bank, mimeo.

De Laat, J., and Sevilla-Sanz, A. (2006). "Working Women, Men's Home Time and Lowest-Low Fertility." ISER WP 2006-23. Colchester: University of Essex.

Dessus, S. and, Suwa-Eisenmann, A. (1999). "Trade Integration With Europe & Labor Reallocations in the South Mediterranean Countries: The Case of Egypt." ERF Working paper 9918, Economic Research Forum.

Deutsch, R. (1998). "Does Child Care Pay? Labor Force Participation and Earnings Effects of Access to Child Care in the Favelas of Rio de Janeiro." Working Paper #384, Inter-American Development Bank, Washington DC.

Diamond-Smith, N., Bishai, D., & El Gibaly, O. (2015). "Inter-generational co-residence and women's work and leisure time in Egypt." *Demographic Research*, *33*, 909.

Douthitt, R. A. (1994). "Time to do the Chores? Factoring Home-Production Needs into Measures of Poverty." *Journal of Family and Economic Issues,* 21(1), 7-22.

El-Ehwany, N., and El-Laithy, H. (2000). "Poverty, Employment and Policy-Making in Egypt: Country Profile." Towards Decent Work in North Africa, 1, International Labor Organization, Geneva, Switzerland.

El-Megharbel, N. (2007). "The Impact of Recent Macro and Labor Market Policies on Job Creation Policies in Egypt." ECES Working Paper No. 123, The Egyptian Center for Economic Studies, Cairo, Egypt.

England, P., and Farkas, G. (1986). Households, Employment and Gender: A Social, Economic, and Demographic View. Aldine.

Evers, B. and Walters, B. (2001). "The Model of a Gender-Segregated Low-Income Economy Reconsidered: Evidence from Uganda." Review of Development Economics, *5(1)*, 76 - 88.

Fafchamps, M. and Quisumbing A. R., (1998). " Social Roles, Human Capital and the Intra household Division of Labor: Evidence from Pakistan," Department of Economics, Stanford University. Mimeograph.

Fafchamps, M., Kebede, B., and Quisumbing, A. R. (2009). "Intra-household Welfare in Rural Ethiopia." *Oxford Bulletin of Economics and Statistics*, 71(4):567-599.

Fawzy, S., (2002). "Investment Policies and Unemployment Problem in Egypt." ECES Working Paper No. 68, The Egyptian Center for Economic Studies, Cairo, Egypt.

Ferrant, G. (2014). "Time Use as a Transformative Indicator for Gender Equality in the Post-2015 Agenda." OECD Development Centre, March 2014.

Ferrant, G., Pesando, L. M., and Nowacka, K. (2014). "Unpaid Care Work: The Missing Link in the Analysis of Gender Gaps in Labour Outcomes." OECD Development Centre, December 2014.

Ferree, M. (1990). "Beyond Separate Spheres: Feminism and Family Research." Journal of Marriage and the Family 52:866-84.

García-Mainar, I., Molina, J. A., & Montuenga, V. (2009). "Intra-Household Time Allocation: Gender Differences in Caring for Children." IZA DP No. 4188.

Gelb, A. (2001). "Gender and Growth: Africa's Missed Potential." Paper No. 197, World Bank, Washington, D. C.

Gershuny, J., and Robinson J. P. (1988). "Historical Shifts in the Household Division of Labor." Demography 25:537-53.

Giménez-nadal, J. I., Marcén, M., & Ortega, R. (2012). "Substitution and presence effects of children on mothers' adult care time." Journal of Family and Economic Issues 33(1): 2-10.

Graham, J., and Green, C. (1984). "Estimating the Parameters of a Household Production Function with Joint Products." Review of Economics and Statistics 66(2): 277 83.

Greenstein, T. N. (1996b). "Husbands' Participation in Domestic Labor: Interactive Effects of Wives' and Husbands' Gender Ideologies." Journal of Marriage and the Family 58:585-95.

Gronau, R., (1977). " Leisure, Home Production and Work -- The Theory of the Allocation of Time Revisited." *Journal of Political Economy*, 85, 1099-1123.

Gupta, S. (1999). "The Effects of Transitions in Marital Status on Men's Performance of Housework." Journal of Marriage and the Family 61:700-711

Gwozdz, W. and Sousa-Poza A. (2010). "Explaining Gender Differences in Housework Time in Germany". Journal of Consumer Policy, *33(2)*, 183 - 200.

Habimana, O. (2011). Gender differences in time allocation: Evidence from Rwanda, Dissertation submitted in fulfillment of Master of Applied Labor Economics for Development, Turin, Italy.

Haddad, T. (1994). "Men's Contribution to Family Work: A Re-examination of 'Time Availability." International Journal of Sociology of the Family 24.

Hallberg, D., and Klevmarken. (2003). "Time for Children: A Study of Parents' Time Allocation." *Journal of Population Economics* 16(2): 205–26.

Hassan, M. and Sassanpour, C. (2008). "Labor Market Pressures in Egypt: Why is the Unemployment Rate Stubbornly High?" paper presented to the International Conference on The Unemployment Crises in the Arab Countries organized by Arab Planning Institute, 17-18 March, Cairo, Egypt.

Heckman, J. (2014). "Introduction to a theory of the allocation of time by Gary Becker." IZA Discussion Paper No. 8424.

Hendy, R. (2010). "Rethinking Time Allocation of Egyptian Women: A Matching Analysis", Working Paper No. 526, Economic Research Forum (ERF).

Hiller, D.V. (1984). "Power Dependence and Division of Family Work." Sex Roles 10:1003-19.

Hochschild, A. R. (1989). *The Second Shift: Working Parents and the Revolution at Home*. New York: Viking Press.

Howie, P., Wicks, J., Fitzgerald J. M., Dalenberg, D., and Connelly R. (2006). "Mothers' Time Spent in Spent in Care of Her Children and Market Work: a Simultaneous Model with Attitudes as Instruments." Applied Economic Letters 13(8):503- 506.

Ibrahim, A. (2013). "The Determinants of Private Sector Demand for Employment in Egypt: 1990-2007." Advances in Management & Applied Economics, vol.3, no.1, 2013, 163-182.

Ilahi, N. (2000). "The Intra-household Allocation of Time and Tasks: What Have We Learnt from the Empirical Literature?" Policy Research Report on Gender and Development, Working Paper Series No. 13, World Bank, Washington, D.C.

Ilahi, N. (2001). "Gender and the Allocation of Adult Time: Evidence from the Peru LSMS Panel Data." Policy Research Working Paper Series No. 2744, World Bank, Washington, D. C.

Ilahi, N. and Jafarey, S. (1998). "Markets, Deforestation and Female Time Allocation in Rural Pakistan," Department of Economics, McGill University. Mimeograph.

Ilahi, N. (1999). "Gender and the Allocation of Adult Time: Evidence from the Peru LSMS Panel Data." The World Bank, mimeograph.

Ilahi, N., & Grimard, F. (2000). "Public infrastructure and private costs: Water supply and time allocation of women in rural Pakistan." *Economic Development and Cultural Change*, *49*(1), 45-75.

ILO (2009). "Give Girls a Chance. Tackling Child Labour, A Key to the Future", International Labour Organization, Geneva.

Jankiewicz, J. (2015). "Time allocation in Poland before and after 1989–working time perspective." *Time & Society*, 0961463X15587836.

Johnson, R. and Lo Sasso, A. (2006). "The Impact of Elder Care on Women's Labor Supply." *Inquiry* 43(3): 195–210.

Kalenkoski, C. M., & Hamrick, K. S. (2013). "How does time poverty affect behavior? A look at eating and physical activity." Applied Economic Perspectives and Policy, 35(1), 89–105.

Kalenkoski, C. M., Hamrick, K. S., & Andrews, M. (2011). "Time poverty thresholds and rates for the U.S. population." Social Indicators Research, 104(1), 129–155.

Kalenkoski, C., Ribar, D., and Stratton L. (2005). "Parental Childcare in Single Parent, Cohabiting, and Married Couple Families: Time Diary Evidence from the United Kingdom." *American Economic Review Papers and Proceedings* 95(2): 194–8.

Kamo, Y. (1988). "Determinants of Household Division of Labor: Resources, Power, and Ideology." Journal of Family Issues 9:177-200.

Kevane, M. and Wydick, B., (1998). "Social Norms and the Time allocation of Women's Labor in Burkina Faso." Economics Department, University of Santa Clara, mimeograph.

Khandker, S. R., (1988). "Determinants of Women's Time Allocation in Rural Bangladesh." *Economic Development and Cultural Change*, 37, 111-126.

Kimmel, J. and Connelly, R. (2009). "Spousal Influences on Parents' Nonmarket Time Choices." Review of Economics of the Household *7(4)*, 361 - 394.

Kimmel, J., & Connelly, R. (2007). "Mothers' time choices caregiving, leisure, home production, and paid work." *Journal of Human Resources*, *42*(3), 643-681.

Kneeland, H. (1929). "Woman's economic contribution in the home." The Annals of the American Academy of Political and Social Science 143(1): 33–40.

Konrad, K, and Lommerud K. (1995). "Family Policy with Non-Cooperative Families." *Scandinavian Journal of Economics* 97: 581-601.

Kooreman, P., and Kapteyn, A., (1987). "A Disaggregated Analysis of the Allocation of Time Within the Household." The Journal of Political Economy 95(2): 223-49.

Korenman, S., Liao M., and O'Neill, J. (2008) "Gender Differences in Time Use and Labor Market Outcomes." Presented at the American Time Use Survey Early Results Conference.

Kumar, S.K. and Hotchkiss D. (1988). "Consequences of Deforestation for Women's Time Allocation, Agricultural Production, and Nutrition in Hill Areas of Nepal." Research Report 69, International Food Policy Research Institute: Washington DC.

Kyrk, H. (1933) "Economic Problems of the Family. New York: Harper and Brothers. Landefeld JS and Mcculla SH (2000) Accounting for nonmarket household production within a national accounts framework." Review of Income and Wealth 3(46): 289–307.

Latif, E. (2006). "Labor Supply Effects of Informal Caregiving in Canada." *Canadian Public Policy / Analyse de Politiques* 32(4): 413–429.

Lawson, D. (2007). "A Gendered Analysis of Time Poverty – The Importance of Infrastructure." GPRG-WPS-078, ESRC Global Poverty Research Group.

Lokshin, M. (1999). "Household Childcare Choices and Women's Work Behavior in Russia." Policy Research Working Paper 2206, The World Bank, Washington.

Manser, M., and Brown, M. (1980). "Marriage and Household Decision- Making: A Bargaining Analysis." *International Economic Review* 21: 31-44.

Marini, M., and Shelton A. (1993). "Measuring Household Work: Recent Experience in the United States." Social Science Research 22:361-82.

Mattila-Wiro, P. (1999.) "Economics Theories of the Household: A Critical Review." UNU-WIDER Working Papers Vol. 1999/159.

Maurer-Fazio, M., Connelly, R., Chen, L., and Tang, L. (2011). "Childcare, eldercare, and labor force participation of married women in urban China, 1982–2000." *Journal of Human Resources* 46: 261–294.

McElroy, M., and Horney, M. (1981). "Nash Bargained Household Decisions: Toward a Generalization of the Theory of Demand." *International Economic Review* 23: 333-49.

Mitchell, WC. (1937). The Backward Art of Spending Money and Other Essays. New York: McGraw-Hill.

Nassar, H., (2011). "Growth, Employment Policies and Economic Linkages: Egypt." Employment Working Paper 85, Employment Sector, ILO, Geneva, Switzerland.

Newman, C. (2002). "Gender, Time Use, and Change: The Impact of the Cut Flower Industry in Ecuador." *World Bank Economic Review*. v. 16, p. 375-95.

Newman, J L. and Paul J. Gertler, (1994), " Family Productivity, Labor Supply, and Welfare in a Low Income Country," Journal of Human Resources, 29, 989-1026.

Ngome, A. (2003). "Gender Division of Labour and Women's Decision- Making Power in Rural Households: The Case of Mbalangi, Ediki and Mabonji Villages of Meme Division." PhD thesis, University of Buea, Department of Women and Gender Studies, Cameroon.

Nock, Steven L., and Kingston P. W. (1988). "Time with Children: The Impact of Couples' Work Time Commitments." Social Forces 67:59-85.

Pleck, J. H. (1983). "Husbands' Paid Work and Family Roles: Current Research Issues." Pp. 251-333 in Research in the Interweave of Social Roles: Families and Jobs. Vol. 3, edited by Helen Znaniecki Lopata and Joseph H. Pleck. JAI Press.

Pollak, RA. (2002). "Gary Becker's Contributions to Family and Household Economics." NBER Working Paper No. 9232.

Presser, H. B. (1994). "Employment Schedules among Dual-Earner Spouses and the Division of Household Labor by Gender." American Sociological Review 59:348-64.

Radwan, S., (2002). "Employment and Unemployment in Egypt: Conventional Problems, Unconventional Remedies." ECES Working Paper no 70, The Egyptian Center for Economic Studies, August, Cairo, Egypt.

Rathnayaka, D., & Weerahewa, J. (2015). "An analysis of gender differences in intra-household time allocation of rural farm families in Sri Lanka." *Tropical Agricultural Research*, *26*(4).

Reid, MG. (1934). Economics of Household Production. New York: John Wiley & Sons, Inc.London: Chapman & Hall, Limited.

Reimer, C. (2002). "Parents' Work Time and the Family." In The Economics of Work and Family, ed. Jean Kimmel and Emily Hoffman, 71-104. Kalamazoo, Mich.: W. E. Upjohn Institute for Employment Research.

Ribar, D. (1995). "A Structural Model of Childcare and the Labor Supply of Married Women." *Journal of Labor Economics* 13(3): 558–97.

Ribeiro, L. L., and Marinho, E. (2012). "Time Poverty in Brazil: Measurement and Analysis of its Determinants." *Est. Econ,* São Paulo, 42(2): 285-306, abr.-jun. 2012.

Robins, L. (1930). "On the Elasticity of Demand for income in Terms of Efforts." Economica 29:123-29.

Robinson, J. P., and Converse, P. E. (1972). "Social Change Reflected in the Use of Time." Pp. 17-86 in The Human Meaning of Social Change, edited by A. Campbell and P. Converse. Russell Sage Foundation.

Robinson, J. P., and Godbey, G. (1997). Time for Life. Pennsylvania State University Press.

Robinson, J. P., and Milkie M. A. (1998). "Back to the Basics: Trends in and Role Determinants of Women's Attitudes toward Housework." Journal of Marriage and the Family 60:205-18.

Robles, P. S. (2010). "Gender Disparities in Time Allocation, Time Poverty, and Labor Allocation Across Employment Sectors in Ethiopia." in Jorge Saba Arbache, Alexandre Kolev, and Ewa Filipiak (ed.), *Gender Disparities in Africa's Labor Market*, 299-332, Africa Development Forum and the World Bank, Washington DC.

Rones, P. L., Randy E. Ilg, and Gardner, J. M. (1997). "Trends in Hours of Work since the Mid-1970s." Monthly Labor Review 120:3-14.

Rosenstein-Rodan, PN. (1934). "The Role of Time in Economic Theory." Economica New Series 1(1): 77–97.

Sanchez, L., and Thomson. E. (1997). "Becoming Mothers and Fathers: Parenthood, Gender, and the Division of Labor." Gender and Society 11:747-72.

Sandberg, J., and Hofferth, S. (2001). "Changes in Children's Time with Parent, U. S. 1981-

1997." Demography 38(3): 423.

Saqib, N., Arif, G. M. (2012). "Time Poverty, Work Status and Gender: The Case of Pakistan." PIDE Working Papers No. 2012: 81, Pakistan Institute of Development Economics, Islamabad.

Sasaki, M. (2002). "Causal Effect of Family Structure on Labor Force Participation among Japanese Married Women." *Journal of Human Resources* 37(2): 429–440.

Sayer, L., Bianchi S., and Robinson J. (2004). "Are Parents Investing Less in Children? Trends in Mothers' and Fathers' Time with Children." *American Journal of Sociology* 110(1): 1–43.

Seguino, S. (2007). "PlusÇa Change? Evidence on Global Trends in Gender Norms and Stereotypes." *Feminist Economics* 13(2): 1-28.

Shelton, A. (1992). Women, Men, and Time: Gender Differences in Paid Work, Housework, and Leisure. Greenwood Press.

Shelton, B. A. (1990). "The Distribution of Household Tasks: Does Wife's Employment Status Make a Difference?" Journal of Family Issues 11:115-5.

Shelton, B. A., and John, D. (1996). "The Division of Household Labor." Annual Review of Sociology 22:299-322.

Skoufias, E., (1993). "Labor Market Opportunities and Interfamily Time Allocation in Rural Households in South Asia." *Journal of Development Economics*, 40, 277-310.

South, S. J., and Spitze, G. (1994). "Housework in Marital and No Marital Households." American Sociological Review 59:327-47.

Sow, F. D. (2010). "Intra-household resource allocation and well-being: The case of rural households in Senegal." PhD thesis, Wageningen University.

Spierings, N., and Smits, J. (2007), "Women's labor market participation in Egypt, Jordan, Morocco, Syria & Tunisia: A three-level analysis". Paper prepared for the IZA-World Bank Conference on Employment and Development, June 8th/9th, 2007, Bonn, Germany.

