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Gender Balance in Villages of Gujarat, India

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Abstract

This paper analyses the variation in the gender balance in villages of Gujarat by using a decomposition approach. The gender balance is measured in terms of the proportion of females in the village population which is the weighted average of the gender balance in different population sub-groups with weights equal to the relative share of the population of the sub-group. The analysis reveals that there are distinct regional patterns in village level gender balance in the state. The gender balance in villages is also influenced by the size of the population of the village, and the relative importance of different population sub-groups in explaining the variation in gender balance across villages is also different. The analysis suggests that an analysis of village society and economy through gender perspective is necessary for gender mainstreaming village development planning.

Keywords: Gender balance, Gujarat, India, Villages

I. Introduction

Gender balance is commonly used in reference to human resources and the equal participation of women and men in all areas of work, projects or programmes. In a scenario of gender equality, women and men are expected to participate in the social and economic production system in proportion to their shares in the population (United Nations, 2016). A gender balance unfavourable to females reflects the under representation of women in productive activities in the society and the economy. The centrality of gender balance in achieving sustainable development is now being increasingly recognised (United Nations, 2014). It is argued that dominant patterns of development and growth are essentially unsustainable in economic, social and environmental terms (ILO, 2012) and they have coincided with the rising inequalities in wealth, income and capabilities (United Nations, 2013a; 2013b). Achieving gender balance in participation in productive activities in the society and the economy has been advocated to address issues of sustainability of the existing development processes, protection of the environment and ensuring continued growth (United Nations, 2014). It is also argued that sustainable development can only be achieved through long-term investments in economic, human and environmental capital and better involvement of females in productive activities in the society and the economy could increase economic growth, reduce poverty, enhance societal well-being, and help ensure sustainable development (OECD, 2008).

Promoting gender balance in the society and the economy requires, a priori, gender-based analysis of the social and economic production system to facilitate appreciation and recognition of the nature of relationships between women and men in the society and the economy as regards their participation in productive activities. Such an analysis also helps in understanding different social realities, life expectations and economic circumstances of women and men in the context of planning and programming for sustainable development. In the absence of gender-based analysis, potentially different effects of sustainable development policies and programmes on women and men may be masked or obscured which may limit the participation of women in the social and economic production system. On the other hand, integrating gender-based analysis in sustainable development planning and programming ensures that sustainable development policies and programmes are inclusive and consistent for informed policy-making and good governance and contribute to reducing inequality and eradicating poverty.

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Gender-based analysis of the society and the economy can be carried out at both macro and micro levels. At the international level, the *Global Gender Gap Report* prepared by the World Economic Forum on an annual basis provides a very effective platform of inter-country variation in gender balance in the society and the economy (World Economic Forum, 2016). At the national level, there are many studies that have analysed gender balance in specific dimensions of development such as education (Katiyar, 2016); health (Canudas-Romo & Saikia, 2013); wages (Deininger, Jin & Nagarajan, 2013; Mahajan & Ramaswamy, 2015); and economic development (Arora, 2012). However, an important yet neglected dimension of gender balance is the gender-based analysis at the micro level. It is well known that women are not equal partners in social and economic development processes in the rural areas in most countries of the world and, often, social and economic disparities between women and men are the most acute in the rural areas (Denken & Voora, 2014). It is well known that planning based on aggregate data at national or regional level frequently masks important micro level variations and under- plays the complex gender relationships which are influenced by a multitude of social, cultural, economic and environmental factors. It has, therefore, been emphasised that factors influencing gender balance at the macro level are of limited, if not little, use in addressing gender balance at the local level.

The above considerations constitute the basis for the present paper which analyses gender balance in the villages of Gujarat, one of the economically developed states of India but having relatively poor state of human development. The state is one of the industrially developed states of the country but, in the context of gender balance, it ranks 14 in terms of the participation of women in the organised industrial sector according to the *Annual Survey of Industries* carried out by the Government of India. Available evidence suggests that on a range of indicators, the gender balance in Gujarat remains skewed which perhaps, remains one of the most serious social concerns in the state. The state policy for gender equity calls for overall development and empowerment of women of Gujarat through creating an enabling environment for enjoyment of all human rights and fundamental freedom by women on equal basis with men in all spheres - personal, political, economic, social, cultural and civil. This includes right to life, right to health care and quality life, right to quality education, right to employment, equal remuneration, social security and right to decision making, etc. (Government of Gujarat, 2006). The policy also calls for main-streaming gender perspective in the development processes, policies and programmes; strengthening participation of civil society, in particular, women's groups, networks and organisations; eradicate all forms of violence against women and girl child; strengthening legal systems to eliminate all forms of discrimination against women; and eliminating, step by step, prejudices as well as customary and other practices that are gender discriminatory by active participation and involvement of both men and women. There is however virtually no analysis of the gender balance in the village society and economy in the state that reflects how gender balance varies across villages. An analysis of the variation in gender balance across villages may help in understanding more about critical variables that shape gender relationships in the village society and economy. Such an analysis is also expected to facilitate gender sensitisation of challenges and concerns related to sustainable development at the grass roots level which may lead to gender sensitive or gender positive sustainable development planning and programming as the first step to address women’s development issues at the grass roots level in a more socially and culturally acceptable and environment friendly manner. Such an analysis is also expected to provide the empirical evidence for promoting participation of women in local level social and economic productive activities.

The paper is organised as follows. The next section of the paper describes the data used in the analysis. The third section outlines the approach used for measuring the gender balance. The most commonly used measure of gender balance, the sex ratio, has not been used in the present analysis for certain obvious reasons discussed in this section. The fourth section of the paper presents results of the analysis including analysis of the contribution of the gender balance in difference population sub-groups to the gender balance in the population. The paper follows the variance decomposition technique to analyse the variation in the gender balance across the villages of the state. The last section of the paper discusses the findings of the analysis with reference to the social, cultural, educational and participation context of gender balance across villages and emphasises the need of

analysing the village society and economy through the gender perspective for gender main-streaming village development planning.

