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2018

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ABSTRACT: The preference for a son at birth is one of the key issues of demographic studies conducted in less developed countries; however, there is a rare exploration of child's sex preference among women in Nepal. This paper estimates the likelihood of a preference for son or daughter using the 2011 Nepal Demographic and Health Survey (NDHS) data, which contains a nationally representative sample of Nepalese women. A multinomial logistic regression analysis shows that son and daughter preferences widely vary across ethnicities, educational and economic status, and geographical region. Regarding ethnic origin, women from the *Janajati* (the largest ethnic minority group that consists of many sub-ethnic groups) prefer daughter more than the top two caste groups, the *Brahman* and *Chhetri*, whereas the *Madhesi*, *Muslim*, and other ethnic minority women prefer son more than the top two caste groups. Similarly, less educated, poorer, and rural women prefer son more than more educated, richer, urban women in general. Women who desire more of either sex end up with more children in their household.

KEYWORDS: child's sex preference; caste/ethnicity; demographic and health survey; multinomial logistic model; gender and demographic studies

Introduction

Distorted sex ratio at birth and its impact on masculinization of Asian population have gained growing attention in academia (Sen, 1989, 1990). Indeed, the preference for a son at birth is a very common behaviour that leads to numerous socioeconomic consequences in locations where patriarchal kinship is deeply rooted in society, such as in East and South Asia, North Africa and the Middle East (Bornstein, Putnick, Bradley, Deater-Deckard & Lansford, 2016; Das Gupta et al., 2003; Koolwal, 2007). The theory of sex ratio transition introduced by

Guilmoto (2009) claims that the sex ratio rises due to the combination of patriarchy and advancing sex selection technology which will declines later as the patriarchy is weakened. The infant sex ratio in Asia ranges from 112 boys per 100 girls in India Pakistan, Vietnam and Georgia to 120-121 in China, Azerbaijan and Armenia while the global average is estimated as 105 (ibid.). Miller (2001) defines such uneven sex ratio at birth that cause by the patriarchal social system as 'patriarchal demographics'.

In Nepal, the World Fertility Survey first categorized the country as having considerable levels of son preference (Cleland, Verall & Vaessen, 1983). Consequently, sex-selective abortions increased in Nepal significantly after the abortion legalized in 2002 (Puri & Tamang, 2015; Frost, Puri & Hinde, 2013). Nepal is in the midst of a rapid fertility decline as birth rates have fallen from 6.11 in 1976 to 2.6 in 2012 (Niraula, 2015). The decrease in births among women of Nepal is mainly driven by son preference as evidenced by the sex ratio of last-born children, which was estimated to be 146 sons per 100 daughters (Brunson, 2010; Leone, Matthews & Zuanna, 2003; Pradhan et al., 1997); this is much higher than the biological constant of 106 sons per 100 daughters ever born (sex ratio at birth). Of course, declining fertility affects development outcomes positively and there are other determinants of rapid fertility decline in Nepal such as improved women's education, increased coverage of contraceptive use and growing male migration (Shakya & Gubhaju, 2016). However, sex discrimination could rise with declining fertility if smaller family size is not accompanied by a decrease in the desired number of sons (Das Gupta & Bhat, 1997). Many studies in fact already evident the sex-selective abortion as the major cause of unbalance sex ratio including in Nepal (Frost, Puri & Hinde, 2013). However, there is limited research about women's child's sex preferences across castes, ethnicities and ecological areas of Nepal even though it is very useful for addressing the unbalanced sex ratio and managing the overall demographic transition occurring in the country. This paper addresses this aspect.

