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Changing Gender Gaps in Employment-Related Activities, Domestic Work, and Care across Northeast India: Evidence from the 2019 and 2024 Time Use Surveys

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Abstract
Gender inequalities in employment-related activities, unpaid domestic services and caregiving remain notable dimensions of economic inequality in India; this study is analyzing changes in gender gaps in activity participation and daily time allocation, across the eight northeastern states applying published projections from the National Statistical Office's Time Use Surveys of 2019 and 2024, in real-world scenarios. Covering persons aged six years and above, one second descriptive-comparative approach is used by this study to evaluate female-male differences in participation rates and average daily minutes per person, spanning rural-urban comparisons, at least for now, and major fluctuation across the states and activities is, to a large extent, uncovered by the findings. Employment-related participation gaps shifted further in favour of men in six states; during this period, changes in unpaid domestic-work participation were mixed. In contrast, in Tripura, the widening participation gap was accompanied by any narrowing gap in daily minutes; In Assam, the domestic-work participation gap widened considerably. Even though participation patterns were less homogeneous, caregiving time gaps increased in seven states; all these findings are, as it stands, revealing that participation rates alone can't satisfactorily encapsulate changes in gendered work responsibilities. Building on this observation, the importance of studying both participation and time allocation when assessing regional gender inequalities is, at least in principle, accentuated by the study; while discerning the descriptive shortcomings of comparisons between autonomous survey rounds.

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Keywords: Gender inequality, Time Use Survey, Unpaid domestic work, Caregiving, Employment-related activities, Northeast India

1. Introduction

Gender inequalities in work distribution are a major issue in development economics because traditional labour-market measures do not include unpaid housework and caregiving activities and their effects on household welfare and social reproduction. Even if not paid, their economic value should be recognized and H. (2015) calls for a more systematic coverage of them in all economic analysis. Janisso *et al*. (2024) [10] record the long-standing gender gaps in housework and care work in India.

Time-use surveys provide an even wider measure of gender disparity by capturing the extent of activity participation and the time spent on the activities and also India's National Statistical Office (NSO) was able to undertake nationally representative Time Use Surveys in 2019 and 2024 (National Statistical Office, 2020, 2025) [14, 15], allowing for an analysis of differences in employment activities, unpaid domestic work and unpaid care work between 2019 and 2024. These measures are mostly relevant, as disparities in activity participation is not necessarily indicative of disparities in the time actually spent. Li (2023) [12] emphasizes the importance of examining changes in working time alongside traditional indicators of economic participation.

The region of north east India offers a suitable location to study these gaps as the eight states of this region have variations in economic composition and employment structure, demographic, and social institutions. Previous research has looked at gendered labour market inequalities from a regional perspective. Bordoloi and Bedamatta (2022) [2] look at gender-based comparison of different labour markets of north east, Doley and Padhan (2021) [5] compare gender-based role of social institutions and role of women in economic sector. Recently, Rani *et al* (2025) [17] indicated the persistent gender gap in female labour-force participation and type of employment. Although the literature on this topic has been expanding, we still have little evidence on the simultaneous evolution of these gender gaps in activity participation and time sharing across all eight northeastern states from the 20192024 Time Use Surveys. The evolution of these gender gaps can shed light on the distribution of paid and unpaid work.

In this context, the two main goals of this study are: i) to analyze the evolution in female-male gaps in participation rate and average daily minutes spent on work- related activities, unpaid domestic work and unpaid care work between 2019 and 2024, and ii) to analyze the evolution of such gaps across Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura and rural-urban differences. Based on official NSO estimates for persons age six and above, the paper brings a descriptive-comparative analysis of regional and differential gendered time-use patterns without making any causal claims.

2. Literature Review and Research Gap

The importance of gender inequalities in the way paid and unpaid work is distributed still plays a key role in understanding the women's economic involvement. Hirway (2015) [9] highlights the economic importance of unpaid domestic and caregiving work, and Sahu (2024a) [18] points out that standard measures of work can fail to take these activities into account. Based on the India Time Use Survey (TUS) 2019, Gupta and Pattanaik (2023) [7] finds the significant gender differences in respect to employment-related activities, unpaid domestic services, and caregiving and Deb (2022) [4] records the variation in women's unpaid work among the different states in India, and Janiso *et al*. (2024) [10] demonstrate that the socioeconomic and demographic characteristics that are measured account for only part of the gender gaps in unpaid housework and care.