II. Data

Analysing gender balance at the village level requires gender dis-aggregated data about village society and economy. In India, the decennial population census is the only source which provides gender dis-aggregated data at the village level on selected aspects of population and economy. The *Primary Census Abstract* prepared by the Census Commissioner of India after every decennial census provides female and male count of total population, population aged 0-6 years, literate and illiterate population aged 7 years and above, total workers and total non-workers as defined in the 2011 population census. Workers in the village are further classified into main workers and marginal workers. A worker is classified as the main worker if she or he had worked for at least six months during the year prior to the population census. All other workers are classified as marginal workers. Marginal workers are classified further into two categories - marginal workers who had worked for 3-6 months during the year prior to the population census and marginal workers who worked for less than 3 months during the year prior to the population census 2011. A person who had worked even for a day during the year preceding the population census is classified as a marginal worker. All workers, main or marginal, are further classified into one of the four occupations - cultivators, agricultural labourers, household industry workers and other workers.

The data available through the primary census abstract of the 2011 population census permits calculating the gender balance in different mutually exclusive sub-groups of the population of the village including population below 7 years of age, population aged 7 years and above who is literate, population aged 7 years and above who is illiterate and working population classified by the work status and occupation. As shown in the next section, the gender balance in the village population depends upon the gender balance in different mutually exclusive population sub-groups in the village and the proportionate distribution of the village population across these mutually exclusive population sub-groups.

According to the 2011 population census, there were 18,225 villages of varying population size in Gujarat in 2011. There was no inhabitant in 382 villages whereas in 118 villages, total number of households was less than 10. These 500 villages have therefore been excluded and the present analysis is restricted to 17,725 villages which had at least 10 households at the time of 2011 population census. Villages included in the present analysis vary widely in terms of the population size. Village Dhari in sub-district Dhari of district Amreli was the largest village in the state with a population of 30,352 inhabitants at the 2011 population census. On the other hand, village Devaliya in sub-district Talala of district Junagadh was the smallest village with a population of 28. There were 166 villages in the state which were very large villages as they had a population of at least 10,000 at the 2011 population census whereas 963 villages had a population ranging between 5000 to 9999. On the other hand, there were 458 villages which were very small as the population, in these villages, was enumerated to be less than 200 at the 2011 population census.

III. Measuring Gender Balance

The gender balance in the population is commonly measured in terms of the sex ratio which is defined as either the ratio of the number of males to the number of females or the ratio of the number of females to the number of males. One limitation of the sex ratio as a measure of gender balance is that it is not bounded from the above. For example, when there is no literate female in a village then the sex ratio of literates measured in terms of the ratio of the number of male literates to the number of female literates is indeterminate. Similarly, when there is no male literate, then the sex ratio measured in terms of the number of female literates per male literate ratio is indeterminate. Moreover, when the size of the village population is small, the sex ratio as a measure of gender balance may be unrealistically high or low.

In view of the limitations of the sex ratio in measuring and analysing gender balance, one alternative is to measure the gender balance in the population in terms of either proportion of males or proportion of females. It is obvious that the proportion of females or males in the population is bounded by 1 from the above and bounded by zero from the below. As such proportion females or proportion males is more appropriate for analysing the gender balance than the sex ratio. In the present paper, we use proportion females (p_f) as the measure of gender balance in the population. It is obvious that when p_f=0.5, the number of females in the population is the same as the number of males and hence the sex ratio - the ratio of the number of females to the number of males or the ratio of the number of males to the number of females is 1. When p_f=0, the sex ratio measured in terms of the ratio of females to males in the population is 0 but the sex ratio measured in terms of the ratio of males to females becomes indeterminate. Similarly, when p_f=1, the sex ratio measured in terms of the ratio of females to males becomes indeterminate but the sex ratio measured in terms of the ratio of males to females is zero. It is also obvious that the higher is the p_f the more favourable is the gender balance to females.

It may be noticed that sex ratio - female to male or male to female - and the proportion of females or the proportion of males in the population are complementary so that the knowledge of the sex ratio permits estimation of the proportion of females or males in the population and the knowledge of the proportion of females or males in the population permits estimation of the sex ratio. If *F* denotes the number of females and *M* denotes the number of males, then

$$p_f = \frac{F}{M+F} = \frac{\frac{F}{M}}{1+\frac{F}{M}} = \frac{SR_f}{1+SR_f} \tag{1}$$

or

$$p_f = \frac{F}{M+F} = \frac{1}{\frac{M}{F}+1} = \frac{1}{SR_m+1} \tag{2}$$

where SR_f denotes the sex ratio (female to male) and SR_m denotes the sex ratio (male to female). It may also be noticed that the proportion females, p_f in a village is the weighted average of the sex ratio in different mutually exclusive sub-groups of the population in the village with weights being equal to the proportionate share of the population of the sub-group to the population of the village. In other words, if there are *k* mutually exclusive population sub-groups in the village, then, the gender balance in the village, measured in terms of p_f can be written as

$$p_f = \sum_{i=1}^{k} w_i * p_{fi} = \sum_{i=1}^{k} c_i \tag{3}$$

where

$$\sum_{i=1}^{k} w_i = 1$$

where w_i is the proportion of the population in the sub-group *i* to the population of the village and p_{fi} denotes the gender balance in the population sub-group *i*. Equation (3) shows that the gender balance in a village is the weighted average of the gender balance in different mutually exclusive population sub-groups in the village with weights being equal to the proportion of the population of the sub-group to the population of the village. Equation (3) applies for every village as well as for every district and for the state. Equation (3) also suggests that it is possible to decompose the difference in the gender balance between two villages or two populations into two components - one attributed to the difference in the gender balance in different population sub-groups between two villages or two populations or the difference in the level of gender balance in two villages or populations and the other attributed to the difference in the proportionate distribution of population across different mutually exclusive population sub-groups in the two villages or the two populations. This decomposition helps in analysing how gender balance in different population sub-groups and the

proportionate distribution of the population across different population sub-groups contribute to the gender balance in the village population. Following Kitagawa (1955), it can be shown that

$$p_f^A - p_f^B = \frac{1}{2}\left[\sum_{i=1}^{k}\left(p_{fi}^A - p_{fi}^B\right) * \left(w_i^A + w_i^B\right) + \sum_{i=1}^{k}\left(p_{fi}^A + p_{fi}^B\right) * \left(w_i^A - w_i^B\right)\right] \quad (4)$$