Although the demand for a son is not only motivated by gender discrimination within a

household and society but also led by the aspirations for an idealized family composition (Dahl & Moretti, 2008; Arnold, 1992); son preference generally hurts daughters (Leone, Matthews & Zuanna, 2003). As resources are very limited in most households of low-income countries, son preference undermines daughters' health and education (Coale & Banister, 1994) and directly leads to abuse against women, sex-selective abortion, and female infanticide (Bardhan, 1982; DasGupta & Bhat, 1997). For example, in their household survey, Center for Research on Environment Health and Population Activities [CREHPA] (2007) found that among all of the 1,263 women whose first birth had been a daughter faced different forms of psychological or mental abuses. Specifically, 86% faced continuous scolding and other mental torture, 40% threatened to marry again by their husband, 38% received inferior meals or clothes, and 18% got physically beaten. Similarly, many studies (e.g., Arnold, Choe & Roy, 1998; Mutharayappa, Choe, Arnold, & Roy, 1997) show that son preference leads to severe gender discrimination and an unbalanced sex ratio in neighbouring India. The another neighbour of Nepal, China also suffers seriously from high sex ratio caused by the son preference and one child policy of the Nation (Golley & Tyers, 2014; Zhou, Wang, Zhou & Hesketh, 2012; Hesketh, Lu & Xing, 2011). Some experts even argued that a large number of girls, nearly 80 million, are 'missing' in Asia due to neglect, sex-selective abortions and even direct killings (Sen, 1990; Kevane & Levine, 2001). Therefore, there is an urgent need to uncover the determinants of child's sex preference among women in developing countries where there is strong son preference, such as in Nepal.

Such exploration is more important in Nepal the country has a very high degree of socio-cultural as well as geographical diversity. There are more than 130 ethnic groups under the four major Hindu hierarchical cast divisions and more than 120 languages (CBS 2012). The caste system provides the main foundation for the ethnic division in Nepal as the majority of population in the nation (81.3%) follow the Hindu religion (ibid). The first ethnic group is *Brahman-Chhetri,* which includes the top two caste groups, *Brahmin* and *Chhetri* of both the

Hills and Terai areas. Although *Brahman* is so-called the highest caste and *Chhetri* the second highest caste rank, they are considered to be historically privileged castes, and they are scattered all over the country. The second ethnic group is the *Madheshi,* from the Terai area. The third ethnic group is the *Janajati*, which includes the largest number of Nepal's indigenous population, people from this group reside mainly in the Hill and Mountain areas and generally follow the Buddhist religion. The fourth group is the *Silpi* (traditionally called *Dalit*), which includes the so-called untouchable low caste of the Hills and the Terai areas. The so-called low caste people are the historically most deprived group with a lack of access to the benefits of development (Arora & Sanditov, 2015). They follow the Hindu religion. The fifth group is the *Newar*. People of this ethnic group mostly live in cities, including Kathmandu Valley, and they engage in trade and commerce. Consequently, they have the highest level of human development with the highest average income and a better health and educational statuses than any other ethnic group (NPC & UNDP, 2014). The sixth group is the *Muslims*. They follow Islam or the Muslim religion. The remaining are grouped as *other*, which includes other caste/ethnic groups from both the Hills and the Terai areas. Furthermore, despite small in size with area of 147,181 square kilometres, Nepal has tremendous geographic diversity with wide range of world climate, including extreme cold and tropical rains (ibid), it is also a matter of interest whether the child's sex preference differs across geographical dimensions. Thus, it is an interesting question whether women's child's sex preference defers across their ethnic origin and other background.

Therefore, this paper sought to determine the preference of women in Nepal if they have the opportunity to choose between a son and a daughter and the socioeconomic characteristics of women that influence their preference. The null hypotheses were that there is no difference in women's preference for sons and daughters and that women have the same child preferences regardless of their economic status, caste/ethnicity and geographical

location.[1] If it is not true, policy targeting may necessary to address the problem of son preference among the workforce that belongs to traditional agricultural sectors of employment. To answer these questions and to test the hypotheses, we employ a multinomial logistic model using data from the 2011 Nepal Demographic and Health Surveys (NDHS), which contains a nationally representative sample of nearly 27,000 Nepalese women aged from 15 to 49 years, to estimate the likelihood of a preference for a son of daughter.

