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Endogenous Women's Autonomy and the Use of Reproductive Health Services: Empirical Evidence from Tajikistan

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【Abstract】Though gender equity is widely considered to be a key to improving maternal health in developing countries, little empirical evidence has been presented to support this claim. This paper investigates whether or not and how female autonomy within the household affects women's use of reproductive health care in Tajikistan, where the situation of maternal health and gender equity is worse compared with neighbouring countries. Estimation is performed using bivariate probit models in which woman's use of health services and the level of female autonomy are recursively and simultaneously determined. Empirical results reveal that female autonomy measured by women's decision-making on child wellbeing and on economic affairs within the household increases the probability of receiving both antenatal and delivery care. Policymakers need to address women's empowerment in the household in addition to implementing direct health interventions towards improvement of maternal health.

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1. Introduction

Improvement of maternal health has become a global agenda as it is clearly stipulated as the fifth target of Millennium Development Goals (MDGs). However, maternal mortality ratio in developing countries declined by just 6% from 430 per 100,000 live births in 1990 to 400 per 100,000 live births in 2005, whilst under-five mortality rate fell by 28% during 1990-2007. One possible reason for this stagnation is uneven and inequitable utilisation of reproductive health care services (Gill et al., 2007). It has been confirmed that almost 80% of maternal deaths could have be prevented if women had had access to essential reproductive health care (Wessel et al., 1999, Bartlett et al., 2005, Kilpatrick et al., 2002). In particular, early timing and high frequency of antenatal visits help to identify and mitigate the risk of threatening lives of mothers and newborns by helping to reach pregnant women with multiple vital interventions for their health (Taguchi et al., 2003, Abou-Zahr and Wardlaw, 2003, Bloom et al., 1999). At birth delivery, skilled birth attendants, i.e. doctors, nurses or midwives with a diploma, in well-equipped facilities play vital roles in averting deaths from pregnancy complications (UNICEF, 2009). Although recent studies have questioned the effectiveness of antenatal care in preventing maternal deaths (Carroli et al., 2001), there is a wide consensus that appropriate reproductive health services contribute to better pregnancy outcomes for mothers and newborns through timely preventive measures (Campbell and Graham, 2006, Adam et al., 2005). Nevertheless, many women in the developing regions confront the difficulty of

accessing to adequate antenatal and delivery care due to multiple layers of constraints. Among all, gender equity, i.e. environment which respects women's rights and their socioeconomic status, has been increasingly realized as a crucial factor in assuring further access to reproductive health. Actually, there was a long process of linking reproductive health issues to gender equity, human rights and development throughout several benchmarking events such as the International Conference on Population and Development (ICPD) in Cairo in 1994, the Fourth World Conference on Women in Beijing in 1995, ICPD+5 in 1999, and the Women Deliver in London in 2007 and in Washington, D.C. in 2010. In accordance with these movements, the second target of MDG 5 which seeks the universal access to reproductive health was introduced in 2005.

Improvement of access to reproductive health care is a special interest of Tajikistan, where the situation of maternal health is worse compared to neighbouring countries. Table 1 summarises indicators on maternal health and gender equity in Central Asia. Maternal mortality ratio in Tajikistan is among the highest in the region, i.e. 170 per 100,000 live births in 2005. Utilization of reproductive health care is also lower than neighbouring countries. For instance, the percentages of women who visited at least one antenatal consultation and at least four antenatal consultations are 89% and 49% respectively. Regarding gender equity, all of the listed indicators in Table 1, i.e. female earned income, enrolment and attendance ratios, female life expectancy relative to men, and contraceptive prevalence in Tajikistan are the lowest in the region. Previous studies

identified socioeconomic and demographic determinants of reproductive health care use among women in Tajikistan, using household survey datasets (Habibov and Fan, 2008, Falkingham, 2003, Fan and Habibov, 2009). However, they do not scrutinize the role of gender in reproductive health. For this reason, this paper aims to examine whether or not and how female autonomy within the household affect women's utilisation of health services in Tajikistan.

<Table 1>

2. Literature Review

In this section, I review the literature on the effects of female autonomy in affecting reproductive health care utilisation in developing countries. A number of empirical studies have clarified factors hampering women's access to reproductive health care in developing countries (Anson, 2004 for China, Navaneetham and Dharmalingam, 2002, Chandrashekar et al., 1998, Bhatia and Cleland, 1995 for India, Mahabub-Ul-Anwar et al., 2006 for Bangladesh, Fatmi and Avan, 2002 for Pakistan, Hotchkiss, 2001, Allendorf, 2007 for Nepal, Obermeyer and Potter, 1991 for Jordan, Phoxay et al., 2001 for Laos, Sepehri et al., 2008, Trinh et al., 2007 for Viet Nam, Erbaydar, 2003 for Turkey, Magadi et al., 2000 for Kenya, Gage, 2007 for Mali, LeVine et al., 1991 for Mexico, Wehby et al., 2009a for Argentina, Wehby et al., 2009b for Brazil, Pebley et al., 1996 for Guatemala, Vecino-

Ortiz, 2008 for Colombia, Elo, 1992 for Peru, Jewell, 2009 for Bolivia, Columbia and Peru, and for systematic reviews see: Simkhada et al., 2008, Say and Raine, 2007). Recently, a growing body of literature confirm that intra-household women's status as measured by education, employment, intimate partner violence affects their access to reproductive health services (Bloom et al., 2001, Gill et al., 2007, Blanc, 2001, Beegle et al., 2001, Matsumura and Gubhaju, 2001, Becker et al., 2006, Furuta and Salway, 2006). In contrast, some other studies also find that female autonomy within the household has only a weak or no effect on women's health care use (Simkhada et al., 2008, Fotso et al., 2009). The problem entailed in the above studies is the assumption that female autonomy is exogenous to household's decision-making on women's use of reproductive health services. Because female autonomy is highly likely to be determined through negotiation processes among family members which reflect the socioeconomic background of both wife and husband, empirical models which do not take into account this simultaneous relationship would yield biased results.

Several recent economics literature explicitly tackles this endogeneity problem in the analysis on intra-household decision-making. Basu, 2006 proposed an "endogenous power" theoretical model in which female autonomy is determined endogenously through negotiation processes within the household. Following this framework, Lancaster et al., 2006 and Maitra and Ray, 2005, confirmed statistically significant effects of a gender balance of power on household expenditure patterns under the assumption of an

endogenous balance of power within the household for micro datasets from India and Australia respectively. These results justify the use of the endogenous power model for analysing intra-household decision-making processes like this paper. The following analysis therefore adopts this framework to examine the relationship between female autonomy and women's use of reproductive health care.

3. Model

Traditionally, models to analyze the household decision-making are based on the unitary approach in which household preferences are defined over a single utility function subject to income constraints (Becker, 1981). Underlying assumption of the unitary model is that either family members' preferences are the same, or individual preferences are aggregated into a single utility. Nevertheless, this assumption was found to be inappropriate to reconcile the fact that there are many individuals within the household who have different preferences. A growing number of empirical results reject the validity of the unitary approach (Schultz, 1990, Quisumbing and Otsuka, 2001, Udry, 1996). Accordingly, more general approach—collective household model—was developed to illustrate intra-household decision-making processes. In particular, Chiappori, 1988 suggested a collective model which incorporates an intra-household resource allocation under the Pareto-efficient sharing rule with certain regularity conditions. I hence apply this Pareto-efficient collective household model in which each adult (*f=female, m=male*) has a

distinct utility which is defined over each members' consumption, leisure and child health. The household utility function is defined as a weighted product of the utility of both members, with weights capturing an intra-household balance of power. The utility function of the woman (= wife) and the man (= husband) is expressed as a function of a bundle of commodities including consumption goods (x_i), leisure (l_i) and child health status (c):

[1] $U_i = U_i(x_i, l_i, c) \quad i = f, m$

Child health production function is written as:

[2] $c = c(r;\ \varphi)$

where r represents health inputs and φ denotes a household's health production efficiency parameter. Couples choose x_i, l_i, and r to maximize the following composite function:

[3] $\text{Max}\ \left[U_f\left(x_f, l_f, c(r)\right) - V_f\right]^{\theta}\ [U_m(x_m, l_m, c(r)) - V_m]^{1-\theta}$

subject to the full income constraint:

[4] $p_x(x_f + x_m) + p_r r \leq w_f(T_f - l_f) + w_m(T_m - l_m) + A_f + A_m$

where V_f and V_m denote the "threat utility" which represents the utility that wife and husband would receive outside the household if the household dissolves. $\theta \in [0,1]$ is the Pareto weight of a gender balance of power which indicates women's autonomy within the household. Woman's autonomy increases as θ augments. p_x, p_r and $(1 - w_i)$ represent prices of consumption goods, health inputs, and leisure (i.e. price of labour = w_i)

respectively. T_f and T_m are time endowments. A_f and A_m are unearned income by the woman and the husband respectively.