Tibaijuka, A. K. (1984). "An Economic Analysis of Smallholder Banana-Coffee Farms in the Kagera Region, Tanzania: Cause of Decline in Productivity and Strategies for Revitalization." PhD thesis, Swedish University of Agricultural Sciences, Uppsala.

Van den Brink, H. M., and Groot W. (1997). "A Household Production Model of Paid Labor, Household Work and Childcare." De Economist 145(3):32.

Vanek, Joann. (1974). "Time Spent in Housework." Scientific American 231:116-20.

Vickery, C. (1977). "The Time-Poor: A New Look at Poverty." *Journal of Human Resources*. v. 12, no 01, p.27-48.

Wakabayashi, C. and Donato, K. (2005). "The Consequences of Caregiving: Effects on

Women's Employment and Earnings." *Population Research and Policy Review* 24: 467–488.

Walker, K. (1969). "Homemaking Still Takes Time." Journal of Home Economics 61:621-24.

Weiss, Y. and Willis, R. (1985). "Children as Collective Goods and Divorce Settlements." *Journal of Labor Economics* 19: 268-292.

West, C, and Zimmerman, Don H. (1987). "Doing Gender." Gender and Society 1:125-5 1.

Williams, J. R., Masuda, Y. J., and Tallis, H. (2016). "A Measure Whose Time has Come: Formalizing Time Poverty." *Social Indicators Research*, 128: 265-283.

Wong, R. and Levine R. E., (1992). "The Effect of Household Structure on Women's Economic Activity and Fertility: Evidence from Recent Mothers in Urban Mexico," *Economic Development and Cultural Change*, 89-102.

World Bank. (1999). *Nicaragua Poverty Assessment*, The World Bank, Washington.

**Figure 1: Average hours of work by gender**
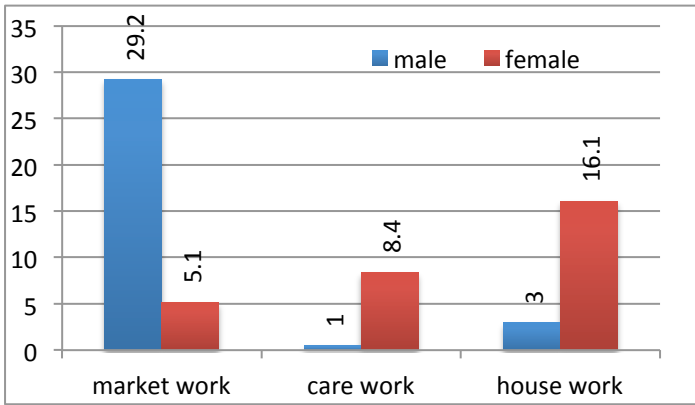


Egypt / Tunisia
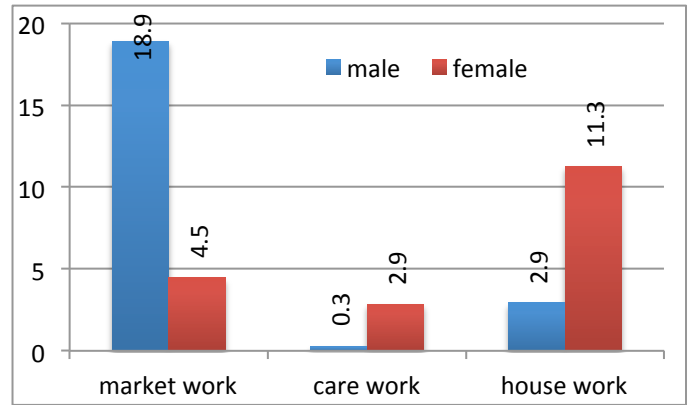
**Figure 2: Average hours of work by marital status and gender**
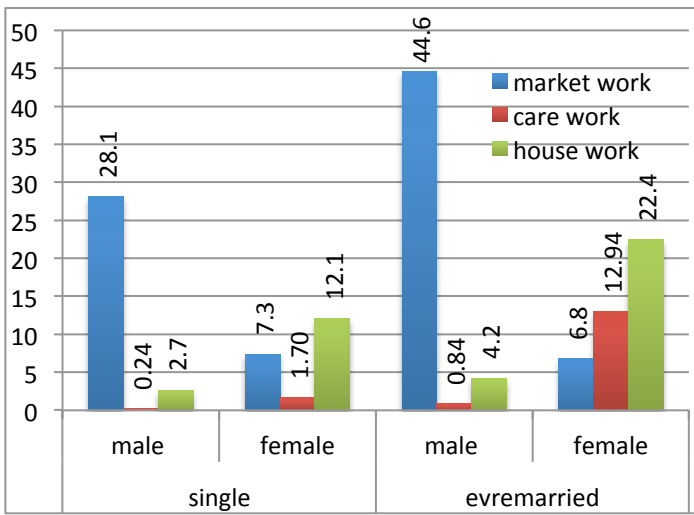


Egypt / Tunisia
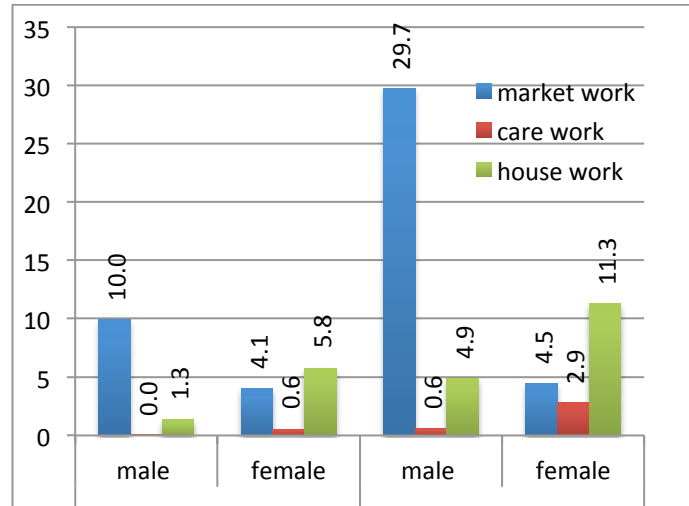
**Figure 3: Average hours of work by age group and gender**

### Egypt



### Tunisia
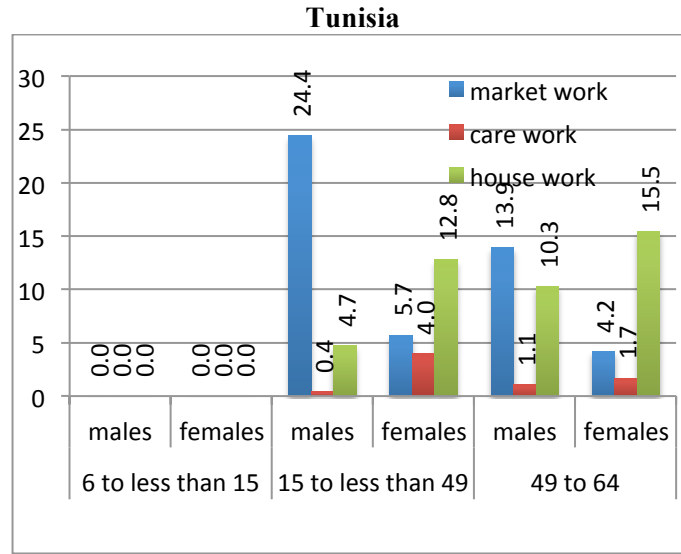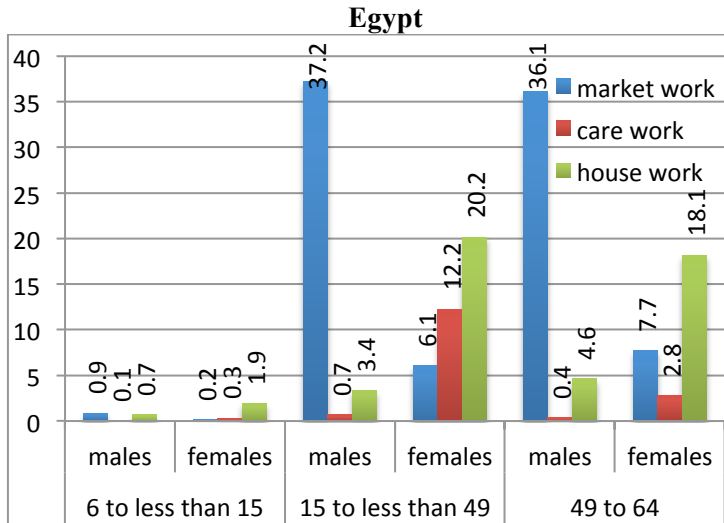


**Figure 4: Average hours of work by education and gender**

### Egypt



### Tunisia
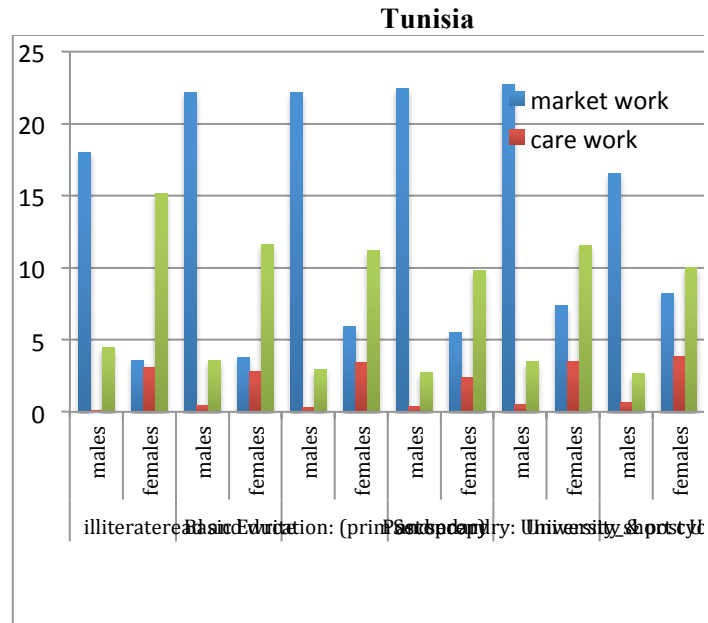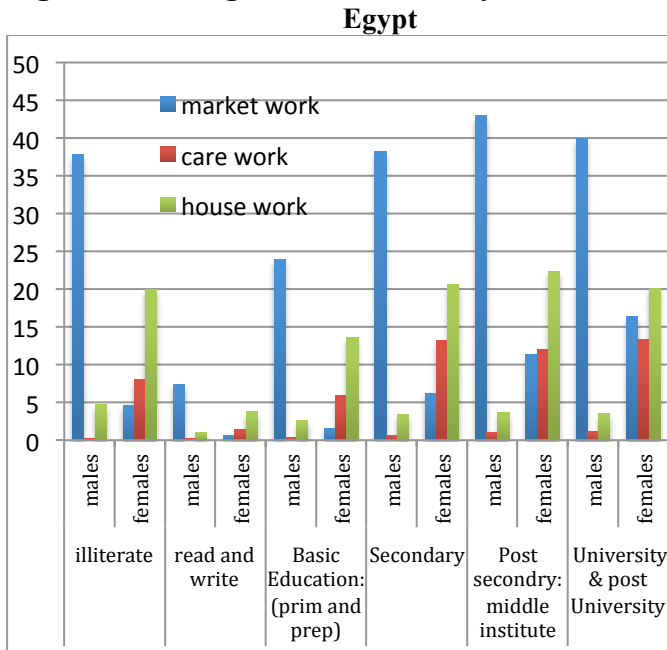
**Figure 5: Average hours of work by head status and gender**



Egypt

Tunisia
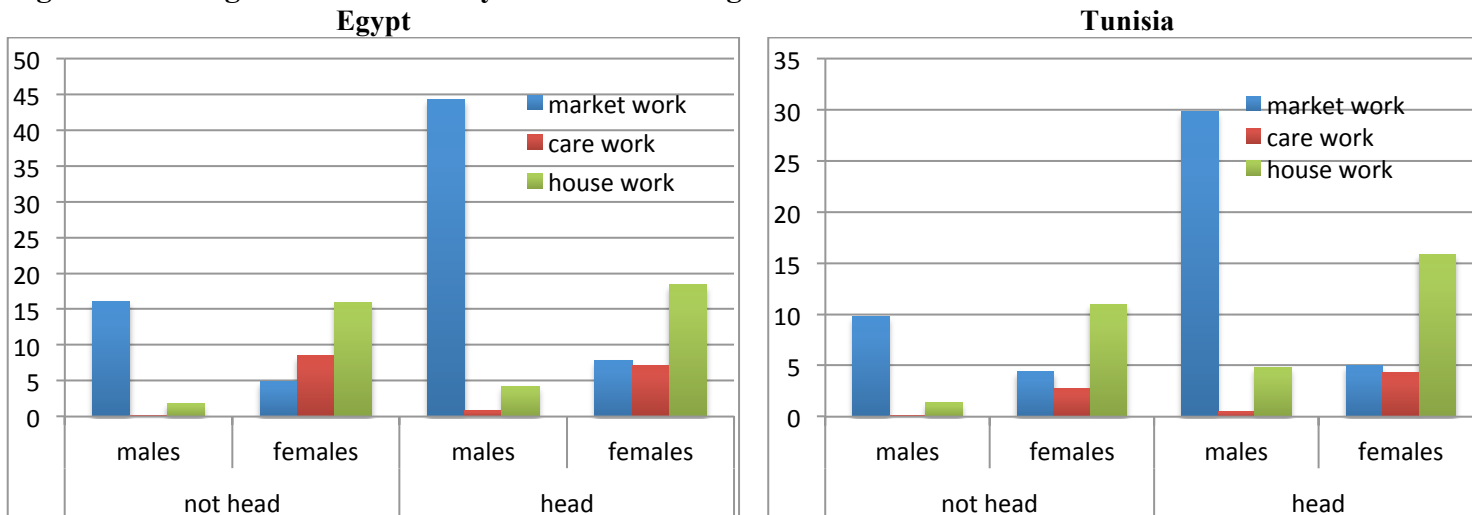
**Figure 6: Average hours of work by region and gender**
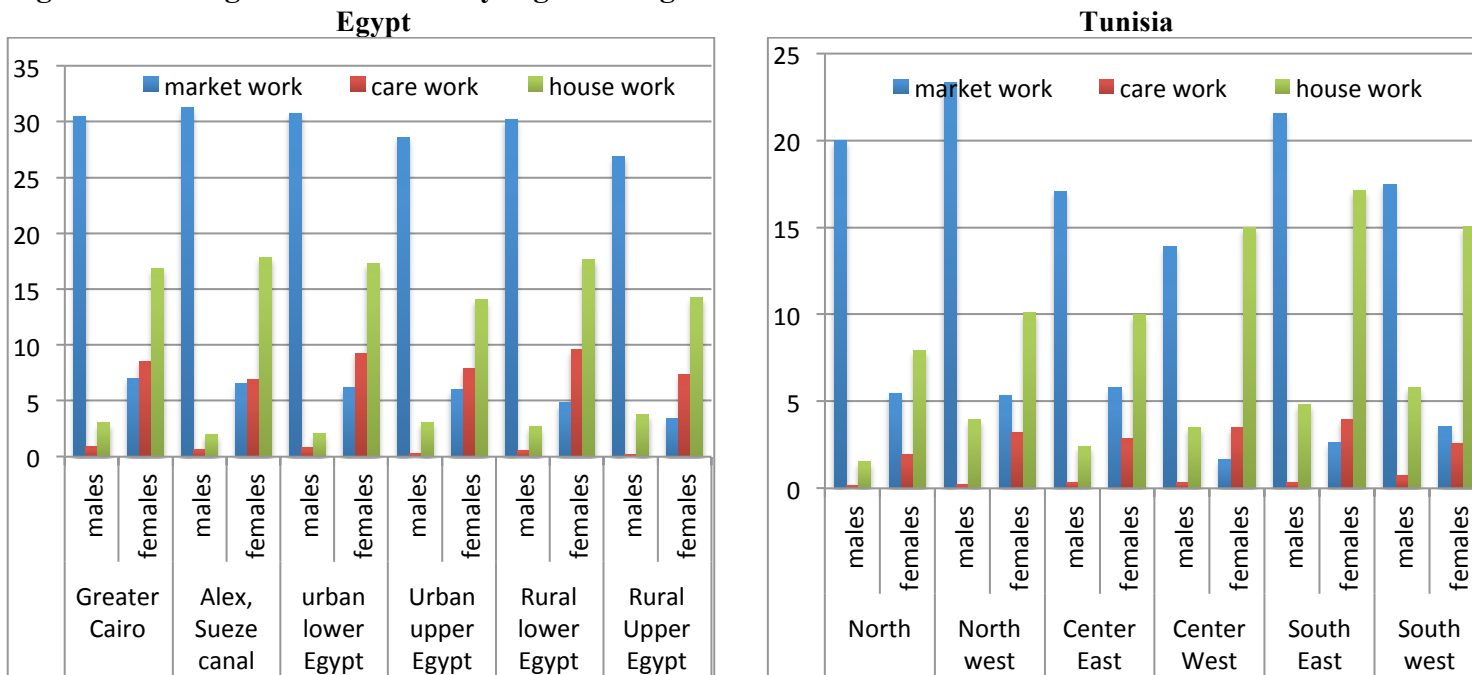