Method

The Data

In this study, we use the 2011 NDHS data. This nationally representative dataset covers all 75 districts of Nepal. The 2011 NDHS is the fourth nationally representative, comprehensive household survey conducted as part of the worldwide demographic and health survey project in the country. It was carried out under the overall guidance of the Ministry of Health and Population of Nepal.

NDHS administered the three sets of questionnaires to obtain information from the sample households; the household questionnaire, the woman's questionnaire, and the man's questionnaire. In this study, we select variables regarding child's sexpreference, respondent and household characteristics, economic status, region, and ethnicity from these questionnaires as they are the key to answering our research questions.

Empirical strategy

Operationalization of Main Concept. The main concept of this study came from the woman's questionnaire. For women with children, this questionnaire asked the following question: 'if you returned to a time when you did not have any children and could choose the number of

children that you would have during your lifetime, how many would that be?' For women without children, the questionnaire asked the following question: 'if you could choose the number of children that you would have during your lifetime, how many would that be?' Then, they were further asked to answer the following question: 'how many of these children would you like to be boys, how many would you like to be girls and how many would it not matter if it were a boy or a girl?'

Therefore, the responses operationalized as multinomial with three different values: a preference for more sons (1), a preference for more daughters (2) and indifference between sons and daughters or a preference for an equal number of sons and daughters (0). By using the woman's questionnaire, we operationalized our dependent variable as multinomial.

Furthermore, due to the non-proportional allocation of the sample to different domains and due to the oversampling of urban areas in each domain, sampling weights were required to analyse the 2011 NDHS data to ensure the actual representativeness of the sample at the national and domain levels. Considering the non-proportionality in the allocation process for domains and urban-rural strata, sampling weights calculated separately for each sampling stage on the basis of sampling probabilities because the sample of the survey is a two-stage stratified cluster sample. According to NDHS (Ministry of Health and Population, 2012), there are two main sampling weights - household weights and individual weights. The inverse of the household selection probability multiplied by the inverse of the household response rate of its household response rate group gives the household weight for a particular household. Similarly, the household weight multiplied by the inverse of the individual response rate of their individual response rate group provides the individual weight of a respondent.

The Model. Multinomial logistic models have been widely used in many studies that have a dependent variable with more than two values (Okwechime & Roberson, 2015; Matejka & McKay, 2014; Paudel, 2011). We used a multinomial model in this paper to analyse child's sex

6

preference as the dependent variable, which consisted of more than two values. This model compares the alternative decisions with a reference category.

Other things being equal, a household (both husband and wife) maximizes its *utility* (level of satisfaction) when a woman gives birth. Sometime either male or female makes the decision to give birth, but mostly they make the decision jointly. The respondents have information symmetry about child preferences. Therefore, they chose a number of children that would provide them with the greatest possible satisfaction regarding the sex of the babies. Some may prefer more sons, some more daughters and some equal or indifferent. Because the questionnaire did not ask about the children who were actual born but about the ideal number of children they wanted, both women with children and women without children could be participants in the survey.

For simplification, suppose that an ith respondent (woman) derives maximum utility by choosing the jth sex of children. Therefore, the ith respondent has three choices: more sons (1), more daughters (2) or indifference between sons and daughters or an equal number of both (0). Following equation is the formulation of this concept:

$$Y_{ij} = X_{ij} + \varepsilon_{ij} \qquad (1)$$

Where Y_{ij} is the household utility that the ith respondent can obtain by choosing the jth sex of children, X_{ij} is a function of observable variables (respondent woman's household characteristics, household economic status, working status of respondent woman's husband, ecological region, ethnicity) and ε_{ij} is the noise term that represents unobservable variables. The covariates are in the model are determined based on the existing literature and the country's unique characteristics. For instance, household characteristics are the basic covariates in most of the studies that uses household survey data.