By solving the above maximization problem, a reduced form demand function for child health input is obtained as:

[5] $r = r(p, w_i, A_i, V_i, \theta;\ \varphi)\quad i = f, m$

For the empirical analysis, r is defined over a price vector (p) consisting of p_x and p_r, price of labour (w_i), woman's autonomy (θ), and characteristics of individuals—woman and husband (δ_I)—, household (δ_H) and community (δ_C):

[6] $r = r(p, w_i, \theta, \delta_I, \delta_H, \delta_C)\quad i = f, m$

Univariate probit model

In the following analysis, I treat the child health input (=r) as a binary variable since I focus on whether or not women utilises antenatal and delivery care for the better health child health outcomes. I hence employ probit models for the empirical estimations. I first adopt the univariate probit model to assess the relationship of female autonomy within the household with women's receipt of reproductive health care by assuming that female autonomy is exogenously determined. I let r^* be a latent variable which denotes the probability that the woman will receive reproductive health care. r^* depends on the female autonomy (θ) within the household and a vector of individual-, household- and

community-level factors (X). The univariate probit model is therefore expressed as follows.

[7] $r^* = \alpha\theta + X\beta + \epsilon$

$$r = \begin{cases} 1 \ \ if \ r^* > 0 \\ 0 \ \ if \ r^* \leq 0 \end{cases}$$

where r is a binary variable that takes $r = 1$ if the woman receives a specific reproductive service, or $r = 0$ otherwise. ϵ is an error term.

Bivariate probit model

The univariate probit model described above assumes that female autonomy within the household is exogenously given, which may bring about biased results. I therefore apply the "endogenous power" model to estimate the role of female autonomy following the literature review in the previous section. For the estimation, I use the bivariate probit model in which female autonomy and women's receipt of health services are simultaneously determined inside the model. The bivariate probit is a joint model for two binary outcomes which may be correlated with each other (Greene, 2007, Greene, 1998). It also allows one of the binary outcomes, i.e. female autonomy in this case, to be included as a covariate of the other binary outcome, i.e. women's receipt of health care. Greene, 1998 shows that estimators from the bivariate probit model becomes consistent and efficient when dependent variables in two equations are binary, and omitted variables are correlated with each other. The bivariate probit model is specified as follows.

[8] $r^* = \alpha\theta + X\beta + \varepsilon_1$

$$r = \begin{cases} 1 \ \ if\ r^* > 0 \\ 0 \ \ if\ r^* \leq 0 \end{cases}$$

[9] $\theta^* = X\gamma + \varepsilon_2$

$$\theta = \begin{cases} 1 \ \ if\ \theta^* > 0 \\ 0 \ \ if\ \theta^* \leq 0, \end{cases}$$

where θ^* is a latent variable which denotes the level of female autonomy within the household. θ is a binary variable that takes $\theta = 1$ if the female autonomy is high, or $\theta = 0$ otherwise. The error terms ε_1 and ε_2 are jointly normally distributed with means of 0, variances of 1, and correlations of σ. If the error correlation σ is 0, the model collapses into two probit models for r and θ.

The probability that a woman receives reproductive health care when the level of female autonomy in the household is high, for instance, can be written as

[10] $p_{jk} = Prob(r = 1, \theta = 1)$

$$= Prob(X_1 < x_1, X_2 < x_2)$$
$$= \int_{-\infty}^{x_2} \int_{-\infty}^{x_1} f(z_1, z_2; \rho) dz_1 dz_2$$
$$= F(X_1\beta_1, X_2\beta_2; \rho),$$

where F is the bivariate normal cumulative distribution function with correlation coefficient ρ. The density f is given as:

$$f(z_1, z_2; \rho) = e^{-(1/2)(x_1^2 + x_2^2 - 2\rho x_1 x_2)/(1-\rho^2)} \Big/ 2\pi(1-\rho^2)^{1/2}$$

The log-likelihood function is

$$ln\ L(\beta_1, \beta_2; \rho) = \sum_{j=1}^{n} \{r_j \times \theta_j ln\ F(X_{j1}\beta_1, X_{j2}\beta_2; \rho) + r_j$$
$$\times (1 - \theta_j) ln\ [\vartheta(X_{j1}\beta_1) F(X_{j1}\beta_1, X_{j2}\beta_2; \rho)] + (1 - r_j)\vartheta(-X_{j1}\beta_1)\}$$

where ϑ denotes the univariate standard normal distribution function.

4. Data

The data for the following analysis are from the Tajikistan Living Standards Survey (TLSS) 2007. The survey was conducted by the National Committee for Statistics collaborating with the World Bank and UNICEF. TLSS 2007 was carried out from July to November in 2007 to collect information about 4,860 households from 270 clusters. TLSS 2007 contains questions asked of women from 19 to 49 years old about their use of health services during pregnancy and birth delivery together with socioeconomic and demographic variables of household members.

As dependent variables to represent the use of reproductive health services ($= r$), I use the following four binary indicators: (1) At least one antenatal care = whether or not the woman visited at least one antenatal care during the last pregnancy; (2) At least four antenatal care = whether or not the woman visited at least four antenatal care during the last pregnancy [1]; (3) Skilled birth attendance = whether or not the woman was attended by a professional health worker, i.e. doctor, nurse or midwife with a diploma, at the last birth-

[1] UNICEF and WHO recommend that the minimum number of antenatal visits during pregnancy is four.

delivery; and (4) Facility delivery = whether or not the woman used a health facility[2] at the last birth-delivery. The distribution of the number of antenatal visits is shown in Figure 1.

<Figure 1>

As a proxy variable to represent female autonomy, I focus on women's decision-making power within the household following the definition of female autonomy as "the ability of women to make decisions within the household relative to their husband" (Anderson and Eswaran, 2009). TLSS 2007 contains questions about whether household's decisions on specific subjects are made by female or male members. Table 2 summarises the descriptive statistics of all of 19 indicators on household's decision-making. For the empirical analysis, I focus on three binary variables: (1) whether or not female members make a decision on 'children's wellbeing'; (2) whether or not female members make a decision on 'buying major items'; and (3) whether or not female members make a decision on 'borrowing money'. Selection of these variables is based on the empirical findings from past studies which show women's involvement into decision-making on key aspect of life such as family planning and household economy is an important predator of

[2] Health facilities include "city hospitals", "SUB" (rural hospitals) and "SVA" (physician ambulatory facilities)

women's capacity to access to maternal health services (Gill et al., 2007, Furuta and Salway, 2006).

<Table 2>

Explanatory variables include socioeconomic and demographic factors at the levels of individual (wife and husband), household and community. Of the individual-level variables, age, ethnicity, educational attainment, a plot area of land (in *hectare*) belonging to each individual, and working status are included as common variables for both woman and husband. Following Habibov and Fan, 2008, a dummy variable on the women's knowledge about issues related to sexual matters is included. Women are considered to have wider knowledge about sexual matters if their primary source of information on those issues is someone outside the household including friends, co-workers, doctors, pharmacist, teachers, books, or the media. Women's knowledge about sexual life is shown to be positively related to use of reproductive health care in Tajikistan by past studies (Habibov and Fan, 2008). Household-level variables include the number of children, household expenditure per capita, and the situation of water (= whether or not the household treats water to make it safer to drink), sanitation (= whether or not the household has either a flush toilet or a latrine with a septic tank) and communication infrastructure (= whether or not the household has a telephone) in each household.

Community-level variables consist of regional dummies (Dushanbe as a reference, Sogd, Khatlon, RRP, Gbao), and the number of health facilities including hospitals, women's consultation places and first aid (ambulance) services per community.

Table 3 summarises descriptive statistics. It shows that 46% of women are from the households in which female members make a decision on children's wellbeing. On the other hand, women's involvement into decision-making on economic affairs measured by decisions on buying major items (19.0%) and borrowing money (18.3%) is very limited. Turning to the variables about reproductive health care, the percentage of women who attended to at least one and at least four antenatal visits during the last pregnancy is 86.2% and 52.6% respectively. As many as 83.8% of women were attended by skilled professionals, whilst just 16.1% of women used health facilities at their last birth-delivery.