Egypt

Tunisia

**Figure 7a: Actual and fitted average hours of work and female share in household by gender Egypt**
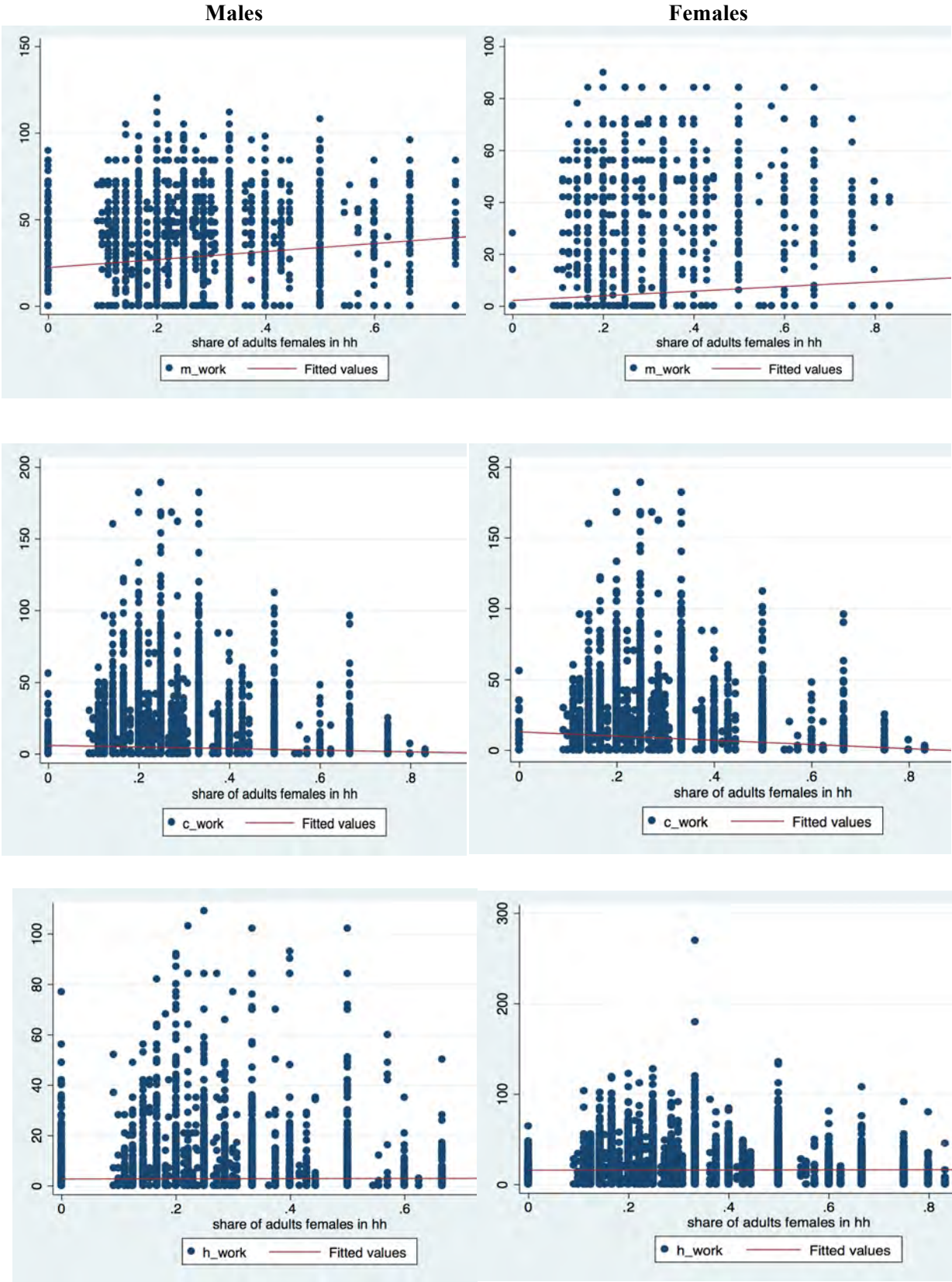
| Males | Females |
|-------|---------|

**Figure 7b: Actual and fitted average hours of work and female share in household by gender Tunisia**
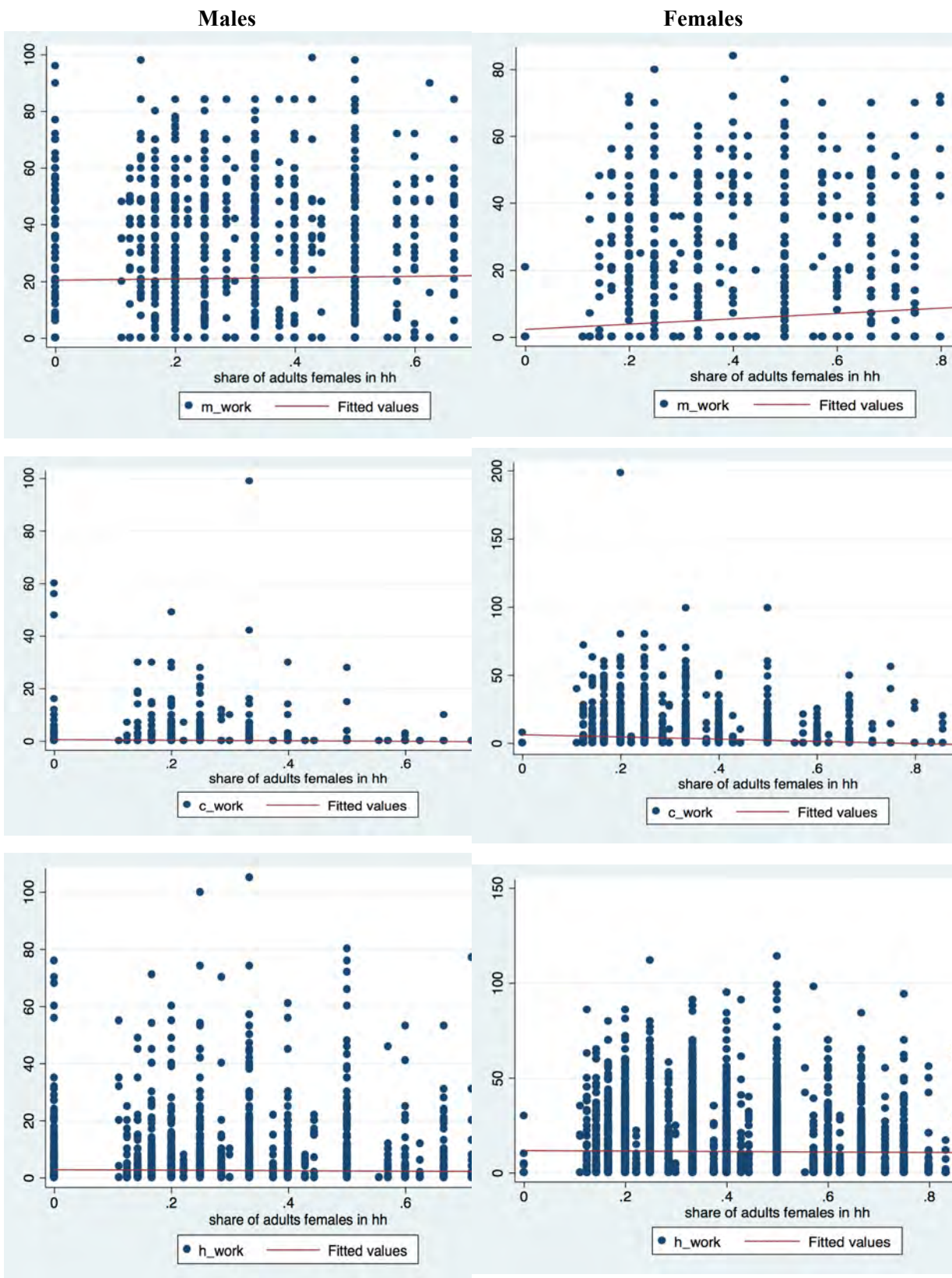
| Males | Females |
|---|---|

**Figure 8a: Actual and fitted average hours of work and male share in household by gender Egypt**
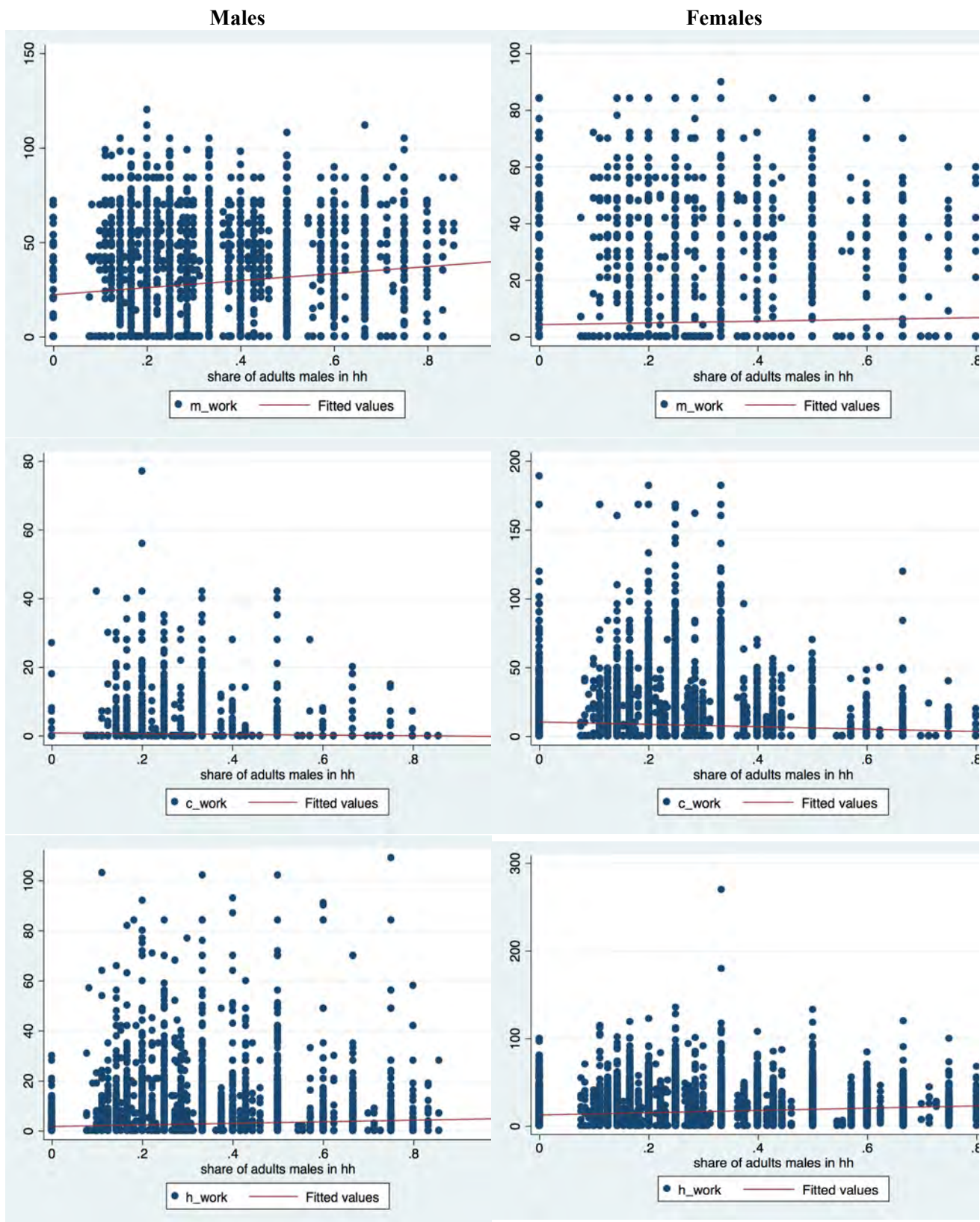
Males                              Females

**Figure 8b: Actual and fitted average hours of work and male share in household by gender Tunisia**
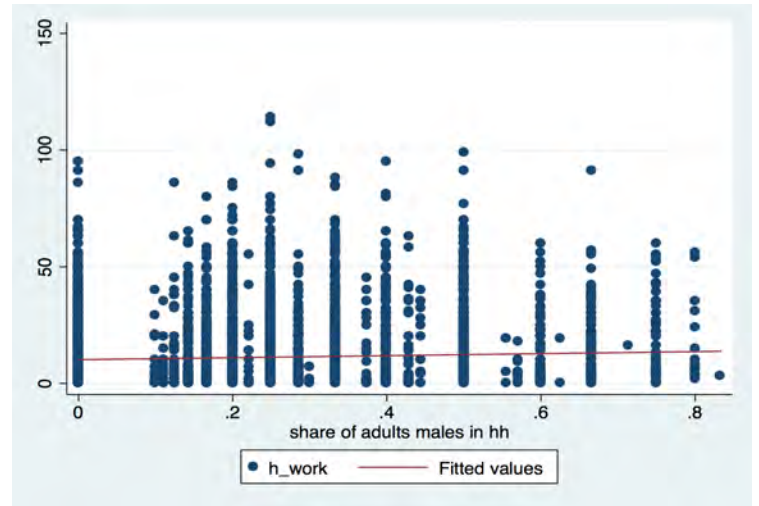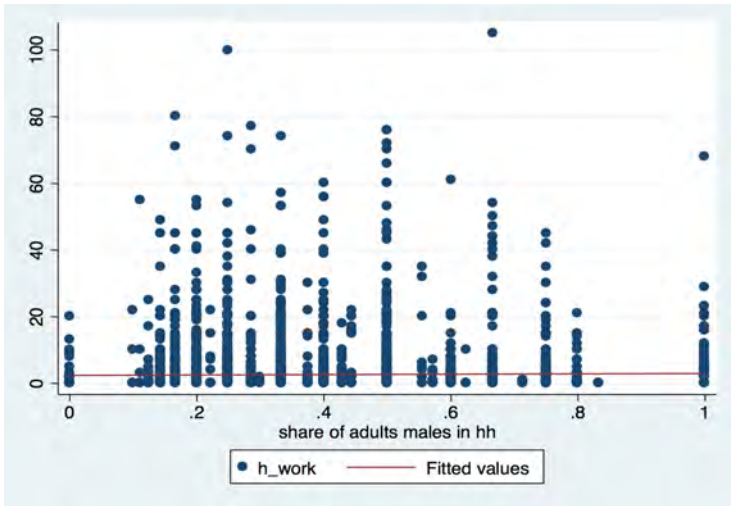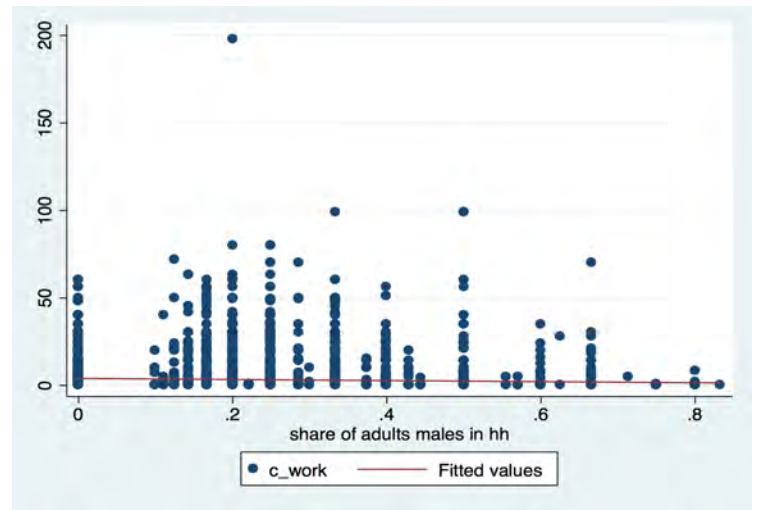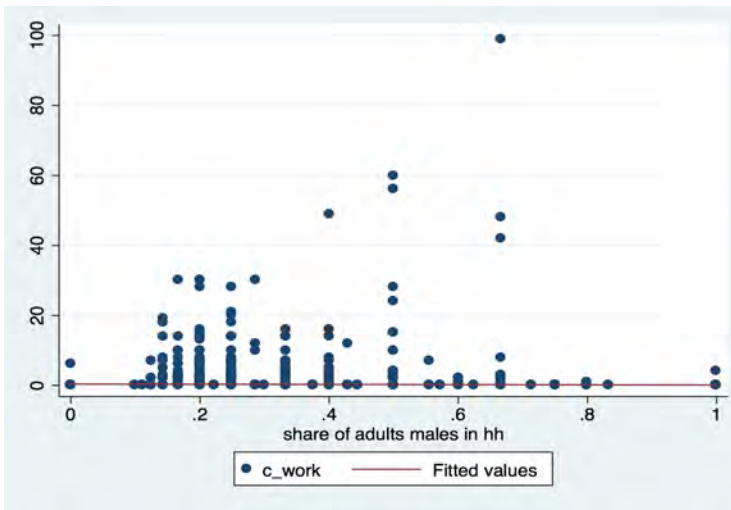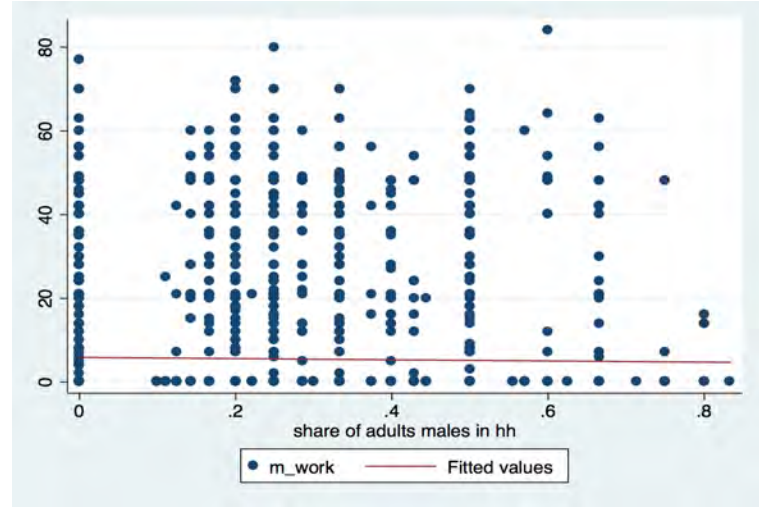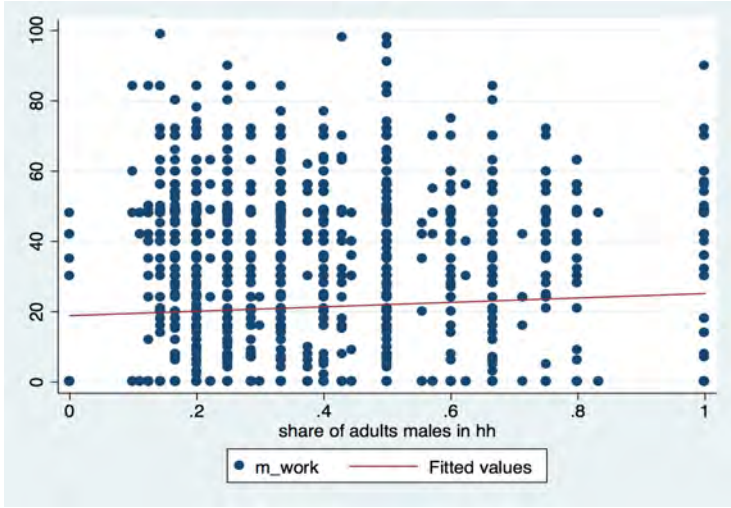
Males | Females