Specification of Variables. The sex preference of a child takes the value of 1 if the respondent prefers to have more sons than daughters, 2 if the respondent prefers to have more daughters than sons and 0 if the respondent is indifferent between sons and daughters. Among total of 12,674 women interviewed the analytical sample size is 26,615 including all births of children. Moreover, the age of the respondent woman, the years of schooling, the sex ratio of children in household, and whether the household head was male are included in the respondent's and household characteristics.

Furthermore, economic status is based on the wealth index of the respondents and is calculated using household asset data via a principal components analysis. In many empirical analyses, the wealth index represents the indicator of the level of wealth that is also consistent with expenditure and income measures (Rutstein, 1999). The wealth index is a composite index composed of key asset ownership variables and used as a proxy indicator of household economic status. Wealth index consists of variables using productive assets (hand mill, sickle, axe, hoe, tractor, plough etc.), non-productive assets (radio, television, refrigerator, bicycle, motorbike, car, phone/cell phone, chair, table, bed etc.), household amenities (types of: water supply, toilet, flooring, walls/house, roof, cooking fuel, light source etc.) and others (persons per sleeping room, number of rooms, land ownership, livestock etc.). We give different weight to construct wealth index. For example, we give the weight one for radio and two for television. Similarly, we give the weight one for bicycle, three for motorbike and five for car or truck etc. We transfer categorical variables into separate dichotomous (0-1) indicators. We examine these indicators and those that are continuous using a principal components analysis to produce a common factor score for each household. The specified categories of the respondent's household economic status are poorest, poorer, middle, richer and richest.

Similarly, we categorize the respondent woman's husband's working status into four different groups. These include having no work, working in the service sector, working in the

manufacturing sector and working in the agriculture sector. Geographically, respondents are grouped as rural or urban, and the ecological region; i.e., mountain, hill and Terai. As the social, economic, and other aspects of people's lives differ significantly between regions, it is also an important dimension of comparison.

The Results

Table 1 shows the descriptive statistics of dependent variable used in the analysis. The data shows that majority of respondent women (65 percent) were indifferent between choosing son or daughter whereas 33 percent choose son and 2 percent choose daughter. The study shows that preference of son is quite larger than the preference of daughter but not preferring both or any children is equally preferred is the choice of majority of women.

Table 1: Descriptive statistics for dependent variable

Variables	Mean	Standard deviation	N
Dependent Variable: Preference of child			
0: Indifferent between son vs daughter	0.65	0.47	17288
1: Prefer son	0.33	0.47	8928
2: Prefer daughter	0.02	0.12	399

Similarly, explanatory variables are respondent's and household characteristics, the household economic status, the husband's working status, rural urban and ecological region and their ethnicity. Table 2 shows the descriptive statistics (mean and standard deviation, standard deviation in parenthesis) for independent variables. Columns 1, 2, 3 and 4 respectively show descriptive statistics for full samples (Y), respondents being indifferent between choosing son or daughter (Y=0), prefer son (Y=1) and prefer daughter (Y=2).