<Table 3>

5. Results

Univariate probit estimates

Tables 4.a-4.c present the univariate probit estimates on the effects of female autonomy as measured by female members' decision-making within the household on woman's receipt of antenatal and delivery care. The results show that women's decision-making on child's wellbeing is positively associated with an increased use of skilled birth attendants and

facility delivery at the less than 1% significance level, whilst it does not affect the receipt of antenatal care. In contrast, decision-making on buying major items and borrowing money does not exert any significant effect on women's health care use.

<Tables 4.a-4.c>

Bivariate probit estimates

Tables 5.a-5.c provide the bivariate probit estimates. Table 5.a demonstrates that women's decision-making on child wellbeing increases the probability that the woman receives at least four antenatal care, skilled birth attendants, and facility delivery at the less than 1% significance level. The null hypothesis $\sigma = 0$, i.e. female autonomy and reproductive health care use are independently determined, is rejected for the estimates on the use of at least four antenatal visits as well as skilled birth attendant at the less than 1% significance level. It suggests that the use of these health services and female autonomy are simultaneously determined and therefore the bivariate probit model specification is more appropriate than the two separate univariate probit models. This result also implies that the impact of female autonomy on increased use of health care would be underestimated if female autonomy is treated as an exogenous variable.

<Tables 5.a-5.c>

Tables 5.b-5.c show that women's decision-making on buying major items as well as on borrowing money also increases the likelihood of using at least one antenatal care, skilled birth attendants and facility delivery. The null hypothesis $\sigma = 0$ is rejected for the estimates on facility delivery in the equation of "buying major items", while it is rejected for skilled birth attendants and facility delivery in the "borrowing money" specification.

Socioeconomic determinants of reproductive health care utilization

Tables 5.a-5.c also report the effects of other socioeconomic variables on women's uptake of reproductive health services in the estimation equation for women's decision-making on child's wellbeing. Of individual-level factors, the women who have achieved secondary or higher education are more likely to attend to the first antenatal visit and at least four visits compared with the reference population (= primary education) at the less than 1% significance level. Women's educational attainments are also significantly related to being attended by a health professional whereas they are not significant on facility delivery. With respect to husbands' characteristics, the area of land owned by the husband is negatively associated with wife's receipt of delivery care (both skilled birth attendant and facility delivery).

Of the variables reflecting household characteristics, the number of children significantly decreases the likelihood of receiving the first antenatal care, skilled birth

attendants, and facility delivery. Household expenditure per capita is a positive determinant of women's receipt of health services except for facility delivery, indicating that women from richer households are more likely to access to reproductive health care. Of the community-level factors, the number of first aid services per community is positively correlated with an increased uptake of both antenatal and delivery care. In contrast, most of the coefficients on the number of hospitals and women's consultation places per community are negative. Similarly, there are no consistent differences across regions in the utilisation of health services.

Determinants of female autonomy

Tables 5.a-5.c also provide the determinants of female autonomy estimated by the bivariate probit model. One of the major findings is that women's working status is favourably correlated with female autonomy at the less than 1% significance level, while the area of land owned by women is not statistically significant. This result is consistent with the findings from Anderson and Eswaran, 2009 which show that earned income is more important than unearned income in enhancing women's autonomy. Surprisingly, coefficients on women's educational attainments are not statistically significant, whereas their knowledge about sexual matters is positively correlated with female autonomy. In contrast, husbands' educational achievements are associated with higher female autonomy, implying the possibility that educated husbands are more generous and therefore female

members in the family become more likely to get involved into decision-making processes. However, the insignificance of mother's educational effect may be caused by a correlation between women's and husband's education. To scrutinize this point, I estimate the effects of couple's education on women's health care utilisation in separate regressions and still confirm the insignificant effect of women's education. Of the household-level factors, the effects of household expenditure per capita are significant and positive, suggesting that women from richer households are more autonomous than those who are not. Of the community-level factors, the number of hospitals per community contributes to the higher level of female autonomy.

6. Conclusions

In this paper I examine whether or not and how female autonomy within the household affects women's receipt of reproductive health services, using household survey data from Tajikistan. Estimation is conducted by the bivariate probit model in which woman's use of health services and the level of female autonomy in the household are recursive and simultaneously determined. The empirical results provide important policy implications for the improvement of maternal and child health in Tajikistan and other developing countries.

First, the results provide new evidence that female autonomy within the household, controlling for its endogenous feature, has a significant and positive impact on the use of

antenatal and delivery care. This finding reconfirms the widely-spread assertion that gender equity is crucial to improving maternal health in developing countries and the necessity of multi-sectoral approach. Policymakers in developing countries therefore need to implement not only direct health interventions but also broader social policies which address women's empowerment. Second, my analysis has also identified how other socioeconomic factors such as education, working status, household expenditure, and community health infrastructure are associated with women's uptake of reproductive health care, as well as with female autonomy. This kind of empirical evidence helps policymakers to identify prioritised needs for specific health and social interventions to improve population health and to reduce inequity inside the country.

There are some caveats to be considered when interpreting these results. The empirical results do not fully support the validity of the assumption that women's use of reproductive health services is simultaneously determined with the level of female autonomy within the household. Further research, using more accurate measures of women's autonomy, on the relationship between gender equity and maternal health care use required to draw more robust empirical results. Despite this limitation, this paper is a pioneering work to estimate the effects of female autonomy within the household on reproductive health care use using a recursive and simultaneous model. It hence provides important policy implications on the role of gender equity in improving women's health and it will also serve as a benchmark for further studies.

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Tables and Figures

Table 1. Indicators regarding maternal health and women's status in Central Asia

Country	Year	Tajikistan	Kazakhstan	Kyrgyzstan	Ukraine	Uzbekistan
Maternal Mortality Ratio (per 100,000 live births)	2005	170	140	150	18	24
Antenatal care (%): At least once	2003-2008	89%	100%	97%	99%	99%
Antenatal care (%): At least four times	2003-2008	49%	70%	81%	75%	79%
Delivery care coverage (%): Skilled attendant at birth	2003-2008	88%	100%	98%	99%	100%
Delivery care coverage (%): Institutional delivery	2003-2008	73%	100%	97%	99%	97%
Female earned income (PPP US$)	2007	1,385	8,831	1,428	5,249	1,891
Primary education enrolment and attendance ratios: Females as a % of males	2003-2008	83%	100%	103%	102%	98%
Life expectancy: females as a % of males	2003-2007	108%	121%	112%	118%	110%
Contraceptive prevalence (%)	2003-2008	37%	51%	48%	67%	65%
Total fertility rate	2003-2008	3.4	2.3	2.5	1.3	2.3

Source: UNICEF, 2010

Table 2. Women's decision-making in the household

No.	Variable	Obs.	Mean	S.D.	Min	Max
1	What to grow in house garden	5117	0.138	0.345	0	1
2	What to grow on presidential land	5117	0.066	0.248	0	1
3	Where to shop	5117	0.222	0.415	0	1
4	Buying major items	5117	0.190	0.392	0	1
5	Whether or not to borrow money	5117	0.183	0.387	0	1
6	Lending month to others	5117	0.173	0.378	0	1
7	Children's well being	5117	0.460	0.498	0	1
8	Children's school attendance	5117	0.491	0.500	0	1
9	Marriage of male household member	5117	0.215	0.411	0	1
10	Marriage of female household member	5117	0.197	0.398	0	1
11	Where male member should work	5117	0.138	0.344	0	1
12	Where female member should work	5117	0.174	0.379	0	1
13	How much to spend of household income	5117	0.196	0.397	0	1
14	How much to save of household income	5117	0.195	0.396	0	1
15	Where to invest household money	5117	0.171	0.376	0	1
16	A household member migrating to seek work	5117	0.135	0.341	0	1
17	How to use resources remitted from abroad	5117	0.141	0.349	0	1
18	Whether and where to sell agricultural product	5117	0.110	0.312	0	1
19	How to use the money from agricultural product	5117	0.111	0.314	0	1
	Total	5117	3.704	5.352	0	19