Equation (4) can also be used to analyse how much of the change in the gender balance in a village or in a population over time is due to the change in the change in gender balance in different population sub-groups and how much of the change is due to the change in the proportionate distribution of the village population across different population sub-groups:

$$p_f^2 - p_f^1 = \frac{1}{2}\left[\sum_{i=1}^{k}\left(p_{fi}^2 - p_{fi}^1\right) * \left(w_i^2 + w_i^1\right) + \sum_{i=1}^{k}\left(p_{fi}^2 + p_{fi}^1\right) * \left(w_i^2 - w_i^1\right)\right] \quad (5)$$

Equation (3) is true by definition so that the naive regression or correlation approaches, which ignore the sum constraint, are potentially problematic (Pooter & Werf, 1998; Wright & Westoby, 2001). An alternative approach which is more appealing is to decompose the variance of p_f in the following manner:

$$Var\left(p_f\right) = \sum_{i=1}^{k} Var(c_i) + \sum_{i=1}^{k}\sum_{\substack{j=1 \\ i \neq j}}^{k} Cov(c_i c_j)$$

or

$$Var\left(p_f\right) = \sum_{i=1}^{k}\left[Var(c_i) + \sum_{\substack{j=1 \\ i \neq j}}^{k} Cov(c_i c_j)\right] \quad (6)$$

Where *Var* is the variance and *Cov* is the covariance. The decomposition given by equation (6) is exact and permits estimating the contribution of the variation in gender balance across villages in different components each reflecting the gender balance in a population sub-groups and the proportionate share of the population of that sub-groups to the village population. For example, if the population of the village is divided into three mutually exclusive social classes: 1) Scheduled Castes (s_1), Scheduled Tribes (s_2), and Other Castes (s_3), then the variation in the gender balance in the population across villages can be decomposed as

$$Var\left(p_f\right) = [Var(c_{s1}) + Cov(c_{s1}c_{s2}) + Cov(c_{s1}c_{s3})] + [Var(c_{s2}) + Cov(c_{s1}c_{s2}) + Cov(c_{s2}c_{s3})] + [Var(c_{s3}) + Cov(c_{s3}c_{s2}) + Cov(c_{s1}c_{s3})] \quad (7)$$

The first three terms on the right of equation (7) give the contribution of the variation across villages in the gender balance in Scheduled Castes to the variation across villages in the gender balance in the population, p_f. Similarly, the next three terms on the right of equation (7) give the contribution of the variation across villages in the gender balance in Scheduled Tribes while the last three terms give the contribution of variation across village in the gender balance in Other Castes. In relative terms, the contribution of variation in p_f attributed to Scheduled Castes is given by

$$Cont(c_{s1}) = \frac{Var(c_{s1}) + Cov(c_{s1}c_{s2}) + Cov(c_{s1}c_{s3})}{Var(p_f)} \quad (8)$$

Similarly, the contribution of the Scheduled Tribes and Other Castes to the variation in the gender balance across villages can be obtained as

$$Cont(c_{s2}) = \frac{Var(c_{s2}) + Cov(c_{s1}c_{s2}) + Cov(c_{s2}c_{s3})}{Var(p_f)} \quad (9)$$

and

$$Cont(c_{s3}) = \frac{Var(c_{s3})+Cov(c_{s1}c_{s3})+Cov(c_{s2}c_{s3})}{Var(p_f)} \quad (10)$$

The same approach can be followed to decompose the variation in gender balance across villages into components attributed to other mutually exclusive population sub-groups. Variance decomposition is widely used in population biology (Smith, 1973; Brown, et al., 1993). It also forms the basis of life-table response experiments (Horvitz, Schemske & Caswell, 1997). It has also been used to partition the components of relative population growth rate (Rees, et al., 2010).

One potential problem in using equation (7) is that the covariance terms may be negative so that the algebraic sum of the variance and the covariance may become either zero or very small and may not reflect the true importance of different mutually exclusive population sub-groups in describing the variation in gender balance in the population across villages. This problem can be addressed by using the absolute values of the covariance term (Horvitz, Schemske & Caswell, 1997; Rees, et al., 2010; Rees, Grubb & Kelly, 1996) so as to estimate the relative importance of different mutually exclusive population sub-groups to the variation in the gender balance in the population. For example, the relative importance of Scheduled Castes, in explaining the variation in gender balance in the population across villages may be defined as

$$Imp(c_{s1}) = \frac{Var(c_{s1})+|Cov(c_{s1}c_{s2})|+|Cov(c_{s1}c_{s3})|}{T} \quad (11)$$

where the normalizing constant *T* is the sum of the absolute values of the terms on the right-hand side of equation (7). This approach allocates the covariance terms equally between different components of gender balance in the population. Equation (11) explicitly allows for the fact that the gender balance in a village is the weighted sum of the gender balance in different population sub-groups.

IV. Gender Balance in Villages of Gujarat

According to the 2011 population census, total population of 17,725 villages in Gujarat was 34.69 million - 17.80 million males and 16.89 million females. This means that the proportion of females (p_f) in the total population of 17,725 villages was 48.7 percent which implies a sex ratio of 949 females for 1,000 males (Table 1). The gender balance varies widely across different population groups in the state (Figure 1). Females constitute more than 77 per cent of the marginal cultivators who worked for 3-6 months during the year prior to the census. On the other hand, among the main cultivators, only 14.3 per cent are females. Among different social classes, gender balance is relatively the most favourable to females in Scheduled Tribes but the least favourable to females in Other Castes. Gender balance in the literate population aged 7 years and above is biased against females but in the illiterate population, it is highly biased towards females which indicates that the female literacy rate in the villages of the state is quite low. Similarly, gender balance is highly unfavourable to females in the working population mainly because of the gender balance in main workers which is very highly unfavourable to females. By contrast, gender balance in marginal workers and in non-workers is highly favourable to females which implies that females in the villages of the state in general get work opportunities for less than six months in a year and a large proportion of females is not engaged in any productive activity.