Table 2: Descriptive statistics for independent variables

Variables	(1) Full sample (Y)	(2) Indifferent between son vs. daughter (Y=0)	(3) Prefer son (Y=1)	(4) Prefer daughter (Y=2)
Independent Variables				
Resident's and Household Characteristics				
Age of respondent woman	35.58 (7.91)	34.80 (8.04)	37.00 (7.47)	37.46 (7.49)
Years of schooling of respondent woman	2.22 (3.51)	2.80 (3.79)	1.09 (2.53)	2.37 (3.76)
Sex ratio of children in household	0.96 (1.02)	0.84 (0.92)	1.19 (1.16)	0.79 (1.08)
Household head male	0.73 (0.44)	0.72 (0.45)	0.75 (0.43)	0.79 (0.41)
Household Economic Status				
Poorest	0.27 (0.44)	0.23 (0.42)	0.34 (0.47)	0.26 (0.44)
Poorer	0.20 (0.40)	0.19 (0.39)	0.23 (0.42)	0.17 (0.37)
Middle	0.18 (0.39)	0.18 (0.38)	0.18 (0.38)	0.16 (0.37)
Richer	0.18 (0.38)	0.19 (0.39)	0.15 (0.36)	0.13 (0.34)
Richest	0.17 (0.37)	0.20 (0,40)	0.11 (0.31)	0.27 (0.45)
Respondent Woman's Husband's Work				
No Work	0.02 (0.15)	0.02 (0.14)	0.02 (0.15)	0.03 (0.18)
Service Sector	0.38 (0.48)	0.42 (0.49)	0.32 (0.47)	0.33 (0.47)
Manufacturing Sector	0.28 (0.44)	0.28 (0.45)	0.27 (0.44)	0.32 (0.46)
Agricultural Sector	0.32 (0.46)	0.28 (0.45)	0.38 (0.48)	0.32 (0.46)
Rural Urban				
Rural	0.76 (0.42)	0.74 (0.44)	0.82 (0.38)	0.69 (0.46)
Urban	0.24 (0.42)	0.26 (0.44)	0.18 (0.39)	0.31 (0.46)
Ecological Region				
Mountain	0.18 (38)	0.17(0.37)	0.20 (0.40)	0.17 (0.37)
Hill	0.39 (0.48)	0.41 (0.49)	0.36 (0.48)	0.46 (0.50)
Terai	0.43 (0.49)	0.73 (0.44)	0.44 (0.50)	0.37 (0.48)
Ethnicity				
Brahman-Chhetri	0.39 (0.49)	0.39 (0.49)	0.39 (0.49)	0.38 (0.48)
Madhesi	0.13 (0.34)	0.12 (0.32)	0.16 (0.37)	0.08 (0.27)
Janajati	0.22 (0.41)	0.25 (0.43)	0.15 (0.36)	0.35 (0.48)
Dalit	0.13 (0.33)	0.13 (0.34)	0.13 (0.33)	0.09 (0.29)
Newar	0.03 (0.18)	0.04 (0.20)	0.02 (0.13)	0.02 (0.15)
Muslim	0.03 (0.17)	0.02 (0.15)	0.04 (0.21)	0.03 (0.16)
Other	0.07 (0.25)	0.05 (0.20)	0.11 (0.31)	0.05 (0.21)
Number of observation	26615	17288	8928	399

Note: Standard deviation in parenthesis

    The average age of respondent women is 35.58 years, 34.80 years, 37 years and 37.46 years for the full sample, indifferent, preferring son, and preferring daughter, respectively. Similarly, average years of schooling is highest 2.80 years for indifferent sample whereas 2.22, 1.09, and 2.37 for full, preferring son, and preferring daughter, respectively. The average sex

ratio of children in household (total number of son/total number of daughter) is highest for respondents preferring son (1.19) and lowest for respondents preferring daughter (0.79). Average of household head male is 0.73 for full sample.

The household economic status measured by the average wealth index of the full sample households specified into five categories; poorest, poorer, middle, richer and richest are 0.27, 0.20, 0.18, 0.18 and 0.17 respectively. Similarly, two percent of respondent woman's husband do not have work, 38 percent work on service sector, 28 percent work on manufacturing sector and 32 percent work on agricultural sector for the full sample. For full sample, on average 76 percent respondent are from rural area while 24 percent are from urban area. Similarly, 18 percent are from mountain region whereas 39 percent from hill and 43 percent from Terai. Respondent indifferent between son and daughter, prefer son and prefer daughter varies with rural urban as well as ecological region. Table 2 also shows that respondent indifferent between son and daughter, prefer son and prefer daughter also vary with ethnicity. Although the percentages of the sample in each group category are not same as the percentages of the respective group in the whole population, the differences are not large and the group composition in each category represents the population well.