Table 3. Descriptive statistics

Variable	Obs.	Mean	S.D.	Min	Max
Women's autonomy					
Women's decision on child's well being*	5117	0.460	0.498	0	1
Women's decision on buying major items†	5117	0.190	0.392	0	1
Women's decision on borrowing money‡	5117	0.183	0.387	0	1
Reproductive health care utilization					
Antenatal care (At least once)	5117	0.862	0.345	0	1
Antenatal care (At least four times)	5117	0.526	0.499	0	1
Skilled birth attendant	5117	0.838	0.368	0	1
Facility delivery	5117	0.161	0.368	0	1
Woman's characteristics					
Age	5117	33.76	8.23	16	49
Ethnic group: Others	5117	0.018	0.134	0	1
Ethnic group: Tajik	5117	0.798	0.401	0	1
Ethnic group: Uzbek	5117	0.184	0.387	0	1
Primary education	5117	0.231	0.422	0	1
Secondary education	5117	0.703	0.457	0	1
Higher education	5117	0.066	0.248	0	1
Worked in the last 14 days	5116	0.351	0.477	0	1
Plot area of land	5117	0.499	4.280	0	114
Wider knowledge about sexual matters	5117	0.268	0.443	0	1
Husband's characteristics					
Age	4196	37.75	8.92	20	88
Ethnic group: Others	4196	0.012	0.110	0	1
Ethnic group: Tajik	4196	0.804	0.397	0	1
Ethnic group: Uzbek	4196	0.184	0.388	0.00	1
Primary education	4278	0.115	0.319	0	1
Secondary education	4278	0.687	0.464	0	1
Higher education	4278	0.198	0.399	0	1
Worked in the last 14 days	4196	0.785	0.411	0	1
Plot area of land	4196	6.734	25.615	0	604
Household characteristics					
Number of children	5117	3.432	1.885	1	14
Household expenditure per capita	5117	104.8	104.2	1	2568.4
Safer water	5117	0.521	0.500	0	1
Flush toilet	5117	0.177	0.382	0	1
Telephone	5117	0.222	0.415	0	1
Community characteristics					
Dushanbe	5117	0.166	0.372	0	1
Sogd	5117	0.175	0.380	0	1
Khatlon	5117	0.313	0.464	0	1
RRP	5117	0.234	0.423	0	1
Gbao	5117	0.113	0.316	0	1
Number of hospitals	5117	0.404	0.799	0	10
Number of women's consultation place	5117	0.330	0.813	0	12
Number of first aid (ambulance)	5117	0.165	0.383	0	2

*Dichotomous variable representing whether the decision on children's well being within the household is made by female member (=1) or not (=0)

‡Dichotomous variable representing whether the decision on buying major items within the household is made by female member (=1) or not (=0)

†Dichotomous variable representing whether the decision on whether or not to borrow money within the household is made by female member (=1) or not (=0)

Table 4.a. Results of the univariate probit estimates: Decision on child's wellbeing

Variables	At least one antenatal care		At least four antenatal care		Skilled birth attendance		Facility delivery	
Women's decision-making on	-0.021		0.006		0.160		0.124	
child's wellbeing	(0.706)		(0.881)		(0.003)	***	(0.011)	**
Woman's age	0.017		0.010		0.001		0.004	
	(0.011)	**	(0.072)	*	(0.866)		(0.566)	
Woman's ethnicity: Tajik	0.292		-0.132		0.418		0.665	
	(0.352)		(0.604)		(0.156)		(0.070)	*
Woman's ethnicity: Uzbek	0.654		-0.095		0.557		1.046	
	(0.058)	*	(0.729)		(0.089)	*	(0.006)	***
Woman's education:	0.341		0.217		0.152		0.152	
Secondary	(0.000)	***	(0.000)	***	(0.017)	**	(0.019)	**
Woman's education: Higher	0.686		0.285		0.610		0.117	
	(0.000)	***	(0.008)	***	(0.001)	***	(0.323)	
Woman worked in the last 14	-0.091		0.055		-0.075		0.032	
days	(0.111)		(0.239)		(0.172)		(0.537)	
Woman's plot area of land	-0.002		0.007		0.006		0.008	
	(0.779)		(0.229)		(0.463)		(0.210)	
Woman's wider knowledge	0.113		0.042		-0.187		0.051	
about sexual matters	(0.068)	*	(0.381)		(0.001)	***	(0.357)	
Husband's age	-0.017		-0.012		-0.001		0.006	
	(0.002)	***	(0.009)	***	(0.912)		(0.281)	
Husband's ethnicity: Tajik	0.133		0.158		-0.090		0.096	
	(0.700)		(0.581)		(0.788)		(0.810)	
Husband's ethnicity: Uzbek	-0.119		0.304		-0.066		-0.163	
	(0.751)		(0.317)		(0.855)		(0.690)	
Husband's education:	0.196		0.178		0.214		-0.172	
Secondary	(0.022)	**	(0.018)	**	(0.010)	**	(0.047)	**
Husband's education: Higher	0.154		0.204		0.582		-0.039	
	(0.147)		(0.021)	**	(0.000)	***	(0.697)	
Husband worked in the last 14	0.034		0.096		0.039		0.014	
days	(0.594)		(0.061)	*	(0.521)		(0.817)	
Husband's plot area of land	0.001		0.001		-0.001		-0.003	
	(0.303)		(0.079)	*	(0.535)		(0.021)	**
Number of children	-0.069		0.009		-0.091		-0.050	
	(0.000)	***	(0.530)		(0.000)	***	(0.004)	***
Household expenditure per	0.002		0.001		0.001		0.000	
capita	(0.000)	***	(0.000)	***	(0.000)	***	(0.734)	
Safer water	0.108		0.007		0.138		0.215	
	(0.074)	*	(0.886)		(0.016)	**	(0.000)	***
Flush toilet	0.072		0.107		0.382		0.154	
	(0.499)		(0.157)		(0.000)	***	(0.066)	*
Telephone	0.480		0.343		0.363		-0.070	
	(0.000)	***	(0.000)	***	(0.000)	***	(0.312)	
Sogd	0.356		0.609		0.441		0.166	
	(0.013)	**	(0.000)	***	(0.002)	***	(0.114)	
Khatlon	-0.164		-0.752		-0.036		0.205	
	(0.146)		(0.000)	***	(0.743)		(0.031)	**
RRP	-0.135		-0.294		-0.157		0.045	
	(0.249)		(0.001)	***	(0.170)		(0.663)	
Gbao	-0.184		-0.168		-0.243		0.161	
	(0.169)		(0.094)	*	(0.057)	*	(0.168)	
Number of hospitals	0.163		0.013		0.082		-0.008	
	(0.009)	***	(0.643)		(0.126)		(0.823)	
Number of women's	-0.107		-0.017		-0.085		-0.037	
consultation	(0.022)	**	(0.663)		(0.086)	*	(0.335)	
Number of first aid	0.370		0.126		0.280		0.136	
(ambulance)	(0.001)	***	(0.066)	*	(0.004)	***	(0.066)	*
Constant	0.244		-0.351		0.286		-2.237	
	(0.370)		(0.129)		(0.294)		(0.000)	***
Pseudo R2	0.1133		0.1367		0.1277		0.0297	
Sample size	4195		4195		4195		4195	

p-value in parentheses, Significance: * p<0.1; ** p<0.05; *** p<0.01

Table 4.b. Results of the univariate probit estimates: Decision on buying major items