The gender balance has also been found to vary by the size of the village population (Figure 2). On average, the gender balance is relatively the most favourable to females in villages with a population size of 500-999 but the least favourable to females in villages with a population of at least 10,000. The gender balance has also been found to be unfavourable to females in very small villages - villages with a population of less than 200 at the 2011 population census. A similar pattern can be observed from Table 1 in case of Scheduled Castes and Other Castes but, in case of Scheduled Tribes, the gender balance is relatively the most unfavourable to females in villages with population size 500-999 but the most favourable in villages with at least 10,000 population. Among literates, the gender balance is highly unfavourable to females in all villages but the unfavourable educational

environment for females, such as the availability of the school in the village, appears to be relatively the most pronounced in very small villages - villages having less than 200 population. On the other hand, gender balance is highly unfavourable to females among main workers but highly favourable to females among marginal workers irrespective of the occupation of the workers.

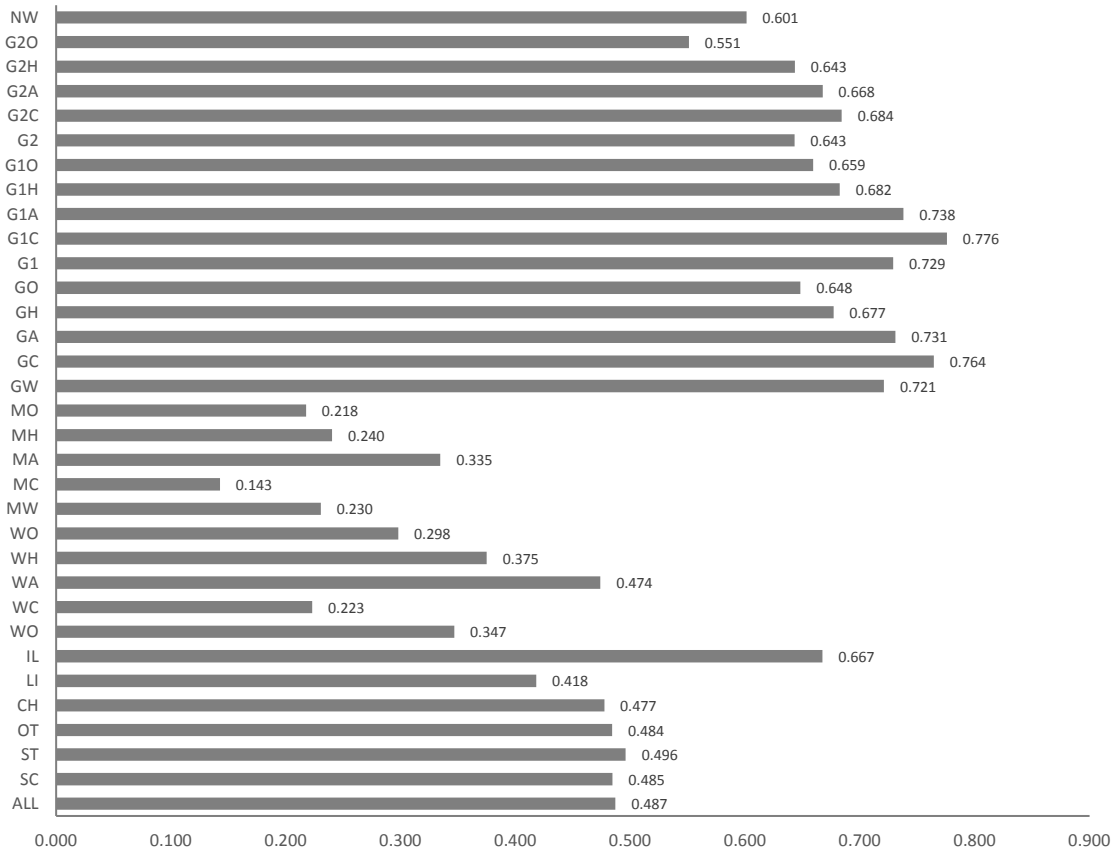
Table 1: Gender balance (p_f) in different population sub-groups in the rural population (17,725 villages) of Gujarat by the size of village population, 2011

Population sub-group	Village population size							
	All	<200	200-499	500-999	1,000-1,999	2,000-4,999	5,000-9,999	≥10,000
ALL	0.487	0.486	0.489	0.489	0.489	0.487	0.485	0.480
CH	0.477	0.483	0.484	0.480	0.479	0.477	0.475	0.473
SC	0.485	0.486	0.486	0.486	0.485	0.484	0.483	0.487
ST	0.496	0.492	0.495	0.494	0.496	0.497	0.497	0.497
OT	0.484	0.482	0.485	0.487	0.487	0.485	0.482	0.476
LI	0.418	0.414	0.415	0.417	0.417	0.417	0.421	0.422
IL	0.667	0.609	0.661	0.668	0.666	0.668	0.669	0.665
WP	0.347	0.384	0.391	0.380	0.367	0.348	0.317	0.272
WC	0.223	0.238	0.234	0.237	0.242	0.224	0.192	0.159
WA	0.474	0.492	0.506	0.496	0.490	0.473	0.447	0.429
WH	0.375	0.541	0.447	0.490	0.376	0.374	0.341	0.337
WO	0.298	0.410	0.424	0.381	0.328	0.310	0.262	0.199
MW	0.230	0.249	0.265	0.253	0.249	0.231	0.206	0.178
MC	0.143	0.157	0.161	0.156	0.156	0.144	0.117	0.093
MA	0.335	0.348	0.362	0.352	0.355	0.334	0.306	0.290
MH	0.240	0.313	0.306	0.341	0.255	0.241	0.205	0.196
MO	0.218	0.268	0.324	0.281	0.242	0.227	0.190	0.151
G1	0.721	0.734	0.727	0.736	0.737	0.724	0.696	0.661
G1C	0.764	0.761	0.761	0.777	0.781	0.769	0.723	0.698
G1A	0.731	0.709	0.724	0.730	0.740	0.732	0.719	0.720
G1H	0.677	0.831	0.693	0.744	0.652	0.675	0.666	0.695
G1O	0.648	0.775	0.708	0.713	0.671	0.657	0.615	0.528
G2	0.729	0.741	0.735	0.744	0.745	0.732	0.706	0.670
G2C	0.776	0.786	0.769	0.785	0.793	0.780	0.738	0.703
G2A	0.738	0.714	0.730	0.738	0.747	0.738	0.728	0.729
G2H	0.682	0.833	0.685	0.741	0.655	0.681	0.678	0.702
G2O	0.659	0.779	0.721	0.725	0.682	0.669	0.625	0.536
G3	0.649	0.672	0.661	0.668	0.664	0.658	0.611	0.584
G3C	0.684	0.607	0.701	0.716	0.699	0.689	0.627	0.661
G3A	0.668	0.663	0.664	0.661	0.675	0.680	0.637	0.633
G3H	0.643	0.818	0.714	0.756	0.629	0.637	0.593	0.635
G3O	0.551	0.746	0.603	0.608	0.559	0.560	0.525	0.473
NW	0.601	0.584	0.584	0.591	0.595	0.600	0.609	0.621
N	17,725	458	1,896	3,888	5561	4,781	963	166