**Figure 9a: Actual and fitted average hours of work and children share in household by gender: Egypt**
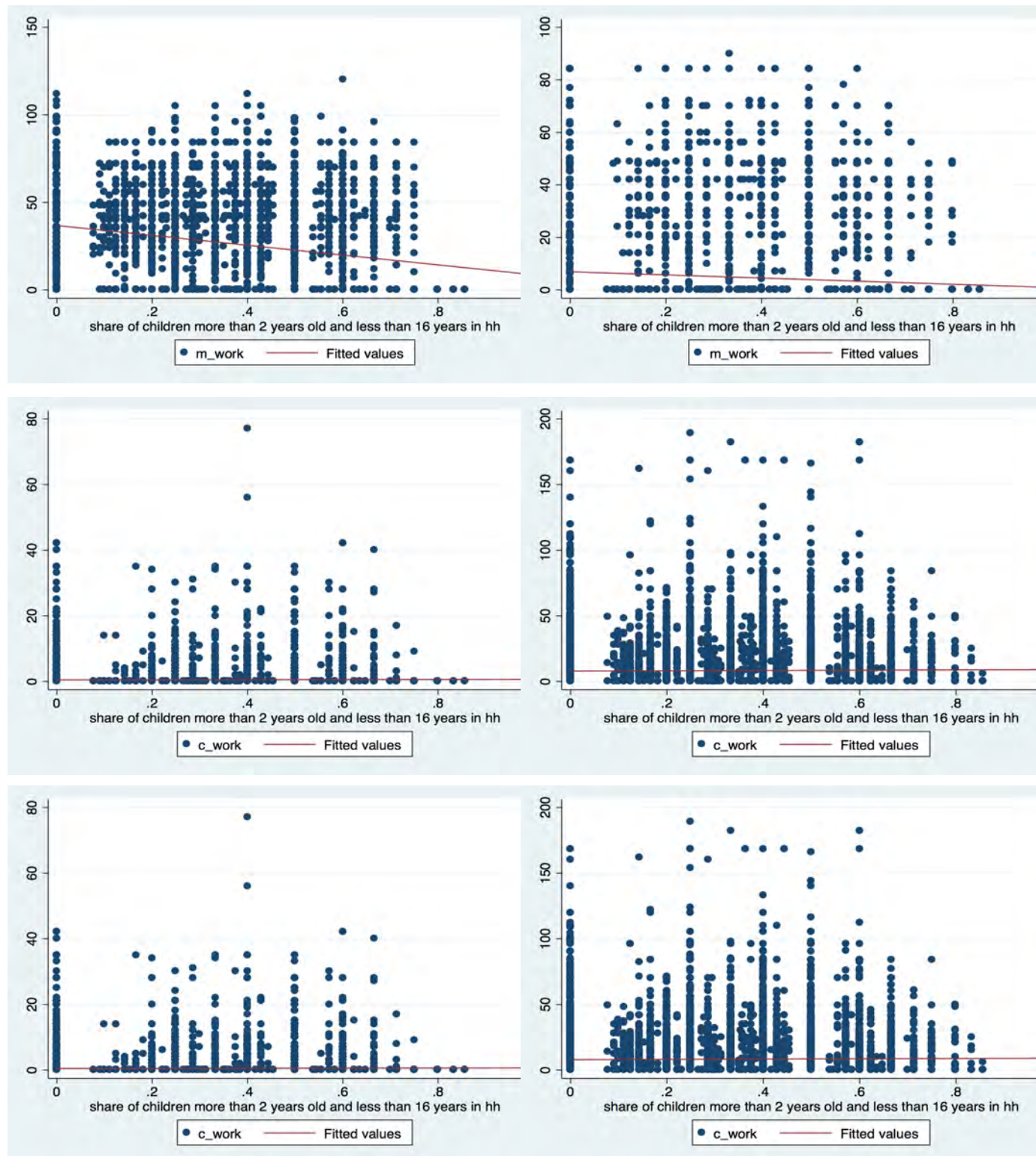
**Figure 9b: Actual and fitted average hours of work and children share in household by gender: Tunisia**

| Males | Females |
|---|---|
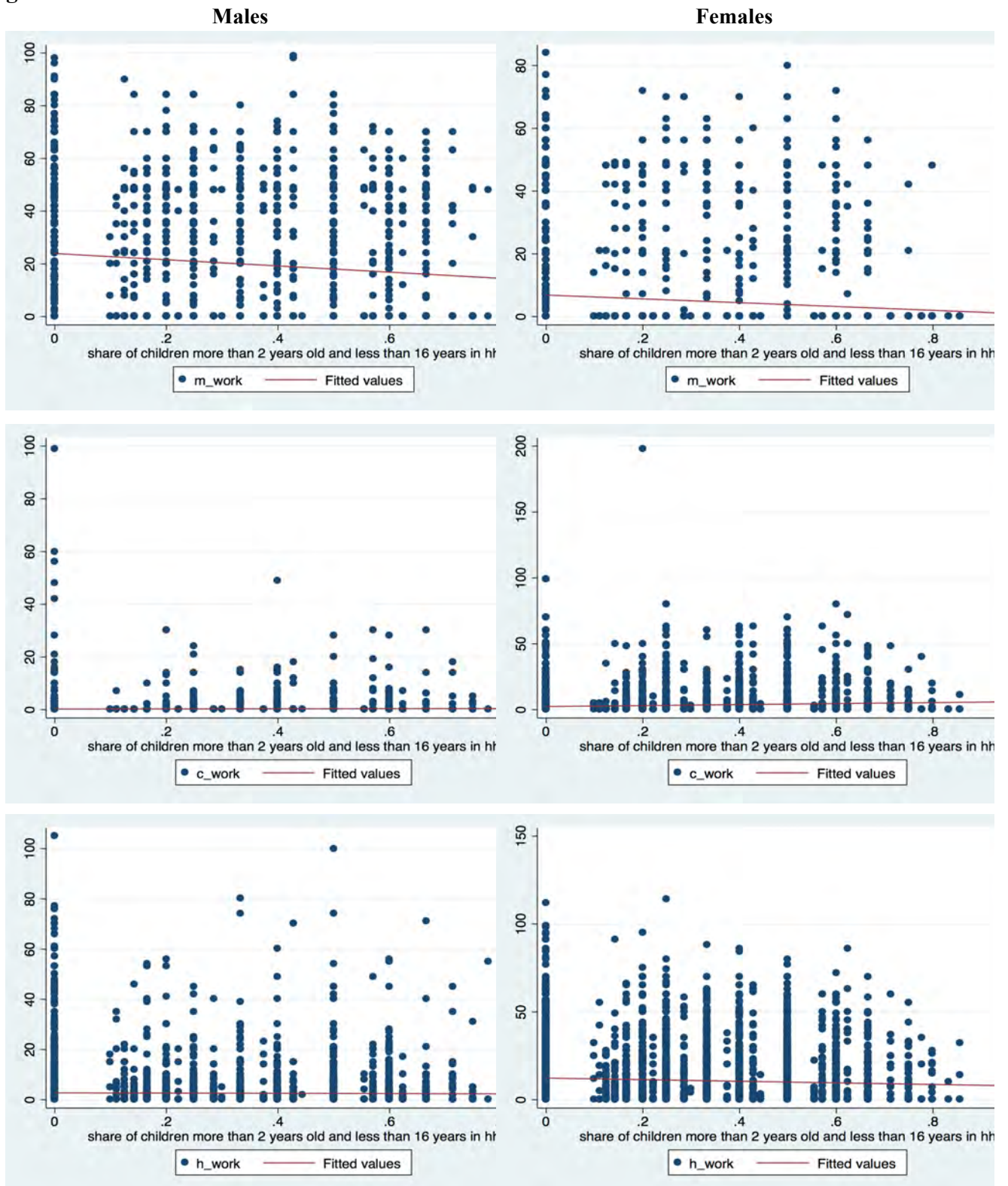
# Appendix

## Table (1): Egypt Summary Statistics

| Variable | Observation | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Market work | 38107 | 17.09662 | 24.74107 | 0 | 120 |
| Care work | 38107 | 4.463379 | 12.18344 | 0 | 189 |
| House work | 38107 | 9.573727 | 13.90776 | 0 | 270 |
| **I- Individual Characteristics** | | | | | |
| Age | 38107 | 28.59582 | 15.29133 | 6 | 64 |
| Female | 38107 | 0.5033458 | 0.4999954 | 0 | 1 |
| **Education level** | | | | | |
| Illiterate | 38071 | 0.1991279 | 0.3993497 | 0 | 1 |
| Read and write (literate) | 38071 | 0.1828689 | 0.386564 | 0 | 1 |
| Basic Education | 38071 | 0.2153345 | 0.4110596 | 0 | 1 |
| Secondary | 38071 | 0.2654251 | 0.4415651 | 0 | 1 |
| Post Secondary | 38071 | 0.0234562 | 0.1513492 | 0 | 1 |
| University and above | 38071 | 0.1137874 | 0.317557 | 0 | 1 |
| **Marital status** | | | | | |
| Less than minimum age | 38107 | 0.2722859 | 0.4451421 | 0 | 1 |
| Unmarried | 38107 | 0.1654289 | 0.3715721 | 0 | 1 |
| Ever married | 38107 | 0.5622851 | 0.4961119 | 0 | 1 |
| Head | 38107 | 0.2714724 | 0.444725 | 0 | 1 |
| **II- Household Characteristics** | | | | | |
| Household size | 38107 | 5.046317 | 2.167676 | 1 | 21 |
| Share of females in household | 38107 | 0.2989441 | 0.1533591 | 0 | 1 |
| Share of infants in household | 38107 | 0.0743929 | 0.1250586 | 0 | 0.75 |
| Share of children in household | 38107 | 0.2806811 | 0.2264874 | 0 | 1 |
| Share of seniors in household | 38107 | 0.0293563 | 0.0874124 | 0 | 0.6666667 |
| **House ownership** | | | | | |
| Unfurnished (or rent old) | 38107 | 0.1100848 | 0.3129995 | 0 | 1 |
| Furnished (or new rent) | 38107 | 0.0435091 | 0.2040027 | 0 | 1 |
| Owned | 38107 | 0.5744351 | 0.4944349 | 0 | 1 |
| Condominium or grant | 38107 | 0.271971 | 0.4449809 | 0 | 1 |
| Number of persons per room | 38107 | 1.479719 | 0.7543662 | 0.1666667 | 8 |
| **Connection to Sewerage** | | | | | |
| Private toilet connected to sewerage network | 38107 | 0.5907838 | 0.4916957 | 0 | 1 |
| Shared toilet connected to sewerage network | 38107 | 0.0173459 | 0.1305583 | 0 | 1 |
| Others | 38107 | 0.3918703 | 0.4881744 | 0 | 1 |
| Public water network | 38107 | 0.9352088 | 0.2461604 | 0 | 1 |
| Number of durables | 38107 | 6.117354 | 1.864831 | 0 | 14 |
| **III- Community Characteristics** | | | | | |
| **Regions** Greater Cairo | 38107 | 0.1100585 | 0.3129668 | 0 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| Alexandria and Suez canal | 38107 | 0.0809563 | 0.2727715 | 0 | 1 |
| Urban lower Egypt | 38107 | 0.1108458 | 0.3139452 | 0 | 1 |
| Urban upper Egypt | 38107 | 0.1396331 | 0.3466106 | 0 | 1 |
| Rural lower Egypt | 38107 | 0.2810245 | 0.4495053 | 0 | 1 |
| Rural upper Egypt | 38107 | 0.2774818 | 0.4477621 | 0 | 1 |
| Urbanization by governorate | 38107 | 0.3785825 | 0.2710964 | 0.1484598 | 1 |
| Share of unemployed by governorate | 38107 | 0.0640698 | 0.0258974 | 0.0124068 | 0.1148066 |

**Table (2): Tunisia Summary Statistics**

| Variable | Observation | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Market work | 12879 | 11.27207 | 20.29583 | 0 | 99 |
| Care work | 12879 | 1.640655 | 6.803312 | 0 | 198 |
| House work | 12879 | 7.315397 | 12.88875 | 0 | 114 |
| **I- Individual Characteristics** | | | | | |
| Age | 12879 | 32.56953 | 16.68822 | 6 | 64 |
| Female | 12697 | 0.5289438 | 0.4991812 | 0 | 1 |
| **Education Level** | | | | | |
| Illiterate | 11305 | 0.2631579 | 0.4403669 | 0 | 1 |
| Read and write (literate) | 11305 | 0.1898275 | 0.3921819 | 0 | 1 |
| Basic Education | 11305 | 0.3567448 | 0.4790598 | 0 | 1 |
| Secondary | 11305 | 0.1091552 | 0.3118477 | 0 | 1 |
| Post secondary | 11305 | 0.0374171 | 0.1897899 | 0 | 1 |
| University and above | 11305 | 0.0436975 | 0.2044302 | 0 | 1 |
| **Marital status** | | | | | |
| Unmarried | 12515 | 0.5012385 | 0.5000184 | 0 | 1 |
| Ever married | 12515 | 0.4987615 | 0.5000184 | 0 | 1 |
| Head of Household | 12861 | 0.2472592 | 0.4314354 | 0 | 1 |
| **II- Household Characteristics** | | | | | |
| Household size | 12879 | 4.656573 | 1.658208 | 1 | 10 |
| Share of adult females in household | 12879 | 0.3476682 | 0.1912393 | 0 | 1 |
| Share of infants in household | 12879 | 0.0360047 | 0.0946385 | 0 | 0.6666667 |
| Share of children in household | 12879 | 0.2349198 | 0.2367297 | 0 | 1l |
| Share of seniors in household | 12879 | 0.0506217 | 0.1259729 | 0 | 0.6666667 |
| **House ownership** | | | | | |
| Owned | 12829 | 0.8981214 | 0.3025003 | 0 | 1 |
| Tenant public/private/public property | 12829 | 0.0643074 | 0.2453093 | 0 | 1 |
| Owned by the employer | 12829 | 0.0028061 | 0.0529007 | 0 | 1 |
| Free accommodation with family | 12829 | 0.034765 | 0.1831911 | 0 | 1 |
| Number of persons per room | 12614 | 1.614268 | 0.8915381 | 0.025 | 8 |
| **Connection to Sewerage** | | | | | |
| Sewage system | 11857 | 0.3766551 | 0.4845677 | 0 | 1 |
| Covered septic tank | 11857 | 0.5520789 | 0.4973014 | 0 | 1 |
| Open drain and others | 11857 | 0.0712659 | 0.2572794 | 0 | 1 |
| Public water network | 12821 | 0.736604 | 0.4404925 | 0 | 1 |
| Number of durables | 12879 | 5.217486 | 2.250913 | 0 | 13 |
| **III- Community Characteristics** | | | | | |
| **Regions** | | | | | |
| North | 12879 | 0.3132231 | 0.4638223 | 0 | 1 |
| North West | 12879 | 0.1441106 | 0.3512154 | 0 | 1 |
| Center East | 12879 | 0.2236198 | 0.4166863 | 0 | 1 |
| Center West | 12879 | 0.1620467 | 0.368508 | 0 | 1 |
| South East | 12879 | 0.1042006 | 0.3055325 | 0 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| South West | 12879 | 0.0527991 | 0.2236409 | 0 | 1 |
| Urbanization by governorate | 12879 | 0.6158274 | 0.2058677 | 0.2614075 | 1 |
| Share of unemployed by governorate | 12879 | 0.1310331 | 0.0521881 | 0.0410013 | 0.2566992 |