Variables	At least one antenatal care		At least four antenatal care		Skilled birth attendance		Facility delivery	
Women's decision-making on	-0.065		0.005		0.105		0.110	
buying major items	(0.408)		(0.936)		(0.176)		(0.111)	
Woman's age	0.017		0.010		0.001		0.004	
	(0.011)	**	(0.072)	*	(0.872)		(0.555)	
Woman's ethnicity: Tajik	0.293		-0.133		0.414		0.647	
	(0.349)		(0.603)		(0.161)		(0.073)	*
Woman's ethnicity: Uzbek	0.655		-0.095		0.560		1.032	
	(0.057)	*	(0.729)		(0.089)	*	(0.006)	***
Woman's education:	0.341		0.217		0.152		0.151	
Secondary	(0.000)	***	(0.000)	***	(0.016)	**	(0.020)	**
Woman's education: Higher	0.684		0.285		0.608		0.115	
	(0.000)	***	(0.008)	***	(0.001)	***	(0.332)	
Woman worked in the last 14	-0.090		0.055		-0.068		0.036	
days	(0.117)		(0.237)		(0.215)		(0.490)	
Woman's plot area of land	-0.002		0.007		0.006		0.008	
	(0.790)		(0.229)		(0.460)		(0.217)	
Woman's wider knowledge	0.113		0.042		-0.183		0.052	
about sexual matters	(0.066)	*	(0.380)		(0.001)	***	(0.342)	
Husband's age	-0.017		-0.012		-0.001		0.005	
	(0.001)	***	(0.009)	***	(0.841)		(0.306)	
Husband's ethnicity: Tajik	0.133		0.160		-0.057		0.138	
	(0.701)		(0.578)		(0.864)		(0.725)	
Husband's ethnicity: Uzbek	-0.118		0.305		-0.044		-0.126	
	(0.751)		(0.315)		(0.903)		(0.756)	
Husband's education:	0.197		0.179		0.220		-0.161	
Secondary	(0.021)	**	(0.018)	**	(0.008)	***	(0.062)	*
Husband's education: Higher	0.152		0.204		0.591		-0.026	
	(0.150)		(0.021)	**	(0.000)	***	(0.792)	
Husband worked in the last 14	0.032		0.096		0.037		0.012	
days	(0.624)		(0.061)	*	(0.551)		(0.840)	
Husband's plot area of land	0.001		0.001		0.000		-0.003	
	(0.303)		(0.077)	*	(0.644)		(0.026)	**
Number of children	-0.069		0.009		-0.090		-0.050	
	(0.000)	***	(0.530)		(0.000)	***	(0.004)	***
Household expenditure per	0.002		0.001		0.001		0.000	
capita	(0.000)	***	(0.000)	***	(0.000)	***	(0.787)	
Safer water	0.106		0.007		0.136		0.212	
	(0.079)	*	(0.888)		(0.018)	**	(0.000)	***
Flush toilet	0.071		0.108		0.393		0.170	
	(0.504)		(0.154)		(0.000)	***	(0.041)	**
Telephone	0.481		0.343		0.374		-0.066	
	(0.000)	***	(0.000)	***	(0.000)	***	(0.341)	
Sogd	0.358		0.610		0.453		0.186	
	(0.013)	**	(0.000)	***	(0.001)	***	(0.076)	*
Khatlon	-0.160		-0.752		-0.051		0.200	
	(0.155)		(0.000)	***	(0.642)		(0.035)	**
RRP	-0.133		-0.295		-0.168		0.038	
	(0.258)		(0.001)	***	(0.141)		(0.709)	
Gbao	-0.183		-0.169		-0.247		0.161	
	(0.172)		(0.093)	*	(0.052)	*	(0.166)	
Number of hospitals	0.163		0.014		0.090		-0.002	
	(0.009)	***	(0.635)		(0.094)	*	(0.947)	
Number of women's	-0.107		-0.017		-0.081		-0.036	
consultation	(0.023)	**	(0.664)		(0.101)		(0.346)	
Number of first aid	0.370		0.126		0.271		0.131	
(ambulance)	(0.001)	***	(0.067)	*	(0.006)	***	(0.078)	*
Constant	0.246		-0.350		0.321		-2.230	
	(0.365)		(0.130)		(0.238)		(0.000)	***
Pseudo R2	0.1134		0.1366		0.1261		0.0282	
Sample size	4195		4195		4195		4195	

p-value in parentheses, Significance: * p<0.1; ** p<0.05; *** p<0.01

Table 4.c. Results of the univariate probit estimates

Variables	At least one antenatal care		At least four antenatal care		Skilled birth attendance		Facility delivery	
Women's decision-making on	-0.085		0.032		0.017		0.111	
borrowing money	(0.300)		(0.625)		(0.830)		(0.123)	
Woman's age	0.017		0.010		0.001		0.004	
	(0.011)	**	(0.073)	*	(0.858)		(0.557)	
Woman's ethnicity: Tajik	0.286		-0.131		0.416		0.651	
	(0.360)		(0.607)		(0.158)		(0.071)	*
Woman's ethnicity: Uzbek	0.647		-0.095		0.567		1.035	
	(0.060)	*	(0.729)		(0.084)	*	(0.006)	***
Woman's education:	0.342		0.217		0.152		0.151	
Secondary	(0.000)	***	(0.000)	***	(0.017)	**	(0.020)	**
Woman's education: Higher	0.686		0.284		0.605		0.112	
	(0.000)	***	(0.008)	***	(0.001)	***	(0.345)	
Woman worked in the last 14	-0.090		0.054		-0.065		0.036	
days	(0.118)		(0.244)		(0.240)		(0.491)	
Woman's plot area of land	-0.002		0.007		0.006		0.008	
	(0.811)		(0.238)		(0.442)		(0.242)	
Woman's wider knowledge	0.113		0.042		-0.181		0.052	
about sexual matters	(0.067)	*	(0.386)		(0.001)	***	(0.343)	
Husband's age	-0.017		-0.012		-0.001		0.005	
	(0.001)	***	(0.010)	**	(0.820)		(0.307)	
Husband's ethnicity: Tajik	0.138		0.158		-0.056		0.137	
	(0.690)		(0.582)		(0.866)		(0.728)	
Husband's ethnicity: Uzbek	-0.113		0.304		-0.045		-0.124	
	(0.760)		(0.316)		(0.902)		(0.758)	
Husband's education:	0.197		0.179		0.222		-0.163	
Secondary	(0.021)	**	(0.018)	**	(0.008)	***	(0.059)	*
Husband's education: Higher	0.153		0.204		0.591		-0.028	
	(0.149)		(0.021)	**	(0.000)	***	(0.780)	
Husband worked in the last 14	0.032		0.097		0.032		0.010	
days	(0.623)		(0.058)	*	(0.599)		(0.861)	
Husband's plot area of land	0.001		0.001		0.000		-0.003	
	(0.309)		(0.078)	*	(0.662)		(0.027)	**
Number of children	-0.070		0.010		-0.091		-0.049	
	(0.000)	***	(0.521)		(0.000)	***	(0.004)	***
Household expenditure per	0.002		0.001		0.001		0.000	
capita	(0.000)	***	(0.000)	***	(0.000)	***	(0.783)	
Safer water	0.106		0.007		0.132		0.211	
	(0.078)	*	(0.877)		(0.022)	**	(0.000)	***
Flush toilet	0.068		0.108		0.394		0.171	
	(0.525)		(0.152)		(0.000)	***	(0.040)	**
Telephone	0.483		0.342		0.374		-0.067	
	(0.000)	***	(0.000)	***	(0.000)	***	(0.334)	
Sogd	0.357		0.609		0.457		0.188	
	(0.013)	**	(0.000)	***	(0.001)	***	(0.073)	*
Khatlon	-0.161		-0.752		-0.050		0.201	
	(0.155)		(0.000)	***	(0.651)		(0.035)	**
RRP	-0.132		-0.295		-0.168		0.037	
	(0.260)		(0.001)	***	(0.141)		(0.717)	
Gbao	-0.185		-0.168		-0.247		0.163	
	(0.167)		(0.094)	*	(0.052)	*	(0.161)	
Number of hospitals	0.162		0.013		0.091		-0.003	
	(0.009)	***	(0.645)		(0.092)	*	(0.930)	
Number of women's	-0.106		-0.017		-0.081		-0.036	
consultation	(0.024)	**	(0.661)		(0.103)		(0.346)	
Number of first aid	0.370		0.126		0.271		0.132	
(ambulance)	(0.001)	***	(0.066)	*	(0.006)	***	(0.074)	*
Constant	0.248		-0.353		0.332		-2.227	
	(0.361)		(0.127)		(0.222)		(0.000)	***
Pseudo R2	0.1136		0.1366		0.1256		0.0282	
Sample size	4195		4195		4195		4195	

p-value in parentheses, Significance: * p<0.1; ** p<0.05; *** p<0.01

Table 5.a. Results of the bivariate probit estimates: Decision on child's well-being