Source: Author's calculations based on 2011 population census

The difference in gender balance among villages of different population size can be decomposed into the difference attributed to the difference in gender balance in different mutually exclusive population sub-groups and the difference attributed to the difference in the proportionate distribution of population across different mutually exclusive population sub-groups in conjunction with equation (3). Table 2 presents results of the decomposition of the difference between the average gender balance in villages with population 500-999 (highest p_f) and the average gender balance in villages with population at least 10,000 (lowest p_f). The different between the average gender balance in two groups of villages is 0.93 per cent out of which 0.55 per cent is attributed to the difference in the gender balance across different population sub-groups while 0.38 per cent is attributed to the different in the proportionate distribution of the population across different population sub-groups. It is clear from Table 2 that the relative contribution of the level component and the composition component of the difference in the gender balance is different in different population sub-groups.

Figure 1: Gender balance (p_f) in population sub-groups in rural Gujarat, 2011



ALL	Total population	SC	Scheduled Castes
ST	Scheduled Tribes	OT	Other Castes
CH	Population below 7 years of age	LI	Population aged 7 years and above literate
IL	Population aged 7 years and above illiterate	WO	Workers
WC	Cultivators	WA	Agricultural labourers
WH	Household industry workers	WO	Other workers
MW	Main workers	MC	Main cultivators
MA	Main agricultural labourers	MH	Main household industry workers
MO	Main other workers	GW	Marginal workers
GC	Marginal cultivators	GA	Marginal agricultural labourers
GH	Marginal household industry workers	GO	Marginal other workers
G1	Marginal (3-6 m) workers	G1C	Marginal (3-6 m) cultivators
G1A	Marginal (3-6 m) agricultural labourers	G1H	Marginal (3-6 m) household industry workers
G1O	Marginal (3-6 m) other workers	G2	Marginal workers (0-3 m)
G2C	Marginal (0-3 m) cultivators	G2A	Marginal (0-3 m) agricultural labourers
G2H	Marginal (0-3 m) household industry workers	G2O	Marginal (0-3 m) other workers
NW	Non-workers		

Source: Author's calculations based on 2011 population census

The gender balance varies widely across the 17,725 villages of the state as p_f ranges from just 3.6 per cent in village Girnar Hills of sub-district Junagadh in district Junagadh to 64.6 per cent in village Merwada (Mahajan) of sub-district Palanpur in district Banas Kantha with a median of 48.8 per cent and an inter-quartile range (IQR) of 1.8 per cent which indicates that in majority of villages, the gender balance varies within a narrow range (Table 3). This means that the sex ratio ranges from 37 to 1,825 females for every 1,000 males, although, in half of the villages, the sex ratio ranges between 921 to 992 females for every 1,000 males. Gender balance also varies across villages in different population sub-groups as is reflected through the variation in IQR, although in most of the population sub-groups, p_f ranges from 0 to 1 which indicates that there is at least one village where the entire population of the sub-group is either female or male. These variations in p_f across villages and across population sub-groups in villages suggests that village specific social, cultural and economic factors influence the gender balance in the villages of the state.

Figure 2: Gender balance (p_f) in villages of different population size

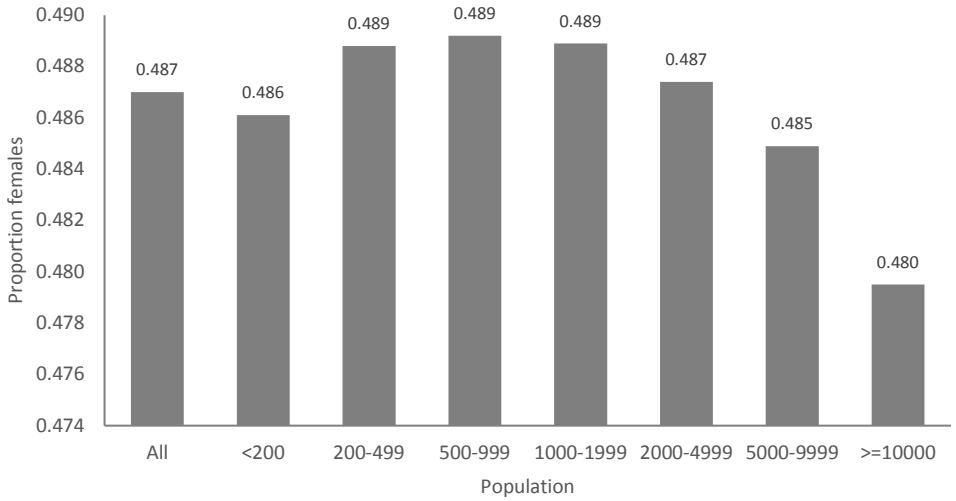


Table 2: Decomposition of the difference between gender-balance in villages with population size 500-999 (most favourable to females) and gender balance in villages with population size 10000 and above (least favourable to females)