We present the results of the estimation from the model (1) in Table 3. We show marginal effects on child's sex preference decision in this table. We observe the results for son preference decision (Y=1) in the first part denoted as (1) and the results for daughter preference decision (Y=2) in the second part indicated as (2).

Table 3: Marginal Effects on Child's sex Preference Decision

	(1) Prefer son (Y=1)		(2) Prefer daughter (Y=2)	
	Coef.	SE	Coef.	SE
Respondent woman's household characteristics				
Age of respondent woman	0.024***	0.001	0.042***	0.007
Years of schooling of respondent woman	-0.102***	0.005	-0.018	0.018
Sex ratio of children in household	0.217***	0.013	-0.160***	0.062
Household head male	0.002	0.034	0.411***	0.130
Household economic status				
Poorest	-----	-----	-----	-----
Poorer	-0.292***	0.039	-0.226	0.161
Middle	-0.569***	0.044	-0.134	0.168
Richer	-0.650***	0.050	-0.365*	0.194
Richest	-0.749***	0.637	0.384	0.207
Respondent woman's husband working on				
No work				
Service sector	-----	-----	-----	-----
Manufacturing sector	-0.051	0.097	-0.608*	0.291
Agricultural sector	-0.213**	0.098	-0.031	0.293
Rural Urban	-0.044	1.098	-0361	0.297
Rural				
Urban	-----	-----	-----	-----
Ecological Region	-0.145**	0.040	0.225	0.137
Mountain				
Hill				
Terai	-----	-----	-----	-----
	-0.146***	0.039	0.027	0.149
Caste/Ethnicity	0.137***	0.048	-0.118	0.178
Brahman-Chhetri				
Madhesi				
Janajati	-----	-----	-----	-----
Silpi	0.363***	0.052	-0.316**	0.119
Newar	-0.659***	0.039	0.321***	0.122
Muslim	-0.271***	0.045	-0.461***	0.198
Other	-0.673***	0.098	-0.894***	0.349
	0.696***	0.082	0.198	0.346
	1.184***	0.061	-0.073	0.260
Constant	-0.917***	0.127	-5.091***	0.441
Pseudo R-squared	0.092			
Chi-square	3482.500			
Log likelihood value	-17145.676			
No. of observations	26615			

Note: *** significant at 1%, ** significant at 5%, * significant at 10% level; Coef. = Coefficient, SE=Standard Error

Son Preference Decision

In case of son preference decision, the significant variables are the age of respondent woman,

years of schooling of respondent woman, sex ratio of children in the household, household economic status (poorer, middle, richer and richest), the respondent's husband's working status in the manufacturing sector, the urban, hill and Terai region, and caste/ethnicity variables (*Madhesi, Janijati, Silpi, Newar, Muslim* and *Other*). However, there are three insignificant variables, household head male and respondent's husband's work in the service and agricultural sectors. Women with a higher age and lower schooling are more likely to prefer a son than being indifferent between them. Similarly, women with the higher sex ratio in the household are more likely to choose a son. It means education is crucial for being indifferent to the sex of child and that younger women are less biased towards sons. The positive association between the sex ratio of children in household and a son preference indicates that having a desire for more sons leads to a household with higher sex ratio.

The richer the household, the less likely it is to prefer sons. Compared with the poorest households, those poorer, middle, richer and the richest are less likely to prefer a son or more likely to be indifferent between either sex of a child. Similarly, compared with the women whose husbands are without work, women whose husbands have work in the manufacturing sector are less likely to prefer sons. Further the results show that urban households are less likely to prefer sons than their rural counterparts. Regarding ecological regions, women from Terai region are more likely to prefer son than women from mountain but women from hill are less likely to prefer son than women from mountain.