Variables	At least one antenatal care		Women's decision-making		At least four antenatal care		Women's decision-making	
Women's decision-making on child's wellbeing	0.386				1.318			
	(0.563)				(0.000)	***		
Woman's age	0.016		0.003		0.007		0.003	
	(0.018)	**	(0.555)		(0.209)		(0.556)	
Woman's ethnicity: Tajik	0.316		-0.248		0.003		-0.189	
	(0.311)		(0.315)		(0.990)		(0.430)	
Woman's ethnicity: Uzbek	0.645		-0.059		-0.050		0.020	
	(0.060)	*	(0.822)		(0.838)		(0.939)	
Woman's education: Secondary	0.330		0.027		0.151		0.026	
	(0.000)	***	(0.607)		(0.004)	***	(0.618)	
Woman's education: Higher	0.686		-0.092		0.261		-0.089	
	(0.000)	***	(0.365)		(0.008)	***	(0.369)	
Woman worked in the last 14 days	-0.115		0.161		-0.041		0.170	
	(0.086)	*	(0.000)	***	(0.352)		(0.000)	***
Woman's plot area of land	-0.003		0.005		0.003		0.005	
	(0.703)		(0.464)		(0.548)		(0.436)	
Woman's wider knowledge about sexual matters	0.094		0.104		-0.022		0.091	
	(0.181)		(0.025)	**	(0.628)		(0.052)	*
Husband's age	-0.015		-0.010		-0.005		-0.009	
	(0.017)	**	(0.039)	**	(0.296)		(0.044)	**
Husband's ethnicity: Tajik	0.031		0.732		-0.218		0.669	
	(0.935)		(0.013)	**	(0.411)		(0.019)	**
Husband's ethnicity: Uzbek	-0.191		0.549		-0.031		0.463	
	(0.622)		(0.074)	*	(0.912)		(0.125)	
Husband's education: Secondary	0.164		0.194		0.048		0.191	
	(0.115)		(0.009)	***	(0.503)		(0.009)	***
Husband's education: Higher	0.121		0.202		0.063		0.187	
	(0.318)		(0.020)	**	(0.453)		(0.030)	**
Husband worked in the last 14 days	0.056		-0.143		0.148		-0.127	
	(0.441)		(0.004)	***	(0.001)	***	(0.009)	***
Husband's plot area of land	0.001		0.003		0.000		0.003	
	(0.561)		(0.002)	***	(0.841)		(0.001)	***
Number of children	-0.068		-0.001		0.006		-0.001	
	(0.000)	***	(0.925)		(0.657)		(0.938)	
Household expenditure per capita	0.002		0.000		0.001		0.000	
	(0.000)	***	(0.042)	**	(0.000)	***	(0.041)	**
Safer water	0.121		-0.100		0.058		-0.100	
	(0.053)	*	(0.028)	**	(0.179)		(0.027)	**
Flush toilet	0.027		0.284		-0.064		0.265	
	(0.837)		(0.000)	***	(0.374)		(0.000)	***
Telephone	0.446		0.160		0.173		0.160	
	(0.000)	***	(0.006)	***	(0.009)	***	(0.006)	***
Sogd	0.279		0.450		0.224		0.438	
	(0.161)		(0.000)	***	(0.050)	*	(0.000)	***
Khatlon	-0.144		-0.107		-0.507		-0.123	
	(0.222)		(0.182)		(0.000)	***	(0.120)	
RRP	-0.119		-0.087		-0.168		-0.095	
	(0.322)		(0.303)		(0.046)	**	(0.255)	
Gbao	-0.188		0.047		-0.148		0.043	
	(0.155)		(0.632)		(0.105)		(0.656)	
Number of hospitals	0.141		0.125		-0.048		0.130	
	(0.060)	*	(0.000)	***	(0.084)	*	(0.000)	***
Number of women's consultation	-0.109		0.030		-0.031		0.019	
	(0.018)	**	(0.392)		(0.348)		(0.565)	
Number of first aid (ambulance)	0.379		-0.105		0.147		-0.099	
	(0.000)	***	(0.102)		(0.017)	**	(0.118)	
Constant	0.134		-0.670		-0.605		-0.679	
	(0.682)		(0.004)	***	(0.004)	***	(0.003)	***
σ: p-value	0.589				0.026	**		
Sample size	4195				4195			

p-value in parentheses, Significance: * p<0.1; ** p<0.05; *** p<0.01

Table 5.a. (continued) Results of the bivariate probit estimates: Decision on child's well-being

Variables	Skilled attendant at birth		Women's decision-making		Facility delivery		Women's decision-making	
Women's decision-making on child's wellbeing	1.155				1.727			
	(0.000)	***			(0.000)	***		
Woman's age	0.000		0.004		0.001		0.003	
	(0.973)		(0.489)		(0.884)		(0.521)	
Woman's ethnicity: Tajik	0.444		-0.228		0.531		-0.273	
	(0.103)		(0.351)		(0.042)	**	(0.243)	
Woman's ethnicity: Uzbek	0.492		-0.051		0.675		-0.083	
	(0.108)		(0.845)		(0.016)	**	(0.741)	
Woman's education: Secondary	0.118		0.025		0.074		0.003	
	(0.059)	*	(0.642)		(0.156)		(0.946)	
Woman's education: Higher	0.566		-0.089		0.140		-0.077	
	(0.001)	***	(0.377)		(0.143)		(0.431)	
Woman worked in the last 14 days	-0.129		0.159		-0.083		0.156	
	(0.015)	**	(0.000)	***	(0.053)	*	(0.000)	***
Woman's plot area of land	0.003		0.004		0.002		0.004	
	(0.674)		(0.486)		(0.717)		(0.546)	
Woman's wider knowledge about sexual matters	-0.204		0.102		-0.036		0.082	
	(0.000)	***	(0.027)	**	(0.420)		(0.069)	*
Husband's age	0.003		-0.010		0.009		-0.010	
	(0.531)		(0.030)	**	(0.037)	**	(0.029)	**
Husband's ethnicity: Tajik	-0.342		0.698		-0.191		0.760	
	(0.287)		(0.015)	**	(0.562)		(0.007)	***
Husband's ethnicity: Uzbek	-0.253		0.525		-0.263		0.593	
	(0.456)		(0.082)	*	(0.438)		(0.044)	**
Husband's education: Secondary	0.110		0.196		-0.224		0.194	
	(0.228)		(0.009)	***	(0.001)	***	(0.006)	***
Husband's education: Higher	0.423		0.202		-0.149		0.195	
	(0.002)	***	(0.020)	**	(0.067)	*	(0.018)	**
Husband worked in the last 14 days	0.092		-0.142		0.097		-0.141	
	(0.119)		(0.004)	***	(0.039)	**	(0.003)	***
Husband's plot area of land	-0.001		0.003		-0.003		0.003	
	(0.097)	*	(0.002)	***	(0.000)	***	(0.001)	***
Number of children	-0.079		-0.002		-0.030		0.001	
	(0.000)	***	(0.892)		(0.035)	**	(0.950)	
Household expenditure per capita	0.001		0.000		0.000		0.000	
	(0.000)	***	(0.045)	**	(0.106)		(0.067)	*
Safer water	0.161		-0.098		0.184		-0.130	
	(0.002)	***	(0.031)	**	(0.000)	***	(0.003)	***
Flush toilet	0.223		0.286		-0.093		0.274	
	(0.066)	*	(0.000)	***	(0.189)		(0.000)	***
Telephone	0.249		0.160		-0.148		0.147	
	(0.012)	**	(0.006)	***	(0.008)	***	(0.010)	**
Sogd	0.207		0.452		-0.213		0.473	
	(0.194)		(0.000)	***	(0.017)	**	(0.000)	***
Khatlon	0.011		-0.107		0.187		-0.094	
	(0.911)		(0.184)		(0.015)	**	(0.226)	
RRP	-0.099		-0.089		0.068		-0.087	
	(0.359)		(0.297)		(0.403)		(0.290)	
Gbao	-0.228		0.043		0.067		0.105	
	(0.053)	*	(0.661)		(0.480)		(0.264)	
Number of hospitals	0.020		0.123		-0.082		0.139	
	(0.708)		(0.000)	***	(0.004)	***	(0.000)	***
Number of women's consultation	-0.083		0.032		-0.041		0.021	
	(0.068)	*	(0.363)		(0.195)		(0.518)	
Number of first aid (ambulance)	0.277		-0.107		0.162		-0.099	
	(0.002)	***	(0.096)	*	(0.007)	***	(0.113)	
Constant	-0.008		-0.654		-1.985		-0.666	
	(0.976)		(0.005)	***	(0.000)	***	(0.004)	***
σ: p-value	0.283				0.000	***		
Sample size	4195				4195			

p-value in parentheses, Significance: * p<0.1; ** p<0.05; *** p<0.01

Table 5.b. Results of the bivariate probit estimates: Decision on buying major items