**Table (3): Empirical Results of Tobit models for different types of work for the whole sample in Egypt and Tunisia**

| | Egypt | | | | Tunisia | | |
|---|---|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | | **(1)** | **(2)** | **(3)** |
| **VARIABLES** | **Market Work** | **House Work** | **Care Work** | **VARIABLES** | **Market Work** | **House Work** | **Care Work** |
| **I- Individual Characteristics** | | | | **I- Individual Characteristics** | | | |
| Age | 0.622*** | 1.292*** | 1.503*** | Age | 0.448** | 1.897*** | 2.516*** |
| | (0.111) | (0.0523) | (0.127) | | (0.207) | (0.0786) | (0.188) |
| Age$^2$ | -0.00896*** | -0.0161*** | -0.0239*** | Age$^2$ | -0.00593** | -0.0215*** | -0.0321*** |
| | (0.00136) | (0.000651) | (0.00163) | | (0.00248) | (0.000961) | (0.00231) |
| Female | -17.65*** | 16.15*** | 25.27*** | Female | -8.534*** | 15.89*** | 21.45*** |
| | (0.573) | (0.267) | (0.761) | | (1.222) | (0.586) | (1.551) |
| **Education level: Reference Category (illiterate)** | | | | **Education level: Reference Category (illiterate)** | | | |
| Read and write (literate) | -1.500* | -2.870*** | -2.485** | Read and write (literate) | 0.357 | 1.785*** | 3.229*** |
| | (0.791) | (0.398) | (0.969) | | (1.172) | (0.580) | (1.182) |
| Basic Education | -1.221** | 0.532* | 1.278* | Basic Education | 2.841** | 2.858*** | 5.132*** |
| | (0.525) | (0.295) | (0.658) | | (1.118) | (0.542) | (1.093) |
| Secondary | -0.420 | 0.152 | 3.277*** | Secondary | 1.243 | 1.787** | 5.477*** |
| | (0.486) | (0.286) | (0.608) | | (1.505) | (0.738) | (1.560) |
| Post secondary | -0.956 | 0.700 | 3.232*** | Post secondary | -0.797 | 2.887*** | 6.971*** |
| | (0.926) | (0.579) | (1.222) | | (2.116) | (1.055) | (2.218) |
| University and above | -2.469*** | 0.0852 | 5.718*** | University and above | -10.09*** | 1.109 | 5.779*** |
| | (0.632) | (0.382) | (0.828) | | (2.076) | (1.034) | (2.118) |
| **Marital status: Reference category (Unmarried)** | | | | **Marital status: Reference category (Unmarried)** | | | |
| Less than minimum age | -3.619*** | -3.509*** | -16.53*** | | | | |
| | (1.135) | (0.487) | (1.329) | | | | |
| Ever married | -1.961*** | 8.801*** | 19.30*** | Ever married | -2.449 | 5.461*** | 15.12*** |
| | (0.644) | (0.351) | (0.869) | | (1.519) | (0.728) | (1.532) |
| Head of Household | -1.704*** | -5.224*** | -7.699*** | Head of Household | 0.604 | 0.335 | -1.581 |
| | (0.594) | (0.314) | (0.739) | | (1.420) | (0.665) | (1.441) |
| **Employment status: Reference category (Public Wage Worker)** | | | | **Employment status: Reference category (Public Wage Worker)** | | | |
| Out of Labor Force | -173.0 | 0.576* | 3.616*** | Out of Labor Force | -93.43*** | 1.778** | 0.960 |
| | (11,680) | (0.346) | (0.747) | | (2.594) | (0.787) | (1.642) |
| Private Wage Worker | 2.000*** | -3.452*** | -4.636*** | Private Wage Worker | 2.658** | 1.389* | -4.659*** |
| | (0.446) | (0.358) | (0.850) | | (1.054) | (0.805) | (1.754) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Self-employed or Employer | 5.625*** | 2.763*** | -1.152 | Self-employed or Employer | 4.109*** | 5.253*** | -2.570 |
| | (0.498) | (0.404) | (0.973) | | (1.156) | (0.879) | (1.893) |
| Unpaid Family Worker | -28.98*** | 11.12*** | 7.708*** | Unpaid Family Worker | -35.15*** | 10.98*** | 0.790 |
| | (0.607) | (0.417) | (0.893) | | (1.481) | (0.961) | (1.946) |
| Unemployed | -177.9 | 2.611*** | 4.390*** | Unemployed | -93.11*** | 4.222*** | 3.312 |
| | (49,721) | (0.529) | (1.099) | | (6.115) | (1.060) | (2.258) |
| **II- Household Characteristics** | | | | **II- Household Characteristics** | | | |
| Share of adult females in household | 3.008** | -5.205*** | -15.95*** | Share of adult females in household | 2.320 | -5.101*** | -10.30*** |
| | (1.413) | (0.746) | (2.095) | | (2.685) | (1.306) | (3.350) |
| Household size | 0.392*** | -0.496*** | -0.453*** | Household size | 0.470* | -0.456*** | 0.516* |
| | (0.0897) | (0.0484) | (0.108) | | (0.259) | (0.126) | (0.270) |
| Share of infants in household | -3.352** | -1.729* | 74.43*** | Share of infants in household | 0.425 | -3.166 | 51.56*** |
| | (1.564) | (0.886) | (1.987) | | (4.134) | (2.161) | (4.055) |
| Share of children in household | -2.743** | -1.101* | 36.04*** | Share of children in household | -2.941 | -5.685*** | 23.46*** |
| | (1.103) | (0.592) | (1.488) | | (2.442) | (1.206) | (2.697) |
| Share of seniors in household | -1.982 | -0.139 | 45.52*** | Share of seniors in household | -0.671 | -1.595 | 27.77*** |
| | (1.930) | (1.010) | (2.217) | | (3.300) | (1.548) | (3.225) |
| **House Ownership: Reference category (owned)** | | | | **House Ownership: Reference category (owned)** | | | |
| Unfurnished (or rent old) | 1.127* | 1.228*** | 1.250* | Tenant public/private/public property | 2.895** | 0.415 | 1.601 |
| | (0.575) | (0.313) | (0.711) | | (1.474) | (0.814) | (1.520) |
| Furnished (or new rent) | 3.054*** | 0.624 | 3.489*** | Owned by employer | 5.578 | 3.581 | 7.835 |
| | (0.755) | (0.434) | (0.886) | | (6.415) | (3.256) | (5.750) |
| Condominium or grant | 0.730* | 0.851*** | 0.386 | Free accommodation with family | 2.740 | 0.658 | 1.431 |
| | (0.378) | (0.213) | (0.458) | | (1.913) | (0.977) | (1.817) |
| **Sewerage Facility: Reference category (others)** | | | | **Sewerage Facility: Reference category (open drain and others)** | | | |
| Private toilet connected to a sewerage network | 0.151 | -1.537*** | 0.941* | Sewage system | -9.253*** | -5.740*** | 3.835** |
| | (0.411) | (0.240) | (0.531) | | (1.608) | (0.824) | (1.794) |
| Shared toilet connected to a sewerage network | -0.596 | -1.476** | -3.074* | Covered septic tank | -8.376*** | -3.703*** | 4.482*** |
| | (1.240) | (0.683) | (1.579) | | (1.445) | (0.741) | (1.640) |
| Public water network | 0.717 | -1.066*** | -3.121*** | Public water network | -0.216 | -0.930** | -0.731 |
| | (0.634) | (0.366) | (0.794) | | (0.936) | (0.472) | (0.956) |
| Number of durables | -0.124 | -0.565*** | -0.286 | Number of durables | 1.282*** | 0.0991 | -0.848** |
| | (0.153) | (0.0844) | (0.192) | | (0.404) | (0.203) | (0.413) |
| **Wealth Quintiles: Reference Category (First Wealth Quintile)** | | | | **Wealth Quintiles: Reference Category (First Wealth Quintile)** | | | |

| | (1) | (2) | (3) | | (1) | (2) | (3) |
|---|---|---|---|---|---|---|---|
| Second Wealth Quintile | 0.388 | 0.669** | 1.846*** | Second Wealth Quintile | 0.821 | -0.563 | -0.918 |
| | (0.482) | (0.275) | (0.623) | | (1.125) | (0.568) | (1.179) |
| Third Wealth Quintile | 1.674*** | 0.692** | 1.327* | Third Wealth Quintile | 2.183 | -0.662 | -0.0307 |
| | (0.530) | (0.300) | (0.681) | | (1.458) | (0.747) | (1.535) |
| Fourth Wealth Quintile | 0.552 | 0.823** | 1.506* | Fourth Wealth Quintile | 1.926 | 0.565 | 3.749* |
| | (0.624) | (0.354) | (0.792) | | (1.833) | (0.945) | (1.940) |
| Fifth Wealth Quintile | 2.176*** | 1.697*** | 1.291 | Fifth Wealth Quintile | -1.140 | 0.784 | 5.434** |
| | (0.831) | (0.469) | (1.060) | | (2.671) | (1.348) | (2.716) |
| **III- Community Variables** | | | | **III- Community Variables** | | | |
| **Regional Dummies: Reference Category (Greater Cairo)** | | | | **Regional Dummies: Reference Category (North)** | | | |
| Alexandria and Suez Canal | -0.459 | -3.143*** | -2.434*** | North West | 7.652*** | 2.367*** | 1.812 |
| | (0.729) | (0.394) | (0.879) | | (1.630) | (0.846) | (1.776) |
| Urban Lower Egypt | 1.336 | -1.063* | -3.349*** | Center East | -1.482 | 3.328*** | 3.502*** |
| | (0.994) | (0.567) | (1.194) | | (1.096) | (0.570) | (1.175) |
| Urban Upper Egypt | -0.170 | -2.015*** | -8.044*** | Center West | -1.667 | 7.769*** | -0.397 |
| | (0.975) | (0.552) | (1.180) | | (1.997) | (1.000) | (2.103) |
| Rural Lower Egypt | -1.386 | -1.751*** | -3.922*** | South East | -2.740** | 9.496*** | 2.548* |
| | (0.949) | (0.543) | (1.142) | | (1.350) | (0.677) | (1.394) |
| Rural Upper Egypt | -2.192** | -1.932*** | -8.878*** | South West | -10.53*** | 10.21*** | 3.745** |
| | (1.000) | (0.569) | (1.208) | | (1.648) | (0.840) | (1.759) |
| Urbanization by governorate | 5.720*** | 4.563*** | -0.596 | Urbanization by governorate | 8.173*** | -0.438 | -3.061 |
| | (1.219) | (0.697) | (1.476) | | (3.106) | (1.602) | (3.300) |
| Share of unemployed by governorate | -23.33*** | -17.66*** | -66.15*** | Share of unemployed by governorate | -14.43 | 3.479 | 19.99* |
| | (7.518) | (4.374) | (9.717) | | (10.93) | (5.569) | (11.21) |
| Constant | 38.77*** | -18.65*** | -64.84*** | Constant | 27.20*** | -41.90*** | -103.5*** |
| | (2.657) | (1.396) | (3.296) | | (5.329) | (2.454) | (5.842) |
| **Observations** | **37718** | **37718** | **37718** | **Observations** | **8884** | **8884** | **8884** |
| **lnsigma** | **2.921*** | **2.681*** | **3.152*** | **lnsigma** | **2.999*** | **2.716*** | **2.988*** |
| | **(0.00616)** | **(0.00495)** | **(0.00820)** | | **(0.0140)** | **(0.00960)** | **(0.0208)** |
| **atrho 12** | | **-0.0228*** | | **atrho 12** | | **0.00685** | |
| | | **(0.00867)** | | | | **(0.0200)** | |
| **atrho 13** | | **-0.0530*** | | **atrho 13** | | **-0.0217** | |
| | | **(0.0132)** | | | | **(0.0325)** | |
| **atrho23** | | **0.223*** | | **atrho23** | | **0.370*** | |

| | | | |
|---|---|---|---|
| | (0.00821) | | (0.0171) |
| **Wald chi2 (117)** | **45260.20** | **Wald chi2 (114)** | **8803.29** |
| **Prob > chi2** | **0.0000** | **Prob > chi2** | **0.0000** |
| **Log likelihood** | **-203708.04** | **Log likelihood** | **-45436.339** |
| **Likelihood ratio test of rho12 = rho13 = rho23 = 0, chi2(3) = 737.793** | | **Likelihood ratio test of rho12 = rho13 = rho23 = 0, chi2(3) = 451.392** | |
| | **Prob > chi2 = 0.0000** | | **Prob > chi2 = 0.0000** |

Notes: standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.
 For each country a system of three equations (one equation for each type of work) is estimated simultaneously using Maximum Simulated Likelihood (MSL) method, and *mvtobit* command in STATA.

**Table (4): Empirical Results of Tobit models for different types of work by gender in Egypt**

| VARIABLES | Females | | | Males | | |
|---|---|---|---|---|---|---|
| | (1) Market Work | (2) House Work | (3) Care Work | (1) Market Work | (2) House Work | (3) Care Work |
| **I- Individual Characteristics** | | | | | | |
| Age | 0.659*** | 1.660*** | 2.026*** | 0.581*** | 0.532*** | 0.702*** |
| | (0.251) | (0.0670) | (0.148) | (0.125) | (0.0806) | (0.194) |
| Age$^2$ | -0.00796** | -0.0221*** | -0.0320*** | -0.00861*** | -0.00531*** | -0.00878*** |
| | (0.00314) | (0.000849) | (0.00192) | (0.00151) | (0.000974) | (0.00239) |
| **Education level: Reference Category (illiterate)** | | | | | | |
| Read and write (literate) | -1.514 | -3.192*** | -3.593*** | -2.518*** | -2.080*** | 2.259* |
| | (2.275) | (0.532) | (1.165) | (0.805) | (0.533) | (1.241) |
| Basic Education | -7.445*** | 1.517*** | 1.613** | -0.702 | -0.872** | 2.157** |
| | (1.413) | (0.387) | (0.770) | (0.548) | (0.424) | (0.978) |
| Secondary | -4.662*** | 0.320 | 3.815*** | -0.659 | -0.739* | 3.419*** |
| | (1.233) | (0.378) | (0.716) | (0.518) | (0.412) | (0.913) |
| Post secondary | -6.162*** | 1.182 | 2.927* | -1.443 | -1.093 | 3.726** |
| | (2.244) | (0.794) | (1.497) | (0.978) | (0.788) | (1.523) |
| University and above | -7.220*** | -0.233 | 5.211*** | -3.468*** | -1.079** | 4.849*** |
| | (1.604) | (0.532) | (1.024) | (0.671) | (0.520) | (1.082) |
| **Marital status: Reference category (Unmarried)** | | | | | | |
| Less than minimum age | -4.697 | -7.323*** | -16.04*** | -10.08*** | 2.503*** | -2.834 |
| | (3.043) | (0.675) | (1.613) | (1.227) | (0.695) | (1.877) |
| Ever married | -2.092 | 7.767*** | 20.85*** | 1.293 | 0.565 | 4.050*** |
| | (1.467) | (0.473) | (1.059) | (0.808) | (0.650) | (1.433) |
| Head of Household | -4.796*** | -0.516 | -4.063*** | -0.818 | 2.575*** | 0.302 |
| | (1.306) | (0.467) | (0.969) | (0.798) | (0.631) | (1.302) |
| **Employment status: Reference category (Public Wage Worker)** | | | | | | |
| Out of Labor Force | -183.3 | -0.564 | 3.290*** | -156.3 | -5.081*** | -3.484*** |
| | (7,844) | (0.485) | (0.931) | (7,883) | (0.540) | (1.263) |
| Private Wage Worker | 4.820*** | -3.484*** | 1.450 | 4.985*** | -2.143*** | -2.342*** |
| | (1.341) | (0.853) | (1.703) | (0.460) | (0.385) | (0.712) |
| Self-employed or Employer | -5.696*** | 1.762* | 2.045 | 8.208*** | 2.869*** | -0.800 |
| | (1.534) | (0.913) | (1.779) | (0.504) | (0.422) | (0.799) |
| Unpaid Family Worker | -49.90*** | 8.406*** | 6.934*** | -3.827*** | 11.11*** | 3.930** |