Regarding the results with respect to the ethnicity variables, we found that the *Madhesi, Muslim* and other ethnic women are more likely to prefer sons than the *Brahman-Chhetri* women, while the *Janajati, Silpi* and *Newar* are less likely to prefer sons than the *Brahman-Chhetri*. Interestingly, the situation for the *Newar* is different. They usually reside in most of the city centres, and they are usually richer and more educated than other caste/ethnic groups. Thus, they are less biased towards son than the *Brahman-Chhetri*.

Daughter Preference Decision

Regarding the preference of daughter, the age of respondent woman, sex ratio of children in household, household head male, a richer household economic status, the respondent woman's husband's work in the service sector, and the ethnicity variables (*Madhesi, Janajati, Silpi, Newar*) are significant, while the years of schooling of the respondent woman, the household economic status (poorer, middle and richest), the respondent woman's husband's work in the service and agricultural sector and ethnicity variables (Muslim and other) are not significant. This result is consistent with Pande and Astone (2007) as they found a weaker son preference among women in wealthier households in rural India. Education did not matter for daughter preference. Women with more age prefer to choose daughter than being indifferent between either sex of the child. Similarly, women with higher sex ratio in household are less likely to choose the daughter. The male headed household are more likely to prefer daughter.

The richer households are less likely to prefer a daughter than the poorest households. Interestingly, richer households are also less likely to prefer sons. It implies that richer households are more indifferent between sons and daughters because they prefer less sons and less daughters. Clearly, richer households prefer sons and daughters less than the poorest households.

Similarly, women whose husbands are working in the service sector are less likely to prefer daughters, respectively, than women whose husbands have no work. However, there is no significant difference in the preference for a daughter between women whose husbands are without work and women whose husbands work in agriculture. Regarding the caste/ethnicity variables, we observe that the *Madhesi, Silpi* and *Newar* prefer less daughters, but the *Janajati* prefer more daughters than the *Brahman-Chhetri*. Similarly, those who were *Muslim* and *other* ethnicities do not significantly prefer daughters.

Discussion and Conclusion

In this study, we used the data from the 2011 NDHS to examine women's child's sex preference across castes, ethnicities and ecological areas of Nepal. It revealed that education is important to reduce son preferences among Nepalese women as the multinomial logistic regression analysis clearly shows that more educated women prefer less sons. Similarly, younger women are less gender biases in Nepali society. Interestingly, we found a positive association between the sex ratio and a son preference but negative association between sex ratio and daughter preference which is consistent with the definition of sex ratio. Similarly, in the context of rural population with low level of industrialization, husband's work in manufacturing sector might increase wife's exposer to information and knowledge that contributes to the negative association between woman's son preference and husband's work in manufacturing sector. However, further investigation is necessary to examine the reasons. Regarding economic status and geographical attributes, we found that women from poorer households in rural areas and Terai region are more likely to prefer son than other counterparts. However, our findings seem conflicting with the existing studies that found the sex-selective abortion is widespread among richer urban households in Nepal (Frost, Puri & Hinde, 2013). In this case, we need to understand that the sex-selective abortion is not only associated with son preference but also combined with the easy availability of technology and users' paying capacity of service fees which is usually very high as sex-selective abortion is not legal elsewhere. Clearly, as poverty is considerably higher and quality of health services is very lower in the rural areas compared to urban centres (Ministry of Health and Population, 2012), women are less likely to take abortion services despite their higher level of son preference.

Combining the result with the household economic status and geographical region, we observe that women from poorest rural Terai region prefer more sons than other households. However, the results do not mean that urban, rich and educated women have no significant

gender bias. In fact, Frost, Puri & Hinde (2013) found that there was an increasing number of sex-selective abortion after the abortion legalized in 2002 in Nepal, and it concentrated in urban areas. Specifically, educated, young women who knew the legal provisions, who had better access to the health facilities, and who had a sufficient capacity to pay for the services tend to take abortion service more than others. Therefore, policy should focus on increasing awareness and educate young women in rural area, whereas control mechanisms should be developed to discourage sex-selective abortion in urban centres.