Variables	At least one antenatal care		Women's decision-making		At least four antenatal care		Women's decision-making	
Women's decision-making on buying major items	0.970				0.002			
	(0.013)	**			(0.998)			
Woman's age	0.013		0.011		0.010		0.009	
	(0.052)	*	(0.141)		(0.080)	*	(0.210)	
Woman's ethnicity: Tajik	0.316		-0.139		-0.133		-0.160	
	(0.281)		(0.626)		(0.604)		(0.562)	
Woman's ethnicity: Uzbek	0.596		0.071		-0.095		0.024	
	(0.068)	*	(0.813)		(0.729)		(0.936)	
Woman's education: Secondary	0.304		0.031		0.217		0.022	
	(0.000)	***	(0.644)		(0.000)	***	(0.751)	
Woman's education: Higher	0.654		-0.125		0.285		-0.129	
	(0.000)	***	(0.350)		(0.009)	***	(0.337)	
Woman worked in the last 14 days	-0.130		0.171		0.055		0.171	
	(0.022)	**	(0.002)	***	(0.310)		(0.002)	***
Woman's plot area of land	-0.005		0.010		0.007		0.010	
	(0.451)		(0.118)		(0.254)		(0.116)	
Woman's wider knowledge about sexual matters	0.066		0.124		0.042		0.129	
	(0.309)		(0.033)	**	(0.421)		(0.028)	**
Husband's age	-0.012		-0.012		-0.012		-0.012	
	(0.032)	**	(0.046)	**	(0.014)	**	(0.061)	*
Husband's ethnicity: Tajik	0.059		0.221		0.160		0.209	
	(0.857)		(0.500)		(0.580)		(0.518)	
Husband's ethnicity: Uzbek	-0.172		0.175		0.305		0.192	
	(0.624)		(0.607)		(0.318)		(0.569)	
Husband's education: Secondary	0.173		0.039		0.179		0.043	
	(0.040)	**	(0.668)		(0.018)	**	(0.639)	
Husband's education: Higher	0.157		-0.049		0.204		-0.052	
	(0.118)		(0.652)		(0.022)	**	(0.637)	
Husband worked in the last 14 days	0.102		-0.244		0.096		-0.250	
	(0.144)		(0.000)	***	(0.153)		(0.000)	***
Husband's plot area of land	0.001		0.001		0.001		0.001	
	(0.520)		(0.112)		(0.089)	*	(0.147)	
Number of children	-0.056		-0.031		0.009		-0.030	
	(0.005)	***	(0.093)	*	(0.547)		(0.112)	
Household expenditure per capita	0.002		0.000		0.001		0.000	
	(0.000)	***	(0.491)		(0.000)	***	(0.467)	
Safer water	0.142		-0.179		0.007		-0.170	
	(0.016)	**	(0.002)	***	(0.904)		(0.003)	***
Flush toilet	0.077		-0.050		0.108		-0.050	
	(0.444)		(0.597)		(0.156)		(0.596)	
Telephone	0.415		0.068		0.343		0.069	
	(0.000)	***	(0.364)		(0.000)	***	(0.351)	
Sogd	0.253		0.265		0.610		0.248	
	(0.099)	*	(0.024)	**	(0.000)	***	(0.036)	**
Khatlon	-0.166		0.096		-0.752		0.095	
	(0.120)		(0.369)		(0.000)	***	(0.377)	
RRP	-0.145		0.117		-0.294		0.102	
	(0.193)		(0.293)		(0.001)	***	(0.370)	
Gbao	-0.185		0.091		-0.168		0.075	
	(0.144)		(0.469)		(0.095)	*	(0.551)	
Number of hospitals	0.139		0.031		0.014		0.029	
	(0.023)	**	(0.356)		(0.639)		(0.397)	
Number of women's consultation	-0.101		0.016		-0.017		0.020	
	(0.023)	**	(0.700)		(0.666)		(0.627)	
Number of first aid (ambulance)	0.321		0.027		0.126		0.036	
	(0.004)	***	(0.735)		(0.068)	*	(0.646)	
Constant	0.066		-1.078		-0.349		-1.013	
	(0.804)		(0.000)	***	(0.188)		(0.001)	***
σ: p-value	0.145				0.026	**		
Sample size	4195				4195			

p-value in parentheses, Significance: * p<0.1; ** p<0.05; *** p<0.01

Table 5.b. (continued) Results of the bivariate probit estimates: Decision on buying major items

Variables	Skilled attendant at birth		Women's decision-making		Facility delivery		Women's decision-making	
Women's decision-making on buying major items	1.156				1.861			
	(0.009)	***			(0.000)	***		
Woman's age	-0.001		0.008		0.000		0.004	
	(0.821)		(0.248)		(0.957)		(0.536)	
Woman's ethnicity: Tajik	0.428		-0.171		0.658		-0.138	
	(0.125)		(0.546)		(0.049)	**	(0.610)	
Woman's ethnicity: Uzbek	0.504		0.000		0.926		-0.040	
	(0.110)		(1.000)		(0.008)	***	(0.890)	
Woman's education: Secondary	0.130		0.027		0.132		0.028	
	(0.041)	**	(0.690)		(0.029)	**	(0.666)	
Woman's education: Higher	0.579		-0.128		0.141		-0.087	
	(0.001)	***	(0.341)		(0.205)		(0.496)	
Woman worked in the last 14 days	-0.110		0.176		-0.011		0.169	
	(0.050)	*	(0.001)	***	(0.830)		(0.002)	***
Woman's plot area of land	0.002		0.010		0.002		0.009	
	(0.830)		(0.117)		(0.685)		(0.149)	
Woman's wider knowledge about sexual matters	-0.201		0.121		0.003		0.092	
	(0.000)	***	(0.036)	**	(0.960)		(0.106)	
Husband's age	0.002		-0.012		0.008		-0.009	
	(0.697)		(0.052)	*	(0.109)		(0.124)	
Husband's ethnicity: Tajik	-0.116		0.265		0.083		0.247	
	(0.713)		(0.428)		(0.820)		(0.432)	
Husband's ethnicity: Uzbek	-0.102		0.250		-0.141		0.276	
	(0.766)		(0.470)		(0.706)		(0.401)	
Husband's education: Secondary	0.192		0.053		-0.156		0.011	
	(0.023)	**	(0.567)		(0.051)	*	(0.898)	
Husband's education: Higher	0.553		-0.040		-0.008		-0.072	
	(0.000)	***	(0.714)		(0.932)		(0.489)	
Husband worked in the last 14 days	0.106		-0.254		0.085		-0.226	
	(0.126)		(0.000)	***	(0.127)		(0.000)	***
Husband's plot area of land	-0.001		0.001		-0.003		0.001	
	(0.378)		(0.086)	*	(0.012)	**	(0.241)	
Number of children	-0.074		-0.025		-0.033		-0.012	
	(0.001)	***	(0.192)		(0.055)	*	(0.526)	
Household expenditure per capita	0.001		0.000		0.000		0.000	
	(0.004)	***	(0.499)		(0.977)		(0.726)	
Safer water	0.170		-0.169		0.231		-0.160	
	(0.002)	***	(0.003)	***	(0.000)	***	(0.004)	***
Flush toilet	0.367		-0.039		0.165		-0.073	
	(0.001)	***	(0.678)		(0.035)	**	(0.431)	
Telephone	0.314		0.071		-0.078		0.089	
	(0.002)	***	(0.340)		(0.228)		(0.206)	
Sogd	0.333		0.268		0.125		0.301	
	(0.045)	**	(0.022)	**	(0.207)		(0.008)	***
Khatlon	-0.070		0.086		0.181		0.097	
	(0.505)		(0.424)		(0.044)	**	(0.352)	
RRP	-0.179		0.120		0.030		0.117	
	(0.096)	*	(0.281)		(0.756)		(0.278)	
Gbao	-0.243		0.099		0.171		0.208	
	(0.044)	**	(0.432)		(0.115)		(0.089)	*
Number of hospitals	0.073		0.033		-0.008		0.034	
	(0.157)		(0.325)		(0.794)		(0.280)	
Number of women's consultation	-0.079		0.019		-0.040		0.004	
	(0.088)	*	(0.649)		(0.277)		(0.934)	
Number of first aid (ambulance)	0.231		0.026		0.100		0.040	
	(0.021)	**	(0.740)		(0.148)		(0.595)	
Constant	0.129		-1.056		-2.293		-1.066	
	(0.636)		(0.000)	***	(0.000)	***	(0.000)	***
σ: p-value	0.145				0.997			
Sample size	4195				4195			

p-value in parentheses, Significance: * p<0.1; ** p<0.05; *** p<0.01

Table 5.c. Results of the bivariate probit estimates: Decision on borrowing money