Population sub-groups	Total difference	Difference attributed to the difference in	
		Gender balance of different population sub-groups	Proportionate distribution of the population
All	0.93	0.55	0.38
Social class			
Scheduled Castes	-0.85	0.00	-0.84
Scheduled Tribes	12.20	-0.07	12.27
Other Castes	-10.43	0.62	-11.05
Education			
Population 0-6 years	0.59	0.15	0.44
Population ≥7 years literate	-3.13	-0.49	-2.64
Population ≥ 7 years illiterate	3.47	-0.10	3.58
Work status and occupation			
Main cultivators	1.91	0.80	1.11
Main agricultural labourers	2.15	0.82	1.33
Main household industry workers	-0.02	0.04	-0.06
Main other workers	-0.36	1.86	-2.22
Marginal (3-6 m) cultivators	0.95	0.09	0.86
Marginal (3-6 m) agricultural labourers	2.94	0.01	2.94
Marginal (3-6 m) household industry workers	-0.05	0.00	-0.05
Marginal (3-6 m) other workers	0.30	0.36	-0.07
Marginal (0-3 m) cultivators	0.12	0.01	0.11
Marginal (0-3 m) agricultural labourers	0.32	0.02	0.30
Marginal (0-3 m) household industry workers	0.01	0.00	0.01
Marginal (0-3 m) other workers	0.02	0.03	-0.01
Non-workers	-7.36	-2.02	-5.34
Work status			
Non-workers < 7 years	0.59	0.15	0.44
Main workers	3.67	2.96	0.71
Marginal (3-6 m) workers	4.14	0.62	3.53
Marginal (0-3 m) workers	0.47	0.09	0.38
Non-workers ≥ years	-7.94	-1.64	-6.30

Source: Author's calculations

Table 3: Summary measures of inter-village distribution of proportion females in different population groups

Population groups	Proportion of females, p_f						N
	Lowest	Q1	Median	Q3	Highest	IQR	
All	0.036	0.480	0.488	0.498	0.646	0.018	17,725
Scheduled Castes	0.000	0.461	0.486	0.509	1.000	0.048	12,406
Scheduled Tribes	0.000	0.471	0.493	0.507	1.000	0.036	10,980
Other Castes	0.000	0.475	0.486	0.498	1.000	0.022	16,738
Population 0-6 years	0.000	0.452	0.478	0.503	1.000	0.051	17,724
Population 7 years and above	0.036	0.481	0.490	0.500	0.649	0.019	17,725
Literates 7 years and above	0.000	0.387	0.416	0.441	0.909	0.054	17,718
Illiterates 7 years and above	0.000	0.574	0.602	0.631	0.917	0.057	17,725
Workers	0.000	0.235	0.366	0.467	0.652	0.232	17,725
Cultivators	0.000	0.036	0.103	0.297	1.000	0.261	17,559
Agricultural labourers	0.000	0.307	0.456	0.574	1.000	0.267	17,522
Household industry workers	0.000	0.000	0.250	0.500	1.000	0.500	11,410
Other workers	0.000	0.122	0.226	0.410	1.000	0.288	17,529
Main workers	0.000	0.088	0.190	0.319	1.000	0.231	17,721
Cultivators	0.000	0.021	0.053	0.162	1.000	0.141	17,525
Agricultural labourers	0.000	0.133	0.290	0.446	1.000	0.313	17,323
Household industry workers	0.000	0.000	0.047	0.333	1.000	0.333	10,289
Other workers	0.000	0.086	0.159	0.300	1.000	0.214	17,454
Marginal workers	0.000	0.500	0.707	0.839	1.000	0.339	17,725
Cultivators	0.000	0.310	0.628	0.879	1.000	0.569	17,559
Agricultural labourers	0.000	0.508	0.727	0.866	1.000	0.358	17,522
Household industry workers	0.000	0.200	0.667	1.000	1.000	0.800	11,410
Other workers	0.000	0.250	0.500	0.802	1.000	0.552	17,529
Marginal workers (3-6 months)	0.000	0.500	0.713	0.848	1.000	0.348	16,984
Cultivators	0.000	0.292	0.635	0.900	1.000	0.608	14,055
Agricultural labourers	0.000	0.500	0.732	0.875	1.000	0.375	15,759
Household industry workers	0.000	0.167	0.667	1.000	1.000	0.833	6,167
Other workers	0.000	0.250	0.500	0.818	1.000	0.568	14,804
Marginal workers (0-3 months)	0.000	0.400	0.625	0.833	1.000	0.433	12,295
Cultivators	0.000	0.212	0.636	1.000	1.000	0.788	6,811
Agricultural labourers	0.000	0.471	0.667	0.933	1.000	0.462	9,791
Household industry workers	0.000	0.000	0.750	1.000	1.000	1.000	2,265
Other workers	0.000	0.000	0.500	0.909	1.000	0.909	7,702
Non-workers all ages	0.065	0.524	0.596	0.644	0.840	0.121	17,725

Source: Author's calculations based on 2011 population census

There is distinct regional pattern as far as gender balance in the villages of the state is concerned. The gender balance is comparatively more favourable to females in majority of villages in the southern part of the state indicating that females in this part of the state are exposed to the social, cultural and economic environment which is favourable to them (Table 4). By contrast, it appears to be generally unfavourable to females in the northern and central part of the state. In this part of the state, females appear to face an unfavourable social, cultural and economic environment as in majority of villages in this part of the state, the gender balance is comparatively unfavourable to females. Lastly, in majority of villages in the Saurashtra region of the state, the gender balance appears to be neither favourable nor unfavourable to females which means that social, cultural and economic environment in this part of the state is more or less neutral to females.