|  | (1.271) | (0.568) | (1.080) | (0.883) | (0.673) | (1.576) |
|---|---|---|---|---|---|---|
| Unemployed | -180.0 | 1.363** | 4.357*** | -161.3 | -0.266 | -0.188 |
|  | (35,590) | (0.690) | (1.304) | (31,870) | (0.799) | (1.641) |
| **II- Household Characteristics** | | | | | | |
| Share of adult females in household | 6.228** | -11.02*** | -15.01*** | -3.251* | -3.727*** | -3.922 |
|  | (3.013) | (1.033) | (2.528) | (1.741) | (1.228) | (3.256) |
| Household size | 0.863*** | -0.485*** | -0.0249 | 0.109 | -0.100 | -0.820*** |
|  | (0.193) | (0.0641) | (0.125) | (0.104) | (0.0723) | (0.192) |
| Share of infants in household | -6.310* | -3.988*** | 84.42*** | -2.482 | -1.489 | 36.13*** |
|  | (3.774) | (1.147) | (2.321) | (1.693) | (1.292) | (2.923) |
| Share of children in household | 0.307 | -3.498*** | 35.77*** | -3.531*** | -3.385*** | 21.93*** |
|  | (2.449) | (0.784) | (1.745) | (1.231) | (0.861) | (2.248) |
| Share of seniors in household | -4.165 | 1.708 | 49.92*** | -0.394 | 5.154*** | 36.08*** |
|  | (3.638) | (1.252) | (2.564) | (2.364) | (1.655) | (3.473) |
| **House Ownership: Reference category (owned)** | | | | | | |
| Unfurnished (or rent old) | 1.925 | 1.522*** | 1.384 | -0.0698 | 0.942** | 0.924 |
|  | (1.302) | (0.411) | (0.852) | (0.617) | (0.442) | (0.886) |
| Furnished (or new rent) | 1.486 | 0.317 | 2.159** | 2.454*** | 0.919 | 4.340*** |
|  | (1.878) | (0.576) | (1.089) | (0.787) | (0.597) | (1.049) |
| Condominium or grant | 0.967 | 1.085*** | 0.652 | 0.319 | 0.637** | 0.338 |
|  | (0.886) | (0.278) | (0.544) | (0.406) | (0.300) | (0.605) |
| **Sewerage Facility: Reference category (others)** | | | | | | |
| Private toilet connected to a sewerage network | -2.345** | -1.012*** | 1.911*** | 0.559 | -2.041*** | -0.865 |
|  | (0.935) | (0.316) | (0.629) | (0.443) | (0.333) | (0.699) |
| Shared toilet connected to a sewerage network | -4.483 | -2.444*** | -2.902 | -0.788 | -1.119 | -5.374** |
|  | (3.349) | (0.895) | (1.828) | (1.251) | (0.911) | (2.576) |
| Public water network | 0.214 | -2.049*** | -4.069*** | 0.706 | -0.169 | -0.558 |
|  | (1.477) | (0.471) | (0.919) | (0.674) | (0.504) | (1.120) |
| Number of durables | -0.447 | -0.636*** | -0.540** | -0.0854 | -0.380*** | 0.172 |
|  | (0.335) | (0.110) | (0.227) | (0.167) | (0.119) | (0.248) |
| **Wealth Quintiles: Reference Category (First Wealth Quintile)** | | | | | | |
| Second Wealth Quintile | -1.226 | 0.711** | 2.203*** | 1.060** | 0.542 | 0.903 |
|  | (1.159) | (0.362) | (0.725) | (0.511) | (0.379) | (0.888) |
| Third Wealth Quintile | -0.0515 | 0.777* | 1.567* | 2.456*** | 0.619 | 0.747 |
|  | (1.280) | (0.398) | (0.801) | (0.562) | (0.417) | (0.937) |

| | | | | | | |
|---|---|---|---|---|---|---|
| Fourth Wealth Quintile | -2.240 | 0.559 | 1.221 | 1.273* | 1.059** | 1.637 |
| | (1.503) | (0.467) | (0.938) | (0.663) | (0.491) | (1.049) |
| Fifth Wealth Quintile | -2.086 | 0.908 | 0.843 | 2.627*** | 2.580*** | 1.617 |
| | (1.890) | (0.623) | (1.263) | (0.899) | (0.651) | (1.366) |
| **III- Community Variables** | | | | | | |
| **Regional Dummies: Reference Category (Greater Cairo)** | | | | | | |
| Alexandria and Suez Canal | -3.032* | -1.238** | -3.653*** | 0.299 | -5.409*** | 0.146 |
| | (1.710) | (0.518) | (1.076) | (0.768) | (0.557) | (1.008) |
| Urban Lower Egypt | -3.243 | 2.439*** | -1.883 | 2.835*** | -5.164*** | -2.284 |
| | (2.285) | (0.728) | (1.450) | (1.064) | (0.795) | (1.436) |
| Urban Upper Egypt | -3.458 | -0.939 | -5.361*** | 1.126 | -2.973*** | -9.935*** |
| | (2.256) | (0.714) | (1.426) | (1.041) | (0.765) | (1.508) |
| Rural Lower Egypt | -8.838*** | 1.044 | -3.116** | 2.006** | -4.558*** | -2.091 |
| | (2.206) | (0.701) | (1.394) | (1.013) | (0.752) | (1.363) |
| Rural Upper Egypt | -4.901** | -1.679** | -7.065*** | -0.701 | -2.138*** | -9.386*** |
| | (2.347) | (0.735) | (1.459) | (1.063) | (0.787) | (1.532) |
| Urbanization by governorate | 0.208 | 7.314*** | 0.429 | 8.019*** | 1.441 | 0.0379 |
| | (2.746) | (0.903) | (1.813) | (1.311) | (0.967) | (1.736) |
| Share of unemployed by governorate | -55.68*** | -3.972 | -70.64*** | -13.61* | -36.97*** | -35.18*** |
| | (17.00) | (5.700) | (11.52) | (8.152) | (6.147) | (12.90) |
| Constant | 41.45*** | -4.390** | -51.21*** | 32.85*** | -5.231*** | -40.43*** |
| | (6.461) | (1.890) | (4.021) | (2.910) | (2.010) | (4.645) |
| **Observations** | **19062** | **19062** | **19062** | **18656** | **18656** | **18656** |
| **lnsigma** | **3.035*** | **2.677*** | **3.164*** | **2.844*** | **2.575*** | **2.768*** |
| | **(0.0149)** | **(0.00589)** | **(0.00876)** | **(0.00672)** | **(0.00924)** | **(0.0243)** |
| **atrho 12** | | **0.000720** | | | **-0.0341*** | |
| | | **(0.0153)** | | | **(0.0103)** | |
| **atrho 13** | | **-0.0104** | | | **-0.0796*** | |
| | | **(0.0205)** | | | **(0.0179)** | |
| **atrho23** | | **0.210*** | | | **0.236*** | |
| | | **(0.00937)** | | | **(0.0164)** | |
| **Wald chi2 (114)** | | **22336.28** | | | **4746.74** | |
| **Prob > chi2** | | **0.0000** | | | **0.0000** | |
| **Log likelihood** | | **-112539.84** | | | **-88772.67** | |
| **Likelihood ratio test of  rho12 = rho13 = rho23 = 0, chi2(3) =** | | **497.132** | | | **222.883** | |

| | Prob > chi2 = | 0.0000 | 0.0000 |
|---|---|---|---|

Notes: standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. For each gender a system of three equations (one equation for each type of work) is estimated simultaneously using Maximum Simulated Likelihood (MSL) method, and *mvtobit* command in STATA.

**Table (5): Empirical Results of Tobit models for different types of work by gender in Tunisia**

| | Females | | | Males | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (1) | (2) | (3) |
| VARIABLES | Market Work | House Work | Care Work | Market Work | House Work | Care Work |
| **I- Individual Characteristics** | | | | | | |
| Age | 0.524 | 2.376*** | 2.900*** | 0.799*** | 0.827*** | 1.606*** |
| | (0.405) | (0.107) | (0.210) | (0.249) | (0.108) | (0.466) |
| Age$^2$ | -0.00612 | -0.0276*** | -0.0373*** | -0.0106*** | -0.00849*** | -0.0180*** |
| | (0.00497) | (0.00132) | (0.00261) | (0.00293) | (0.00129) | (0.00552) |
| **Education level: Reference Category (illiterate)** | | | | | | |
| Read and write (literate) | -0.526 | 1.660** | 3.373** | 0.147 | 0.321 | 7.540** |
| | (2.541) | (0.839) | (1.342) | (1.346) | (0.703) | (2.966) |
| Basic Education | 4.329* | 3.734*** | 5.480*** | 1.779 | 0.553 | 8.846*** |
| | (2.320) | (0.762) | (1.236) | (1.299) | (0.670) | (2.835) |
| Secondary | 2.249 | 1.960* | 4.757** | 0.100 | 0.790 | 10.07*** |
| | (3.355) | (1.081) | (1.850) | (1.696) | (0.867) | (3.290) |
| Post secondary | 2.209 | 1.531 | 4.317 | -3.476 | 2.704** | 14.66*** |
| | (4.248) | (1.493) | (2.665) | (2.436) | (1.290) | (4.170) |
| University and above | -10.19*** | -0.414 | 4.218* | -10.11*** | 2.001 | 8.473** |
| | (3.904) | (1.507) | (2.549) | (2.526) | (1.246) | (4.064) |
| **Marital status: Reference category (Unmarried)** | | | | | | |
| Ever married | -1.404 | 5.078*** | 15.50*** | -3.162 | 4.482*** | 19.05*** |
| | (2.816) | (0.999) | (1.693) | (2.427) | (1.246) | (3.944) |
| Head of Household | -7.681*** | 0.678 | 1.574 | 4.353* | 0.968 | -12.48*** |
| | (2.920) | (1.065) | (1.731) | (2.541) | (1.277) | (3.492) |
| **Employment status: Reference category (Public Wage Worker)** | | | | | | |
| Out of Labor Force | -100.1*** | 2.838* | -0.224 | -87.02*** | -2.084** | 0.257 |
| | (5.280) | (1.498) | (2.368) | (2.875) | (0.814) | (2.760) |
| Private Wage Worker | 10.40*** | 0.850 | -4.458 | 0.511 | 1.323* | -3.313 |
| | (2.585) | (1.746) | (2.844) | (1.126) | (0.700) | (2.075) |
| Self-employed or Employer | 5.660* | 2.783 | -1.773 | 3.412*** | 4.956*** | -3.517 |
| | (3.062) | (2.081) | (3.246) | (1.223) | (0.749) | (2.216) |
| Unpaid Family Worker | -39.79*** | 10.55*** | -2.443 | -21.81*** | 12.19*** | 8.011** |
| | (2.957) | (1.664) | (2.642) | (1.986) | (1.159) | (3.968) |
| Unemployed | -159.8 | 7.880*** | 3.757 | -89.20*** | 0.690 | 5.780* |

|  | (6,635) | (1.868) | (3.014) | (6.985) | (1.076) | (3.439) |
|---|---|---|---|---|---|---|
| **II- Household Characteristics** | | | | | | |
| Share of adult females in household | 7.556 | -5.891*** | -10.21*** | -1.176 | -6.041*** | -10.03 |
|  | (5.707) | (1.937) | (3.833) | (3.370) | (1.715) | (7.402) |
| Household size | 0.301 | -0.607*** | 0.964*** | 0.561* | -0.180 | -1.112* |
|  | (0.521) | (0.179) | (0.305) | (0.314) | (0.159) | (0.608) |
| Share of infants in household | 0.609 | 0.155 | 59.23*** | -1.110 | -7.209*** | 33.74*** |
|  | (9.419) | (3.093) | (4.683) | (4.602) | (2.559) | (8.033) |
| Share of children in household | -0.942 | -6.975*** | 21.61*** | -5.554** | -5.128*** | 24.54*** |
|  | (5.182) | (1.753) | (3.059) | (2.779) | (1.432) | (5.539) |
| Share of seniors in household | 0.0971 | -0.0345 | 30.47*** | -0.0725 | -3.044 | 12.48 |
|  | (5.937) | (2.052) | (3.536) | (4.382) | (2.257) | (8.200) |
| **House Ownership: Reference category (owned)** | | | | | | |
| Tenant  public/private/public property | -0.632 | -0.651 | -1.235 | 3.580** | 1.408 | 6.968*** |
|  | (2.945) | (1.159) | (1.844) | (1.673) | (0.942) | (2.455) |
| Owned by employer | -11.91 | 4.926 | 4.390 | 12.03* | 2.046 | 11.56 |
|  | (16.36) | (5.007) | (7.661) | (6.970) | (3.674) | (7.894) |
| Free accommodation with family | -0.847 | 1.313 | 1.055 | 4.876** | -0.447 | 3.853 |
|  | (4.571) | (1.390) | (2.127) | (2.070) | (1.157) | (3.318) |
| **Sewerage Facility: Reference category (open drain and others)** | | | | | | |
| Sewage system | -16.64*** | -5.976*** | 4.695** | -5.873*** | -4.737*** | -0.301 |
|  | (3.227) | (1.173) | (2.033) | (1.826) | (0.965) | (3.576) |
| Covered septic tank | -17.02*** | -4.454*** | 5.400*** | -4.095** | -2.504*** | -0.442 |
|  | (2.826) | (1.059) | (1.848) | (1.646) | (0.864) | (3.362) |
| Public water network | -4.000** | -0.715 | -1.390 | 1.499 | -1.089* | 1.232 |
|  | (1.815) | (0.662) | (1.087) | (1.098) | (0.566) | (1.934) |
| Number of durables | 2.344*** | 0.0124 | -1.145** | 0.992** | 0.105 | 0.169 |
|  | (0.861) | (0.289) | (0.476) | (0.451) | (0.238) | (0.780) |
| **Wealth Quintiles: Reference Category (First Wealth Quintile)** | | | | | | |
| Second Wealth Quintile | 1.245 | -0.400 | -0.587 | 1.204 | -0.843 | -2.521 |
|  | (2.205) | (0.793) | (1.330) | (1.296) | (0.678) | (2.505) |
| Third Wealth Quintile | -1.377 | -0.503 | 0.225 | 2.868* | -0.855 | -1.085 |
|  | (3.026) | (1.061) | (1.761) | (1.638) | (0.876) | (3.016) |
| Fourth Wealth Quintile | -4.195 | 1.495 | 4.316* | 3.305 | -0.632 | 1.709 |
|  | (3.871) | (1.356) | (2.239) | (2.026) | (1.097) | (3.636) |

| | | | | | | |
|---|---|---|---|---|---|---|
| Fifth Wealth Quintile | -10.57* | 1.951 | 4.764 | 1.805 | -0.613 | 5.240 |
| | (5.714) | (1.915) | (3.136) | (2.978) | (1.586) | (5.070) |

**III- Community Variables**

**Regional Dummies: Reference Category (North)**

| | | | | | | |
|---|---|---|---|---|---|---|
| North West | 9.682*** | 1.868 | 3.313 | 7.386*** | 2.638*** | -4.007 |
| | (3.436) | (1.201) | (2.016) | (1.865) | (0.994) | (3.635) |
| Center East | 4.078* | 4.282*** | 3.730*** | -3.263*** | 2.036*** | 2.758 |
| | (2.344) | (0.809) | (1.348) | (1.227) | (0.673) | (2.212) |
| Center West | -4.614 | 10.78*** | 2.091 | 0.742 | 2.993** | -5.052 |
| | (4.376) | (1.425) | (2.398) | (2.241) | (1.183) | (4.116) |
| South East | -6.888** | 11.31*** | 5.036*** | -0.978 | 6.293*** | -4.399 |
| | (3.324) | (0.963) | (1.579) | (1.443) | (0.790) | (2.914) |
| South West | 1.905 | 10.55*** | 1.106 | -14.59*** | 7.986*** | 9.073*** |
| | (3.622) | (1.202) | (2.104) | (1.829) | (0.972) | (2.871) |
| Urbanization by governorate | 18.34*** | 3.797* | 0.108 | 5.009 | -5.315*** | -5.498 |
| | (6.499) | (2.270) | (3.776) | (3.513) | (1.909) | (6.292) |
| Share of unemployed by governorate | 16.14 | 9.146 | 8.266 | -27.06** | -4.643 | 67.53*** |
| | (22.37) | (7.872) | (12.80) | (12.55) | (6.550) | (22.92) |
| Constant | 7.799 | -37.52*** | -89.60*** | 20.89*** | -13.94*** | -83.71*** |
| | (11.14) | (3.637) | (6.674) | (6.141) | (2.977) | (12.79) |
| **Observations** | **4826** | **4826** | **4826** | **4058** | **4058** | **4058** |
| **lnsigma** | **3.068*** | **2.802*** | **2.990*** | **2.950*** | **2.424*** | **2.870*** |
| | **(0.0300)** | **(0.0118)** | **(0.0222)** | **(0.0157)** | **(0.0165)** | **(0.0551)** |
| **atrho 12** | | **-0.104*** | | | **0.0566*** | |
| | | **(0.0366)** | | | **(0.0219)** | |
| **atrho 13** | | **-0.0665** | | | **0.0266** | |
| | | **(0.0480)** | | | **(0.0486)** | |
| **atrho23** | | **0.397*** | | | **0.350*** | |
| | | **(0.0203)** | | | **(0.0356)** | |
| **Wald chi2 (111)** | | **3814.73** | | | **3042.08** | |
| **Prob > chi2** | | **0.0000** | | | **0.0000** | |
| **Log likelihood** | | **-25553.657** | | | **-19433.739** | |
| **Likelihood ratio test of  rho12 = rho13 = rho23 = 0, chi2(3) =** | | **379.343** | | | **95.3164** | |
| **Prob > chi2 =** | | **0.0000** | | | **0.0000** | |