Regarding caste/ethnicity, the *Madhesi* are less likely to prefer daughters and prefer more sons. Similarly, *Muslim* and *Other* ethnic groups are more likely to prefer sons than the *Brahman-Chhetri.* Interestingly, the *Janajati* prefer daughters more and sons less than the *Brahman-Chhetri*. There are a number of reasons behind these results. For instance, the Madhesi community lives in the Terai region of Nepal, which shares a border with India and similarly has a dowry system as in India. In this system, they have to give a huge amount of property as a dowry to the son-in-law and his family at the time of the marriage ceremony, which creates a huge burden on the parents of the daughter (Banerjee, 2014). In the Muslim community, sons have more privileges than daughters, therefore, they also prefer sons. Similar sociocultural practices are persistent in the other ethnic group, which include the rest of the castes from the Terai region. In contrast, the Janajati and Silpi cultural traditions generally require the parents of the groom to pay some amount, similar to a dowry, to the parents of the bride. Due to this tradition, these groups prefer sons less than the Brahman-Chhetri. Interestingly, kinship system of Janajati is less patriarchal than other group (Bennett, 2008) which reflected in Janajati women's more preference of girls than the women from any other ethnic group. It can have significant policy implication on targeting gender inclusion and sex-selective abortion in Nepal.

In general, the findings of the study are consistent with the previous studies that showed

a significant association between son preferences and socio-demographic as well as economic factors in other social settings such as in China, India and South Korea (Guilmoto, 2010; Das Gupta et al., 2003), Bangladesh and Pakistan (Jejeebhoy et al., 2015), and Vietnam (Guilmoto (2012). Their conclusions and policy recommendations are firmly relevant to Nepal that the pace of progress on minimizing son preference through urbanisation, education and employment is too slow. Therefore, through effective legislation and social movements government, civil society and mass media should play more powerful roles to eliminate the gender bias and value daughter equally as son.

In the context of high level of socio-cultural as well as geographical diversity, the findings of this study have even more significant policy implications in Nepal for targeting health and education services together with advocacy and awareness to the underprivileged groups. Although how important targeting policies with well-designed programs to underprivileged is intuitive, the findings of this study guides further that *Janajati* needs more income generation types of supports than advocacy and awareness as they prefer less sons even than the most privileged *Brahman-Chhetri*. Thus, the so called high-caste *Brahman-Chhetri* need more awareness program than *Janajati* groups.

Furthermore, the problem of unbalanced sex ratio is becoming acuter as Nepal is in the midst of a rapid demographic transition with declining fertility and increasing life expectancy. For instance, the total fertility rate (births per woman) has dropped from 5.2 to 2.2 from 1990 to 2015, respectively, whereas life expectancy at birth (for females) increased from 54.84 years to 71.45 years during the same period (World Bank, 2016). Similar to other aspects of gender issues, empowerment of women throughout the country by targeting rural, poor *Madhesi and Muslim* and other ethnic groups can minimize son preference among women significantly. On the other hand, as educated urban women from privileged group tends to misuse the rapidly advancing health technologies and legal provisions for abortion that contributes to the

17

unbalanced sex ratio of young generation of the nation. Thus, the result of this study implies that more advocacy, awareness and careful legal provisions are urgent in urban centres of the nation. Further studies are required for specific policy formulation.

The main limitation of this study is that the results cannot show the causal links between the dependent variables and its predictors. As we use only the cross-sectional data, it is just an associational analysis. We propose employing panel data to explore causal relationships which bears stronger policy implication.

Notes

1. As our respondents are women, we refer to child's sex preference as "women's preferences" or "women prefer" throught the paper. However, it should be noted here that both parents (and to some extent grandparents) involve pregnancy decision and women's preference affect significantly by their spouse, parents and society. Therefore, women's preference referred in this study can be considered as parent's preference or general preference of the society.

Funding

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