Table 5 shows how the average gender balance across villages (un-weighted average of p_f) is influenced by the average contribution of different mutually exclusive population sub-groups. For example, when the population is divided into three mutually exclusive population sub-groups on the basis of social class, the average contribution of the Other Castes is the deciding factor in the average gender balance in the population whereas the average contribution of Scheduled Castes is at best marginal. The sum of the three components is equal to the un-weighted average p_f across villages. Similarly, when the population is divided into three mutually exclusive population sub-groups on the

basis of age and literacy, the average contribution of literates aged 7 years and above is the most important, although the average contribution of illiterates aged 7 years is also important but the average contribution of population below 7 years of age or the child population is only marginal. On the other hand, when the population is divided into 13 mutually exclusive population sub-groups on the basis of the work status and occupation, the average contribution of non-workers is the most important one in deciding the average across villages of the gender balance in the population which means that the change in the average contribution of non-workers influences the most the change in the un-weighted average of the gender balance in population across villages.

Table 4: Regional variation in gender balance in villages in districts of Gujarat, 2011

State/District	Number of villages where gender balance is					
	Highly unfavourable to females	Unfavourable to females	Neither unfavourable nor favourable to females	Favourable to females	Highly favourable to females	Number of villages
Kachchh	140	123	163	205	228	859
Banas Kantha	136	278	431	249	138	1232
Patan	61	130	178	98	50	517
Mahesana	53	157	234	109	44	597
Sabar Kantha	123	228	357	366	284	1358
Gandhinagar	19	55	105	55	18	252
Ahmedabad	55	145	183	89	33	505
Surendranagar	68	161	241	130	47	647
Rajkot	69	130	279	243	112	833
Jamnagar	52	91	196	170	165	674
Porbandar	13	27	49	46	29	164
Junagadh	65	146	278	267	111	867
Amreli	31	53	158	196	175	613
Bhavnagar	64	109	275	203	130	781
Anand	45	143	124	27	8	347
Kheda	52	153	222	141	46	614
Panch Mahals	121	217	354	312	191	1195
Dahod	8	35	118	239	290	690
Vadodara	169	287	460	310	300	1526
Narmada	74	87	115	115	164	555
Bharuch	88	124	180	163	91	646
The Dangs	16	22	44	65	161	308
Navsari	15	28	64	125	140	372
Valsad	19	40	83	153	138	433
Surat	55	66	151	191	226	689
Tapi	5	15	41	110	280	451
Gujarat	1,616	3,050	5,083	4,377	3,599	17,725

Source: Author's calculations

Results of the variance decomposition analysis are presented in Table 6, which shows that the relative importance of different mutually exclusive population sub-groups in explaining the variation in the gender balance in population across the 17,725 villages of the state included in the present analysis is different. When the village population is divided on the basis of social class, the variation in the gender balance in population across villages is determined primarily by the variation across villages in the gender balance in Scheduled Tribes and the gender balance in Other Castes and the variation in their relative share in the village population. On the other hand, when the village population is divided on the basis of age and education, the variation in gender balance in population across villages is influenced primarily by the variation in gender balance in the literates and the illiterates aged 7 years and above and the variation in their relative share in the village population. When the village population is divided on the basis of the work status, the variation in the gender balance in the population across villages is influenced primarily by the variation in gender balance across villages in main workers, marginal workers working for 3-6 months in a year and non-workers and the variation in their relative share in the village population. Finally, when the village population

is divided on the basis of the work status and occupation, the variation in gender balance in the population across villages is determined primarily by the variation in gender balance in main agricultural labourers, marginal agricultural labourers working for 3-6 months in the year and the variation in their relative share in the village population. It may also be seen from Table 6 that the relative importance of different mutually exclusive population sub-groups in explaining the gender balance in population across villages varies by the size of the village population probably and so obviously because the society and economy of villages of different population sizes are essentially different.

Table 5: Decomposition of gender balance by village population size and selected population characteristics.

Mutually exclusive population sub-groups	Village population size							
	All	<200	200-499	500-999	1000-1999	2000-4999	5000-9999	≥10000
All	0.487	0.486	0.489	0.489	0.489	0.487	0.485	0.480
Social class								
Scheduled Castes	0.032	0.017	0.018	0.026	0.034	0.035	0.028	0.026
Scheduled Tribes	0.115	0.202	0.196	0.171	0.135	0.103	0.094	0.074
Other Castes	0.340	0.267	0.275	0.291	0.320	0.349	0.363	0.379
Education								
Population 0-6 years	0.066	0.074	0.070	0.068	0.066	0.066	0.066	0.065
Population ≥7 years literate	0.258	0.219	0.246	0.253	0.254	0.256	0.266	0.277
Population ≥7 years illiterate	0.163	0.193	0.172	0.169	0.169	0.165	0.152	0.138
Work status								
Main workers	0.079	0.088	0.095	0.090	0.088	0.079	0.068	0.058
Marginal workers (3-6 m)	0.069	0.090	0.088	0.084	0.076	0.069	0.061	0.047
Marginal workers (0-3 m)	0.007	0.010	0.010	0.009	0.008	0.007	0.006	0.005
Non-workers all ages	0.331	0.299	0.296	0.307	0.318	0.332	0.350	0.370
Work status and occupation								
Main cultivators	0.019	0.023	0.026	0.024	0.023	0.019	0.013	0.007
Main agricultural labourers	0.041	0.042	0.049	0.047	0.047	0.040	0.035	0.027
Main household industry workers	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001
Main other workers	0.019	0.022	0.020	0.017	0.017	0.019	0.020	0.023
Marginal (3-6 m) cultivators	0.013	0.015	0.015	0.016	0.016	0.014	0.010	0.006
Marginal (3-6 m) agricultural labourers	0.044	0.052	0.059	0.055	0.048	0.043	0.039	0.029
Marginal (3-6 m) HH industry workers	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Marginal (3-6 m) other workers	0.012	0.022	0.014	0.012	0.011	0.012	0.012	0.011
Marginal (0-3 m) cultivators	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001
Marginal (0-3 m) agricultural labourers	0.004	0.005	0.006	0.006	0.005	0.004	0.004	0.003
Marginal (0-3 m) HH industry workers	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Marginal (0-3 m) other workers	0.001	0.003	0.002	0.001	0.001	0.001	0.001	0.001
Non-workers all ages	0.331	0.299	0.296	0.307	0.318	0.332	0.350	0.370

Source: Author's calculations.