Notes: standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.  For each gender a system of three equations (one equation for each type of work) is estimated simultaneously using Maximum Simulated Likelihood (MSL) method, and *mvtobit* command in STATA

**Table (3): Empirical Results of Tobit models for different types of work for the whole sample in Egypt and Tunisia**

| | Egypt | | | | Tunisia | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | | (1) | (2) | (3) |
| VARIABLES | Market Work | House Work | Care Work | VARIABLES | Market Work | House Work | Care Work |
| **I- Individual Characteristics** | | | | **I- Individual Characteristics** | | | |
| Age | 0.622*** | 1.292*** | 1.503*** | Age | 0.448** | 1.897*** | 2.516*** |
| | (0.111) | (0.0523) | (0.127) | | (0.207) | (0.0786) | (0.188) |
| Age$^2$ | -0.00896*** | -0.0161*** | -0.0239*** | Age$^2$ | -0.00593** | -0.0215*** | -0.0321*** |
| | (0.00136) | (0.000651) | (0.00163) | | (0.00248) | (0.000961) | (0.00231) |
| Female | -17.65*** | 16.15*** | 25.27*** | Female | -8.534*** | 15.89*** | 21.45*** |
| | (0.573) | (0.267) | (0.761) | | (1.222) | (0.586) | (1.551) |
| **Education level: Reference Category (illiterate)** | | | | **Education level: Reference Category (illiterate)** | | | |
| Read and write (literate) | -1.500* | -2.870*** | -2.485** | Read and write (literate) | 0.357 | 1.785*** | 3.229*** |
| | (0.791) | (0.398) | (0.969) | | (1.172) | (0.580) | (1.182) |
| Basic Education | -1.221** | 0.532* | 1.278* | Basic Education | 2.841** | 2.858*** | 5.132*** |
| | (0.525) | (0.295) | (0.658) | | (1.118) | (0.542) | (1.093) |
| Secondary | -0.420 | 0.152 | 3.277*** | Secondary | 1.243 | 1.787** | 5.477*** |
| | (0.486) | (0.286) | (0.608) | | (1.505) | (0.738) | (1.560) |
| Post secondary | -0.956 | 0.700 | 3.232*** | Post secondary | -0.797 | 2.887*** | 6.971*** |
| | (0.926) | (0.579) | (1.222) | | (2.116) | (1.055) | (2.218) |
| University and above | -2.469*** | 0.0852 | 5.718*** | University and above | -10.09*** | 1.109 | 5.779*** |
| | (0.632) | (0.382) | (0.828) | | (2.076) | (1.034) | (2.118) |
| **Marital status: Reference category (Unmarried)** | | | | **Marital status: Reference category (Unmarried)** | | | |
| Less than minimum age | -3.619*** | -3.509*** | -16.53*** | | | | |
| | (1.135) | (0.487) | (1.329) | | | | |
| Ever married | -1.961*** | 8.801*** | 19.30*** | Ever married | -2.449 | 5.461*** | 15.12*** |
| | (0.644) | (0.351) | (0.869) | | (1.519) | (0.728) | (1.532) |
| Head of Household | -1.704*** | -5.224*** | -7.699*** | Head of Household | 0.604 | 0.335 | -1.581 |
| | (0.594) | (0.314) | (0.739) | | (1.420) | (0.665) | (1.441) |
| **Employment status: Reference category (Public Wage Worker)** | | | | **Employment status: Reference category (Public Wage Worker)** | | | |
| Out of Labor Force | -173.0 | 0.576* | 3.616*** | Out of Labor Force | -93.43*** | 1.778** | 0.960 |
| | (11,680) | (0.346) | (0.747) | | (2.594) | (0.787) | (1.642) |
| Private Wage Worker | 2.000*** | -3.452*** | -4.636*** | Private Wage Worker | 2.658** | 1.389* | -4.659*** |
| | (0.446) | (0.358) | (0.850) | | (1.054) | (0.805) | (1.754) |

| | (1) | (2) | (3) |
|---|---|---|---|
| Self-employed or Employer | 5.625*** | 2.763*** | -1.152 |
| | (0.498) | (0.404) | (0.973) |
| Unpaid Family Worker | -28.98*** | 11.12*** | 7.708*** |
| | (0.607) | (0.417) | (0.893) |
| Unemployed | -177.9 | 2.611*** | 4.390*** |
| | (49,721) | (0.529) | (1.099) |
| **II- Household Characteristics** | | | |
| Share of adult females in household | 3.008** | -5.205*** | -15.95*** |
| | (1.413) | (0.746) | (2.095) |
| Household size | 0.392*** | -0.496*** | -0.453*** |
| | (0.0897) | (0.0484) | (0.108) |
| Share of infants in household | -3.352** | -1.729* | 74.43*** |
| | (1.564) | (0.886) | (1.987) |
| Share of children in household | -2.743** | -1.101* | 36.04*** |
| | (1.103) | (0.592) | (1.488) |
| Share of seniors in household | -1.982 | -0.139 | 45.52*** |
| | (1.930) | (1.010) | (2.217) |
| **House Ownership: Reference category (owned)** | | | |
| Unfurnished (or rent old) | 1.127* | 1.228*** | 1.250* |
| | (0.575) | (0.313) | (0.711) |
| Furnished (or new rent) | 3.054*** | 0.624 | 3.489*** |
| | (0.755) | (0.434) | (0.886) |
| Condominium or grant | 0.730* | 0.851*** | 0.386 |
| | (0.378) | (0.213) | (0.458) |
| **Sewerage Facility: Reference category (others)** | | | |
| Private toilet connected to a sewerage network | 0.151 | -1.537*** | 0.941* |
| | (0.411) | (0.240) | (0.531) |
| Shared toilet connected to a sewerage network | -0.596 | -1.476** | -3.074* |
| | (1.240) | (0.683) | (1.579) |
| Public water network | 0.717 | -1.066*** | -3.121*** |
| | (0.634) | (0.366) | (0.794) |
| Number of durables | -0.124 | -0.565*** | -0.286 |
| | (0.153) | (0.0844) | (0.192) |
| **Wealth Quintiles: Reference Category (First Wealth Quintile)** | | | |

| | (1) | (2) | (3) |
|---|---|---|---|
| Self-employed or Employer | 4.109*** | 5.253*** | -2.570 |
| | (1.156) | (0.879) | (1.893) |
| Unpaid Family Worker | -35.15*** | 10.98*** | 0.790 |
| | (1.481) | (0.961) | (1.946) |
| Unemployed | -93.11*** | 4.222*** | 3.312 |
| | (6.115) | (1.060) | (2.258) |
| **II- Household Characteristics** | | | |
| Share of adult females in household | 2.320 | -5.101*** | -10.30*** |
| | (2.685) | (1.306) | (3.350) |
| Household size | 0.470* | -0.456*** | 0.516* |
| | (0.259) | (0.126) | (0.270) |
| Share of infants in household | 0.425 | -3.166 | 51.56*** |
| | (4.134) | (2.161) | (4.055) |
| Share of children in household | -2.941 | -5.685*** | 23.46*** |
| | (2.442) | (1.206) | (2.697) |
| Share of seniors in household | -0.671 | -1.595 | 27.77*** |
| | (3.300) | (1.548) | (3.225) |
| **House Ownership: Reference category (owned)** | | | |
| Tenant public/private/public property | 2.895** | 0.415 | 1.601 |
| | (1.474) | (0.814) | (1.520) |
| Owned by employer | 5.578 | 3.581 | 7.835 |
| | (6.415) | (3.256) | (5.750) |
| Free accommodation with family | 2.740 | 0.658 | 1.431 |
| | (1.913) | (0.977) | (1.817) |
| **Sewerage Facility: Reference category (open drain and others)** | | | |
| Sewage system | -9.253*** | -5.740*** | 3.835** |
| | (1.608) | (0.824) | (1.794) |
| Covered septic tank | -8.376*** | -3.703*** | 4.482*** |
| | (1.445) | (0.741) | (1.640) |
| Public water network | -0.216 | -0.930** | -0.731 |
| | (0.936) | (0.472) | (0.956) |
| Number of durables | 1.282*** | 0.0991 | -0.848** |
| | (0.404) | (0.203) | (0.413) |
| **Wealth Quintiles: Reference Category (First Wealth Quintile)** | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Second Wealth Quintile | 0.388 | 0.669** | 1.846*** | Second Wealth Quintile | 0.821 | -0.563 | -0.918 |
| | (0.482) | (0.275) | (0.623) | | (1.125) | (0.568) | (1.179) |
| Third Wealth Quintile | 1.674*** | 0.692** | 1.327* | Third Wealth Quintile | 2.183 | -0.662 | -0.0307 |
| | (0.530) | (0.300) | (0.681) | | (1.458) | (0.747) | (1.535) |
| Fourth Wealth Quintile | 0.552 | 0.823** | 1.506* | Fourth Wealth Quintile | 1.926 | 0.565 | 3.749* |
| | (0.624) | (0.354) | (0.792) | | (1.833) | (0.945) | (1.940) |
| Fifth Wealth Quintile | 2.176*** | 1.697*** | 1.291 | Fifth Wealth Quintile | -1.140 | 0.784 | 5.434** |
| | (0.831) | (0.469) | (1.060) | | (2.671) | (1.348) | (2.716) |
| **III- Community Variables** | | | | **III- Community Variables** | | | |
| **Regional Dummies: Reference Category (Greater Cairo)** | | | | **Regional Dummies: Reference Category (North)** | | | |
| Alexandria and Suez Canal | -0.459 | -3.143*** | -2.434*** | North West | 7.652*** | 2.367*** | 1.812 |
| | (0.729) | (0.394) | (0.879) | | (1.630) | (0.846) | (1.776) |
| Urban Lower Egypt | 1.336 | -1.063* | -3.349*** | Center East | -1.482 | 3.328*** | 3.502*** |
| | (0.994) | (0.567) | (1.194) | | (1.096) | (0.570) | (1.175) |
| Urban Upper Egypt | -0.170 | -2.015*** | -8.044*** | Center West | -1.667 | 7.769*** | -0.397 |
| | (0.975) | (0.552) | (1.180) | | (1.997) | (1.000) | (2.103) |
| Rural Lower Egypt | -1.386 | -1.751*** | -3.922*** | South East | -2.740** | 9.496*** | 2.548* |
| | (0.949) | (0.543) | (1.142) | | (1.350) | (0.677) | (1.394) |
| Rural Upper Egypt | -2.192** | -1.932*** | -8.878*** | South West | -10.53*** | 10.21*** | 3.745** |
| | (1.000) | (0.569) | (1.208) | | (1.648) | (0.840) | (1.759) |
| Urbanization by governorate | 5.720*** | 4.563*** | -0.596 | Urbanization by governorate | 8.173*** | -0.438 | -3.061 |
| | (1.219) | (0.697) | (1.476) | | (3.106) | (1.602) | (3.300) |
| Share of unemployed by governorate | -23.33*** | -17.66*** | -66.15*** | Share of unemployed by governorate | -14.43 | 3.479 | 19.99* |
| | (7.518) | (4.374) | (9.717) | | (10.93) | (5.569) | (11.21) |
| Constant | 38.77*** | -18.65*** | -64.84*** | Constant | 27.20*** | -41.90*** | -103.5*** |
| | (2.657) | (1.396) | (3.296) | | (5.329) | (2.454) | (5.842) |
| **Observations** | **37718** | **37718** | **37718** | **Observations** | **8884** | **8884** | **8884** |
| **lnsigma** | **2.921*** | **2.681*** | **3.152*** | **lnsigma** | **2.999*** | **2.716*** | **2.988*** |
| | **(0.00616)** | **(0.00495)** | **(0.00820)** | | **(0.0140)** | **(0.00960)** | **(0.0208)** |
| **atrho 12** | | **-0.0228*** | | **atrho 12** | | **0.00685** | |
| | | **(0.00867)** | | | | **(0.0200)** | |
| **atrho 13** | | **-0.0530*** | | **atrho 13** | | **-0.0217** | |
| | | **(0.0132)** | | | | **(0.0325)** | |
| **atrho23** | | **0.223*** | | **atrho23** | | **0.370*** | |

| | | | |
|---|---|---|---|
| | (0.00821) | | (0.0171) |
| **Wald chi2 (117)** | **45260.20** | **Wald chi2 (114)** | **8803.29** |
| **Prob > chi2** | **0.0000** | **Prob > chi2** | **0.0000** |
| **Log likelihood** | **-203708.04** | **Log likelihood** | **-45436.339** |
| **Likelihood ratio test of rho12 = rho13 = rho23 = 0, chi2(3) = 737.793** | | **Likelihood ratio test of rho12 = rho13 = rho23 = 0, chi2(3) = 451.392** | |
| | **Prob > chi2 = 0.0000** | | **Prob > chi2 = 0.0000** |

Notes: standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.
 For each country a system of three equations (one equation for each type of work) is estimated simultaneously using Maximum Simulated Likelihood (MSL) method, and *mvtobit* command in STATA.

**Table (4): Empirical Results of Tobit models for different types of work by gender in Egypt**

| | Females | | | Males | | |
|---|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** |
| **VARIABLES** | **Market Work** | **House Work** | **Care Work** | **Market Work** | **House Work** | **Care Work** |
| **I- Individual Characteristics** | | | | | | |
| Age | 0.659*** | 1.660*** | 2.026*** | 0.581*** | 0.532*** | 0.702*** |
| | (0.251) | (0.0670) | (0.148) | (0.125) | (0.0806) | (0.194) |
| Age$^2$ | -0.00796** | -0.0221*** | -0.0320*** | -0.00861*** | -0.00531*** | -0.00878*** |
| | (0.00314) | (0.000849) | (0.00192) | (0.00151) | (0.000974) | (0.00239) |
| **Education level: Reference Category (illiterate)** | | | | | | |
| Read and write (literate) | -1.514 | -3.192*** | -3.593*** | -2.518*** | -2.080*** | 2.259* |
| | (2.275) | (0.532) | (1.165) | (0.805) | (0.533) | (1.241) |
| Basic Education | -7.445*** | 1.517*** | 1.613** | -0.702 | -0.872** | 2.157** |
| | (1.413) | (0.387) | (0.770) | (0.548) | (0.424) | (0.978) |
| Secondary | -4.662*** | 0.320 | 3.815*** | -0.659 | -0.739* | 3.419*** |
| | (1.233) | (0.378) | (0.716) | (0.518) | (0.412) | (0.913) |
| Post secondary | -6.162*** | 1.182 | 2.927* | -1.443 | -1.093 | 3.726** |
| | (2.244) | (0.794) | (1.497) | (0.978) | (0.788) | (1.523) |
| University and above | -7.220*** | -0.233 | 5.211*** | -3.468*** | -1.079** | 4.849*** |
| | (1.604) | (0.532) | (1.024) | (0.671) | (0.520) | (1.082) |
| **Marital status: Reference category (Unmarried)** | | | | | | |
| Less than minimum age | -4.697 | -7.323*** | -16.04*** | -10.08*** | 2.503*** | -2.834 |
| | (3.043) | (0.675) | (1.613) | (1.227) | (0.695) | (1.877) |
| Ever married | -2.092 | 7.767*** | 20.85*** | 1.293 | 0.565 | 4.050*** |
| | (1.467) | (0.473) | (1.059) | (0.808) | (0.650) | (1.433) |
| Head of Household | -4.796*** | -0.516 | -4.063*** | -0.818 | 2.575*** | 0.302 |
| | (1.306) | (0.467) | (0.969) | (0.798) | (0.631) | (1.302) |
| **Employment status: Reference category (Public Wage Worker)** | | | | | | |
| Out of Labor Force | -183.3 | -0.564 | 3.290*** | -156.3 | -5.081*** | -3.484*** |
| | (7,844) | (0.485) | (0.931) | (7,883) | (0.540) | (1.263) |
| Private Wage Worker | 4.820*** | -3.484*** | 1.450 | 4.985*** | -2.143*** | -2.342*** |
| | (1.341) | (0.853) | (1.703) | (0.460) | (0.385) | (0.712) |
| Self-employed or Employer | -5.696*** | 1.762* | 2.045 | 8.208*** | 2.869*** | -0.800 |
| | (1.534) | (0.913) | (1.779) | (0.504) | (0.422) | (0.799) |
| Unpaid Family Worker | -49.90*** | 8.406*** | 6.934*** | -3.827*** | 11.11*** | 3.930** |