Variables	At least one antenatal care		Women's decision-making		At least four antenatal care		Women's decision-making	
Women's decision-making on borrowing money	1.013				0.756			
	(0.004)	***			(0.207)			
Woman's age	0.013		0.011		0.009		0.011	
	(0.056)	*	(0.140)		(0.143)		(0.133)	
Woman's ethnicity: Tajik	0.365		-0.299		-0.069		-0.324	
	(0.210)		(0.281)		(0.789)		(0.230)	
Woman's ethnicity: Uzbek	0.645		-0.080		-0.061		-0.141	
	(0.044)	**	(0.785)		(0.823)		(0.624)	
Woman's education: Secondary	0.294		0.062		0.204		0.068	
	(0.000)	***	(0.379)		(0.000)	***	(0.336)	
Woman's education: Higher	0.601		0.040		0.270		0.054	
	(0.001)	***	(0.760)		(0.013)	**	(0.680)	
Woman worked in the last 14 days	-0.131		0.178		0.027		0.180	
	(0.020)	**	(0.002)	***	(0.598)		(0.002)	***
Woman's plot area of land	-0.008		0.017		0.003		0.017	
	(0.228)		(0.004)	***	(0.659)		(0.005)	***
Woman's wider knowledge about sexual matters	0.068		0.116		0.023		0.111	
	(0.286)		(0.051)	*	(0.641)		(0.065)	*
Husband's age	-0.012		-0.011		-0.011		-0.012	
	(0.028)	**	(0.064)	*	(0.036)	**	(0.054)	*
Husband's ethnicity: Tajik	0.028		0.307		0.100		0.315	
	(0.932)		(0.341)		(0.728)		(0.329)	
Husband's ethnicity: Uzbek	-0.173		0.141		0.259		0.183	
	(0.619)		(0.674)		(0.392)		(0.588)	
Husband's education: Secondary	0.161		0.087		0.165		0.091	
	(0.059)	*	(0.371)		(0.031)	**	(0.347)	
Husband's education: Higher	0.144		0.005		0.201		0.005	
	(0.156)		(0.968)		(0.022)	**	(0.964)	
Husband worked in the last 14 days	0.089		-0.204		0.126		-0.206	
	(0.171)		(0.001)	***	(0.023)	**	(0.001)	***
Husband's plot area of land	0.001		0.001		0.001		0.001	
	(0.408)		(0.463)		(0.109)		(0.422)	
Number of children	-0.053		-0.040		0.014		-0.040	
	(0.008)	***	(0.037)	**	(0.349)		(0.033)	**
Household expenditure per capita	0.002		0.000		0.001		0.000	
	(0.000)	***	(0.627)		(0.000)	***	(0.646)	
Safer water	0.132		-0.144		0.024		-0.132	
	(0.021)	**	(0.016)	**	(0.612)		(0.027)	**
Flush toilet	0.094		-0.113		0.122		-0.120	
	(0.348)		(0.236)		(0.105)		(0.214)	
Telephone	0.394		0.117		0.314		0.120	
	(0.000)	***	(0.119)		(0.000)	***	(0.111)	
Sogd	0.272		0.182		0.569		0.176	
	(0.060)	*	(0.123)		(0.000)	***	(0.138)	
Khatlon	-0.154		0.043		-0.737		0.061	
	(0.147)		(0.691)		(0.000)	***	(0.577)	
RRP	-0.153		0.143		-0.304		0.154	
	(0.165)		(0.202)		(0.000)	***	(0.179)	
Gbao	-0.156		-0.019		-0.158		-0.021	
	(0.219)		(0.884)		(0.113)		(0.871)	
Number of hospitals	0.128		0.061		0.002		0.059	
	(0.038)	**	(0.049)	**	(0.946)		(0.064)	*
Number of women's consultation	-0.102		0.019		-0.020		0.021	
	(0.022)	**	(0.652)		(0.606)		(0.626)	
Number of first aid (ambulance)	0.346		-0.053		0.132		-0.041	
	(0.001)	***	(0.509)		(0.052)	*	(0.616)	
Constant	0.075		-1.127		-0.448		-1.107	
	(0.776)		(0.000)	***	(0.059)	*	(0.000)	***
σ: p-value	0.126				0.392			
Sample size	4195				4195			

p-value in parentheses, Significance: * p<0.1; ** p<0.05; *** p<0.01

Table 5.c. (continued) Results of the bivariate probit estimates: Decision on borrowing money

Variables	Skilled attendant at birth		Women's decision-making		Facility delivery		Women's decision-making	
Women's decision-making on borrowing money	1.330				2.152			
	(0.000)	***			(0.000)	***		
Woman's age	-0.002		0.009		-0.001		0.004	
	(0.691)		(0.238)		(0.907)		(0.526)	
Woman's ethnicity: Tajik	0.479		-0.328		0.715		-0.297	
	(0.071)	*	(0.237)		(0.025)	**	(0.246)	
Woman's ethnicity: Uzbek	0.535		-0.160		0.957		-0.225	
	(0.071)	*	(0.586)		(0.004)	***	(0.412)	
Woman's education: Secondary	0.104		0.067		0.113		0.041	
	(0.091)	*	(0.340)		(0.056)	*	(0.530)	
Woman's education: Higher	0.465		0.044		0.085		0.052	
	(0.008)	***	(0.739)		(0.432)		(0.670)	
Woman worked in the last 14 days	-0.118		0.181		-0.025		0.158	
	(0.022)	**	(0.001)	***	(0.606)		(0.004)	***
Woman's plot area of land	-0.004		0.018		-0.004		0.017	
	(0.616)		(0.003)	***	(0.467)		(0.002)	***
Woman's wider knowledge about sexual matters	-0.193		0.114		-0.002		0.086	
	(0.000)	***	(0.053)	*	(0.965)		(0.120)	
Husband's age	0.003		-0.012		0.008		-0.009	
	(0.568)		(0.057)	*	(0.088)	*	(0.139)	
Husband's ethnicity: Tajik	-0.167		0.364		0.034		0.319	
	(0.582)		(0.271)		(0.924)		(0.294)	
Husband's ethnicity: Uzbek	-0.112		0.239		-0.132		0.267	
	(0.732)		(0.488)		(0.714)		(0.401)	
Husband's education: Secondary	0.162		0.105		-0.168		0.055	
	(0.047)	**	(0.279)		(0.031)	**	(0.530)	
Husband's education: Higher	0.499		0.013		-0.030		-0.050	
	(0.000)	***	(0.908)		(0.741)		(0.633)	
Husband worked in the last 14 days	0.106		-0.218		0.078		-0.159	
	(0.071)	*	(0.000)	***	(0.140)		(0.006)	***
Husband's plot area of land	-0.001		0.001		-0.003		0.000	
	(0.496)		(0.359)		(0.018)	**	(0.689)	
Number of children	-0.063		-0.031		-0.025		-0.014	
	(0.001)	***	(0.107)		(0.129)		(0.451)	
Household expenditure per capita	0.001		0.000		0.000		0.000	
	(0.004)	***	(0.637)		(0.992)		(0.903)	
Safer water	0.157		-0.136		0.216		-0.117	
	(0.003)	***	(0.021)	**	(0.000)	***	(0.030)	**
Flush toilet	0.368		-0.106		0.180		-0.128	
	(0.000)	***	(0.263)		(0.018)	**	(0.148)	
Telephone	0.253		0.121		-0.092		0.149	
	(0.007)	***	(0.106)		(0.139)		(0.029)	**
Sogd	0.303		0.182		0.136		0.218	
	(0.035)	**	(0.121)		(0.159)		(0.047)	**
Khatlon	-0.058		0.020		0.183		0.054	
	(0.558)		(0.854)		(0.036)	**	(0.587)	
RRP	-0.190		0.136		0.012		0.146	
	(0.066)	*	(0.221)		(0.898)		(0.160)	
Gbao	-0.195		-0.025		0.195		0.124	
	(0.097)	*	(0.842)		(0.064)	*	(0.291)	
Number of hospitals	0.053		0.065		-0.028		0.052	
	(0.282)		(0.035)	**	(0.361)		(0.079)	*
Number of women's consultation	-0.076		0.022		-0.043		-0.003	
	(0.083)	*	(0.608)		(0.227)		(0.942)	
Number of first aid (ambulance)	0.239		-0.065		0.140		0.004	
	(0.008)	***	(0.423)		(0.037)	**	(0.956)	
Constant	0.116		-1.109		-2.250		-1.115	
	(0.647)		(0.000)	***	(0.000)	***	(0.000)	***
σ: p-value	0.049	**			0.002	***		
Sample size	4195				4195			

p-value in parentheses, Significance: * p<0.1; ** p<0.05; *** p<0.01

Figure 1. Distribution of the number of antenatal care visits