V. Discussions and Conclusions

The present analysis, probably and so obviously, is the first to analyse gender balance at the village level in Gujarat. The underlying premise of the present analysis is that the gender balance in village or in any population is the weighted average of the gender balance in different mutually exclusive population sub-groups in the village and therefore, the variation in gender balance in different mutually exclusive population sub-groups, along with the variation in the proportionate share of the population of the sub-group in the village population, determines the variation in the gender balance across villages of the state. Using this analytical framework and the data available through the primary census abstract of the 2011 population census, this paper has made an attempt to analyse the variation in gender balance across villages from three perspectives. The first perspective is the social and cultural perspective which has been captured through the distribution of population by social class. The second perspective is the education perspective which has been captured through literacy. Finally, the third perspective is the participation perspective which has

been captured through work status and occupation. Decomposing the variation in the gender balance across the villages into its different components in the context of three perspectives helps in understanding social, cultural, educational and participation context of gender balance across villages.

Table 6: Relative importance of different population sub-groups in explaining the variation in gender balance across villages.

Mutually exclusive population sub-groups	Village population size							
	All	<200	200-499	500-999	1000-1999	2000-4999	5000-9999	≥10000
Social class								
Scheduled Castes	4.10	4.13	2.73	3.96	4.54	4.38	3.01	3.00
Scheduled Tribes	50.50	48.99	50.51	50.42	50.50	50.56	50.64	50.10
Other Castes	45.40	46.88	46.76	45.62	44.96	45.05	46.35	46.90
Education								
Population 0-6 years	10.75	10.40	10.56	10.68	10.87	10.77	11.34	11.11
Population ≥7 years literate	49.50	48.82	49.60	49.52	49.74	49.44	48.99	49.33
Population ≥7 years illiterate	39.75	40.78	39.84	39.80	39.39	39.78	39.67	39.56
Work status								
Main workers	25.82	26.30	28.81	27.10	25.84	23.35	17.45	13.76
Marginal workers (3-6 m)	32.61	31.16	32.54	32.87	33.00	32.71	34.01	33.01
Marginal workers (0-3 m)	3.09	2.87	3.23	3.32	2.86	3.07	3.19	3.51
Non-workers	38.48	39.66	35.41	36.71	38.29	40.85	45.34	49.71
Work status and occupation								
Main cultivators	7.43	11.39	12.38	10.04	7.04	4.59	2.30	0.75
Main agricultural labourers	12.39	22.13	20.81	16.87	11.59	7.22	4.01	2.99
Main household industry workers	0.19	0.16	0.30	0.34	0.14	0.13	0.07	0.05
Main other workers	4.46	9.66	7.85	5.47	3.68	3.18	2.07	2.08
Marginal (3-6 m) cultivators	6.09	9.94	8.16	7.78	6.25	4.49	3.08	1.56
Marginal (3-6 m) agricultural labourers	20.05	30.23	32.84	27.05	18.44	12.76	9.29	7.76
Marginal (3-6 m) HH industry workers	0.20	0.22	0.18	0.35	0.16	0.20	0.09	0.14
Marginal (3-6 m) other workers	4.25	13.87	6.76	5.39	3.50	2.82	1.79	1.63
Marginal (0-3 m) cultivators	0.79	1.16	1.08	1.14	0.81	0.53	0.42	0.17
Marginal (0-3 m) agricultural labourers	1.82	2.68	3.27	2.60	1.55	1.14	0.79	0.71
Marginal (0-3 m) HH industry workers	0.04	0.08	0.10	0.07	0.02	0.03	0.01	0.00
Marginal (0-3 m) other workers	0.34	1.34	0.64	0.41	0.24	0.22	0.14	0.17
Non-workers all ages	34.00	55.81	47.23	42.42	31.28	23.83	17.68	14.53

Source: Author's calculations

The findings of the analysis presented in this paper are revealing. First, the gender balance varies widely across villages and there are distinct regional patterns in the village level gender balance. In the southern part of the state, the gender balance in majority of the villages is favourable to females. In the central part of the state, the gender balance is unfavourable and in the north and eastern parts, it is highly unfavourable to females. Finally, in the Saurashtra region of the state, the gender balance in majority of the villages appears to be neither favourable nor unfavourable to females. Second, the gender balance in the village appears to be related to the size of the village population. In very small villages - villages with a population of less than 200, the gender balance is highly unfavourable to females. With the increase in the village population size, the gender balance becomes increasingly favourable to females up to villages with a population size ranging between 500-999. In villages with a population 1,000 and more, the gender balance decreases with the increase in the village population size so that the gender balance is the most unfavourable to females in very large villages, villages with a population of at least 10,000. Third, the relative importance of different mutually exclusive population sub-groups in explaining the variation in gender balance is different. From the social and cultural perspective, the most important contributor to the variation in gender balance across villages is variation in gender balance in Scheduled Tribes followed by Other Castes whereas the importance of Scheduled Castes is only marginal. From the education perspective, the importance of literate population aged 7 years and above in explaining the variation in gender balance

across villages is relatively the most important. Finally, from the participation perspective, the importance of main agricultural labourers, marginal agricultural labourers who work on average 3-6 months in the year and non-workers in explaining the variation in gender balance across villages is substantially higher than the importance of other working classes. The importance of other mutually exclusive population sub-groups in explaining the variation in gender balance across villages is not significant because either the variation in the gender balance across villages in these population sub-groups is not substantial or variation in the proportionate share of the population of these sub-groups across villages is not significant.

From the policy perspective, it is obvious from the present analysis that the gender balance in the villages of the state is conditioned by the village society and economy. The regional pattern in the variation in gender balance across villages also suggests that the village society and economy is essentially different in different parts of the state. As such, strategies and approaches to make gender balance more favourable to females should be different in different parts of the state. From the perspective of gender main-streaming of village society and economy, it is therefore imperative that a comprehensive analysis of village society and economy is carried out through the gender perspective. Such an analysis has never been carried out at the village level in India. Needless to emphasise, such an analysis is important from the view point of increasing opportunities for women in the village economy and society which is necessary for making the gender balance favourable to females in the typical rural social and economic context.

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