|  | (1.271) | (0.568) | (1.080) | (0.883) | (0.673) | (1.576) |
|---|---|---|---|---|---|---|
| Unemployed | -180.0 | 1.363** | 4.357*** | -161.3 | -0.266 | -0.188 |
|  | (35,590) | (0.690) | (1.304) | (31,870) | (0.799) | (1.641) |
| **II- Household Characteristics** | | | | | | |
| Share of adult females in household | 6.228** | -11.02*** | -15.01*** | -3.251* | -3.727*** | -3.922 |
|  | (3.013) | (1.033) | (2.528) | (1.741) | (1.228) | (3.256) |
| Household size | 0.863*** | -0.485*** | -0.0249 | 0.109 | -0.100 | -0.820*** |
|  | (0.193) | (0.0641) | (0.125) | (0.104) | (0.0723) | (0.192) |
| Share of infants in household | -6.310* | -3.988*** | 84.42*** | -2.482 | -1.489 | 36.13*** |
|  | (3.774) | (1.147) | (2.321) | (1.693) | (1.292) | (2.923) |
| Share of children in household | 0.307 | -3.498*** | 35.77*** | -3.531*** | -3.385*** | 21.93*** |
|  | (2.449) | (0.784) | (1.745) | (1.231) | (0.861) | (2.248) |
| Share of seniors in household | -4.165 | 1.708 | 49.92*** | -0.394 | 5.154*** | 36.08*** |
|  | (3.638) | (1.252) | (2.564) | (2.364) | (1.655) | (3.473) |
| **House Ownership: Reference category (owned)** | | | | | | |
| Unfurnished (or rent old) | 1.925 | 1.522*** | 1.384 | -0.0698 | 0.942** | 0.924 |
|  | (1.302) | (0.411) | (0.852) | (0.617) | (0.442) | (0.886) |
| Furnished (or new rent) | 1.486 | 0.317 | 2.159** | 2.454*** | 0.919 | 4.340*** |
|  | (1.878) | (0.576) | (1.089) | (0.787) | (0.597) | (1.049) |
| Condominium or grant | 0.967 | 1.085*** | 0.652 | 0.319 | 0.637** | 0.338 |
|  | (0.886) | (0.278) | (0.544) | (0.406) | (0.300) | (0.605) |
| **Sewerage Facility: Reference category (others)** | | | | | | |
| Private toilet connected to a sewerage network | -2.345** | -1.012*** | 1.911*** | 0.559 | -2.041*** | -0.865 |
|  | (0.935) | (0.316) | (0.629) | (0.443) | (0.333) | (0.699) |
| Shared toilet connected to a sewerage network | -4.483 | -2.444*** | -2.902 | -0.788 | -1.119 | -5.374** |
|  | (3.349) | (0.895) | (1.828) | (1.251) | (0.911) | (2.576) |
| Public water network | 0.214 | -2.049*** | -4.069*** | 0.706 | -0.169 | -0.558 |
|  | (1.477) | (0.471) | (0.919) | (0.674) | (0.504) | (1.120) |
| Number of durables | -0.447 | -0.636*** | -0.540** | -0.0854 | -0.380*** | 0.172 |
|  | (0.335) | (0.110) | (0.227) | (0.167) | (0.119) | (0.248) |
| **Wealth Quintiles: Reference Category (First Wealth Quintile)** | | | | | | |
| Second Wealth Quintile | -1.226 | 0.711** | 2.203*** | 1.060** | 0.542 | 0.903 |
|  | (1.159) | (0.362) | (0.725) | (0.511) | (0.379) | (0.888) |
| Third Wealth Quintile | -0.0515 | 0.777* | 1.567* | 2.456*** | 0.619 | 0.747 |
|  | (1.280) | (0.398) | (0.801) | (0.562) | (0.417) | (0.937) |

| | | | | | | |
|---|---|---|---|---|---|---|
| Fourth Wealth Quintile | -2.240 | 0.559 | 1.221 | 1.273* | 1.059** | 1.637 |
| | (1.503) | (0.467) | (0.938) | (0.663) | (0.491) | (1.049) |
| Fifth Wealth Quintile | -2.086 | 0.908 | 0.843 | 2.627*** | 2.580*** | 1.617 |
| | (1.890) | (0.623) | (1.263) | (0.899) | (0.651) | (1.366) |
| **III- Community Variables** | | | | | | |
| **Regional Dummies: Reference Category (Greater Cairo)** | | | | | | |
| Alexandria and Suez Canal | -3.032* | -1.238** | -3.653*** | 0.299 | -5.409*** | 0.146 |
| | (1.710) | (0.518) | (1.076) | (0.768) | (0.557) | (1.008) |
| Urban Lower Egypt | -3.243 | 2.439*** | -1.883 | 2.835*** | -5.164*** | -2.284 |
| | (2.285) | (0.728) | (1.450) | (1.064) | (0.795) | (1.436) |
| Urban Upper Egypt | -3.458 | -0.939 | -5.361*** | 1.126 | -2.973*** | -9.935*** |
| | (2.256) | (0.714) | (1.426) | (1.041) | (0.765) | (1.508) |
| Rural Lower Egypt | -8.838*** | 1.044 | -3.116** | 2.006** | -4.558*** | -2.091 |
| | (2.206) | (0.701) | (1.394) | (1.013) | (0.752) | (1.363) |
| Rural Upper Egypt | -4.901** | -1.679** | -7.065*** | -0.701 | -2.138*** | -9.386*** |
| | (2.347) | (0.735) | (1.459) | (1.063) | (0.787) | (1.532) |
| Urbanization by governorate | 0.208 | 7.314*** | 0.429 | 8.019*** | 1.441 | 0.0379 |
| | (2.746) | (0.903) | (1.813) | (1.311) | (0.967) | (1.736) |
| Share of unemployed by governorate | -55.68*** | -3.972 | -70.64*** | -13.61* | -36.97*** | -35.18*** |
| | (17.00) | (5.700) | (11.52) | (8.152) | (6.147) | (12.90) |
| Constant | 41.45*** | -4.390** | -51.21*** | 32.85*** | -5.231*** | -40.43*** |
| | (6.461) | (1.890) | (4.021) | (2.910) | (2.010) | (4.645) |
| **Observations** | **19062** | **19062** | **19062** | **18656** | **18656** | **18656** |
| **lnsigma** | **3.035*** | **2.677*** | **3.164*** | **2.844*** | **2.575*** | **2.768*** |
| | **(0.0149)** | **(0.00589)** | **(0.00876)** | **(0.00672)** | **(0.00924)** | **(0.0243)** |
| **atrho 12** | | **0.000720** | | | **-0.0341*** | |
| | | **(0.0153)** | | | **(0.0103)** | |
| **atrho 13** | | **-0.0104** | | | **-0.0796*** | |
| | | **(0.0205)** | | | **(0.0179)** | |
| **atrho23** | | **0.210*** | | | **0.236*** | |
| | | **(0.00937)** | | | **(0.0164)** | |
| **Wald chi2 (114)** | | **22336.28** | | | **4746.74** | |
| **Prob > chi2** | | **0.0000** | | | **0.0000** | |
| **Log likelihood** | | **-112539.84** | | | **-88772.67** | |
| **Likelihood ratio test of rho12 = rho13 = rho23 = 0, chi2(3) =** | | **497.132** | | | **222.883** | |

| | **Prob > chi2 =** | 0.0000 | 0.0000 |

**Table (5): Empirical Results of Tobit models for different types of work by gender in Tunisia**

| VARIABLES | Females | | | Males | | |
|---|---|---|---|---|---|---|
| | (1)<br>Market Work | (2)<br>House Work | (3)<br>Care Work | (1)<br>Market Work | (2)<br>House Work | (3)<br>Care Work |
| **I- Individual Characteristics** | | | | | | |
| Age | 0.524 | 2.376*** | 2.900*** | 0.799*** | 0.827*** | 1.606*** |
| | (0.405) | (0.107) | (0.210) | (0.249) | (0.108) | (0.466) |
| Age$^2$ | -0.00612 | -0.0276*** | -0.0373*** | -0.0106*** | -0.00849*** | -0.0180*** |
| | (0.00497) | (0.00132) | (0.00261) | (0.00293) | (0.00129) | (0.00552) |
| **Education level: Reference Category (illiterate)** | | | | | | |
| Read and write (literate) | -0.526 | 1.660** | 3.373** | 0.147 | 0.321 | 7.540** |
| | (2.541) | (0.839) | (1.342) | (1.346) | (0.703) | (2.966) |
| Basic Education | 4.329* | 3.734*** | 5.480*** | 1.779 | 0.553 | 8.846*** |
| | (2.320) | (0.762) | (1.236) | (1.299) | (0.670) | (2.835) |
| Secondary | 2.249 | 1.960* | 4.757** | 0.100 | 0.790 | 10.07*** |
| | (3.355) | (1.081) | (1.850) | (1.696) | (0.867) | (3.290) |
| Post secondary | 2.209 | 1.531 | 4.317 | -3.476 | 2.704** | 14.66*** |
| | (4.248) | (1.493) | (2.665) | (2.436) | (1.290) | (4.170) |
| University and above | -10.19*** | -0.414 | 4.218* | -10.11*** | 2.001 | 8.473** |
| | (3.904) | (1.507) | (2.549) | (2.526) | (1.246) | (4.064) |
| **Marital status: Reference category (Unmarried)** | | | | | | |
| Ever married | -1.404 | 5.078*** | 15.50*** | -3.162 | 4.482*** | 19.05*** |
| | (2.816) | (0.999) | (1.693) | (2.427) | (1.246) | (3.944) |
| Head of Household | -7.681*** | 0.678 | 1.574 | 4.353* | 0.968 | -12.48*** |
| | (2.920) | (1.065) | (1.731) | (2.541) | (1.277) | (3.492) |
| **Employment status: Reference category (Public Wage Worker)** | | | | | | |
| Out of Labor Force | -100.1*** | 2.838* | -0.224 | -87.02*** | -2.084** | 0.257 |
| | (5.280) | (1.498) | (2.368) | (2.875) | (0.814) | (2.760) |
| Private Wage Worker | 10.40*** | 0.850 | -4.458 | 0.511 | 1.323* | -3.313 |
| | (2.585) | (1.746) | (2.844) | (1.126) | (0.700) | (2.075) |
| Self-employed or Employer | 5.660* | 2.783 | -1.773 | 3.412*** | 4.956*** | -3.517 |
| | (3.062) | (2.081) | (3.246) | (1.223) | (0.749) | (2.216) |
| Unpaid Family Worker | -39.79*** | 10.55*** | -2.443 | -21.81*** | 12.19*** | 8.011** |
| | (2.957) | (1.664) | (2.642) | (1.986) | (1.159) | (3.968) |
| Unemployed | -159.8 | 7.880*** | 3.757 | -89.20*** | 0.690 | 5.780* |

| | (6,635) | (1.868) | (3.014) | (6.985) | (1.076) | (3.439) |
|---|---|---|---|---|---|---|
| **II- Household Characteristics** | | | | | | |
| Share of adult females in household | 7.556 | -5.891*** | -10.21*** | -1.176 | -6.041*** | -10.03 |
| | (5.707) | (1.937) | (3.833) | (3.370) | (1.715) | (7.402) |
| Household size | 0.301 | -0.607*** | 0.964*** | 0.561* | -0.180 | -1.112* |
| | (0.521) | (0.179) | (0.305) | (0.314) | (0.159) | (0.608) |
| Share of infants in household | 0.609 | 0.155 | 59.23*** | -1.110 | -7.209*** | 33.74*** |
| | (9.419) | (3.093) | (4.683) | (4.602) | (2.559) | (8.033) |
| Share of children in household | -0.942 | -6.975*** | 21.61*** | -5.554** | -5.128*** | 24.54*** |
| | (5.182) | (1.753) | (3.059) | (2.779) | (1.432) | (5.539) |
| Share of seniors in household | 0.0971 | -0.0345 | 30.47*** | -0.0725 | -3.044 | 12.48 |
| | (5.937) | (2.052) | (3.536) | (4.382) | (2.257) | (8.200) |
| **House Ownership: Reference category (owned)** | | | | | | |
| Tenant  public/private/public property | -0.632 | -0.651 | -1.235 | 3.580** | 1.408 | 6.968*** |
| | (2.945) | (1.159) | (1.844) | (1.673) | (0.942) | (2.455) |
| Owned by employer | -11.91 | 4.926 | 4.390 | 12.03* | 2.046 | 11.56 |
| | (16.36) | (5.007) | (7.661) | (6.970) | (3.674) | (7.894) |
| Free accommodation with family | -0.847 | 1.313 | 1.055 | 4.876** | -0.447 | 3.853 |
| | (4.571) | (1.390) | (2.127) | (2.070) | (1.157) | (3.318) |
| **Sewerage Facility: Reference category (open drain and others)** | | | | | | |
| Sewage system | -16.64*** | -5.976*** | 4.695** | -5.873*** | -4.737*** | -0.301 |
| | (3.227) | (1.173) | (2.033) | (1.826) | (0.965) | (3.576) |
| Covered septic tank | -17.02*** | -4.454*** | 5.400*** | -4.095** | -2.504*** | -0.442 |
| | (2.826) | (1.059) | (1.848) | (1.646) | (0.864) | (3.362) |
| Public water network | -4.000** | -0.715 | -1.390 | 1.499 | -1.089* | 1.232 |
| | (1.815) | (0.662) | (1.087) | (1.098) | (0.566) | (1.934) |
| Number of durables | 2.344*** | 0.0124 | -1.145** | 0.992** | 0.105 | 0.169 |
| | (0.861) | (0.289) | (0.476) | (0.451) | (0.238) | (0.780) |
| **Wealth Quintiles: Reference Category (First Wealth Quintile)** | | | | | | |
| Second Wealth Quintile | 1.245 | -0.400 | -0.587 | 1.204 | -0.843 | -2.521 |
| | (2.205) | (0.793) | (1.330) | (1.296) | (0.678) | (2.505) |
| Third Wealth Quintile | -1.377 | -0.503 | 0.225 | 2.868* | -0.855 | -1.085 |
| | (3.026) | (1.061) | (1.761) | (1.638) | (0.876) | (3.016) |
| Fourth Wealth Quintile | -4.195 | 1.495 | 4.316* | 3.305 | -0.632 | 1.709 |
| | (3.871) | (1.356) | (2.239) | (2.026) | (1.097) | (3.636) |

| | | | | | | |
|---|---|---|---|---|---|---|
| Fifth Wealth Quintile | -10.57* | 1.951 | 4.764 | 1.805 | -0.613 | 5.240 |
| | (5.714) | (1.915) | (3.136) | (2.978) | (1.586) | (5.070) |
| **III- Community Variables** | | | | | | |
| **Regional Dummies: Reference Category (North)** | | | | | | |
| North West | 9.682*** | 1.868 | 3.313 | 7.386*** | 2.638*** | -4.007 |
| | (3.436) | (1.201) | (2.016) | (1.865) | (0.994) | (3.635) |
| Center East | 4.078* | 4.282*** | 3.730*** | -3.263*** | 2.036*** | 2.758 |
| | (2.344) | (0.809) | (1.348) | (1.227) | (0.673) | (2.212) |
| Center West | -4.614 | 10.78*** | 2.091 | 0.742 | 2.993** | -5.052 |
| | (4.376) | (1.425) | (2.398) | (2.241) | (1.183) | (4.116) |
| South East | -6.888** | 11.31*** | 5.036*** | -0.978 | 6.293*** | -4.399 |
| | (3.324) | (0.963) | (1.579) | (1.443) | (0.790) | (2.914) |
| South West | 1.905 | 10.55*** | 1.106 | -14.59*** | 7.986*** | 9.073*** |
| | (3.622) | (1.202) | (2.104) | (1.829) | (0.972) | (2.871) |
| Urbanization by governorate | 18.34*** | 3.797* | 0.108 | 5.009 | -5.315*** | -5.498 |
| | (6.499) | (2.270) | (3.776) | (3.513) | (1.909) | (6.292) |
| Share of unemployed by governorate | 16.14 | 9.146 | 8.266 | -27.06** | -4.643 | 67.53*** |
| | (22.37) | (7.872) | (12.80) | (12.55) | (6.550) | (22.92) |
| Constant | 7.799 | -37.52*** | -89.60*** | 20.89*** | -13.94*** | -83.71*** |
| | (11.14) | (3.637) | (6.674) | (6.141) | (2.977) | (12.79) |
| **Observations** | **4826** | **4826** | **4826** | **4058** | **4058** | **4058** |
| **lnsigma** | **3.068*** | **2.802*** | **2.990*** | **2.950*** | **2.424*** | **2.870*** |
| | **(0.0300)** | **(0.0118)** | **(0.0222)** | **(0.0157)** | **(0.0165)** | **(0.0551)** |
| **atrho 12** | | **-0.104*** | | | **0.0566*** | |
| | | **(0.0366)** | | | **(0.0219)** | |
| **atrho 13** | | **-0.0665** | | | **0.0266** | |
| | | **(0.0480)** | | | **(0.0486)** | |
| **atrho23** | | **0.397*** | | | **0.350*** | |
| | | **(0.0203)** | | | **(0.0356)** | |
| **Wald chi2 (111)** | | **3814.73** | | | **3042.08** | |
| **Prob > chi2** | | **0.0000** | | | **0.0000** | |
| **Log likelihood** | | **-25553.657** | | | **-19433.739** | |
| **Likelihood ratio test of rho12 = rho13 = rho23 = 0, chi2(3) =** | | **379.343** | | | **95.3164** | |
| **Prob > chi2 =** | | **0.0000** | | | **0.0000** | |

Notes: standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.  For each gender a system of three equations (one equation for each type of work) is estimated simultaneously using Maximum Simulated Likelihood (MSL) method, and *mvtobit* command in STATA