Further empirical research underscores the need to differentiate between taking part in economic activities and the actual time spent on them. By comparing the 1998-99 and 2019 time-use surveys, Li (2023) [12] shows that changes in traditional employment indicators do not necessarily indicate changes in working time. Sahu (2024b) [19] records gender inequalities in relation to paid work, unpaid work and total work, including differences between rural and urban areas. Gupta and Pattanaik (2025) [8] look at the relationships between unpaid work and women's participation in the labour market, while Chakraborty and Sutradhar (2023) [3] note the variations by state in women's unpaid work. Studies on caregiving also indicate that unpaid responsibilities are distributed in an unequal manner and are linked to women's employment and their well-being (Majumder & Som, 2025; Sinha *et al*., 2024; Tripathi & Zhai, 2024) [13, 21, 22].

Studies concerning Northeast India show a great deal of variation in the way women take part in the economy and carry out household duties. Bordoloi and Bedamatta (2022) [2] record the gender disparities that exist in the labour markets of the northeast, and Doley and Padhan (2021) [5] look at unpaid work and the social institutions in the area also Rani *et al*. (2025) [17] also spot the differences in female labour-force participation and in the conditions of employment among the various states in the northeast. Moreover, the regional studies highlight the significance of the local socioeconomic settings. Kenye and Faishal (2025) [11] investigate informal livelihoods and economic participation in the tribal markets of Nagaland.

With regard to the time allocation, Borah (2026) [1] looks at gendered work and well-being in Assam and Meghalaya. Rai and Roy Mukherjee (2026) [16] examined the development of time-use research in India and point out the methodological problems that arise when comparing different survey rounds. Yet their studies do not include the specific two-round comparison of both participation and the gender gaps in daily minutes per person across all eight northeastern states carried out in this study.

Even though earlier research has shown that there are continuing inequalities in the employment and in the allocation of unpaid duties, the literature surveyed offers only limited evidence regarding the changes that took place between 2019 and 2024 in the gender gaps concerning both participation in activities and the way daily time is allocated among the eight northeastern states. The current study fills this gap by making a descriptive comparison of employment-related activities, unpaid domestic services, and caregiving, including the differences between states and between rural and urban populations.

3. Data and Methodology

The study is using the descriptive-comparative research design applying secondary data from the National Statistical Office's (NSO) Time Use in India reports for 2019 and 2024 (National Statistical Office, 2020, 2025) [14, 15], published by the Ministry of Statistics and Programme Implementation, Government of India, in many respects. Within this framework, both surveys were running from January to December of their respective years and recorded individuals' participation and time spent in diverse activities during a 24-hour reference period, broadly speaking.

Eight northeastern states of India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura are covered by the investigation. Three activity categories are analyzed: use and related activities, unpaid domestic services for household members, and unpaid caregiving services for household members. In light of this dynamic, to uphold comparability between the two published reports, the study is considering persons aged six years and above, spanning rural and urban populations.

Two principal indicators are applied, namely the participation rate, representing the percentage of individuals engaging in any particular activity during the reference day, and average daily minutes per person, representing time spent on that activity across all individuals, covering non-participants, to a significant degree; both sets of assessments are considering all recorded activities, within each individual time slot rather than only this major activity, in actual application.

Building on this observation, the figures are determined from the state-level Statements 5.1 and 7.1 of the respective NSO reports.

Gender disparities are, to a large extent, computed by subtracting male projections from the associated female approximations; in fact, participation-rate differences are formulated in percentage points. Along these dimensions, changes between survey years are measured by subtracting the 2019 gender gap from the 2024 gender gap, in real-world scenarios; still by comparison, time-allocation differences are measured in minutes per person per day.

$$G_t = F_t - M_t$$

Where:

G_t = Female-male gender gap in year t.

F_t = Female participation rate or average daily minutes per person in year t.

M_t = Corresponding male participation rate or average daily minutes per person in year t.

t = Survey year (2019 or 2024).

$$\Delta G = G_{2024} - G_{2019}$$

Where:

ΔG = Change in the female-male gender gap between 2019 and 2024.

G_{2024} = Female-male gender gap in 2024.

G_{2019} = Female-male gender gap in 2019.

Rural-urban comparisons are, for all practical purposes, analyzed separately to discern geographical fluctuation in the changes; the reliability of published projections is assessed applying the relative standard deviations reported by the NSO for both survey rounds, broadly speaking. In this broader context, all these measures are identifying approximations needing careful reading rather than starting the statistical significance of gender gaps or changes, in real-world scenarios.

As, the investigation is counting on published accumulate statistics from two autonomous cross-sectional surveys, it does not entail individual-level regression or causal estimation, on the whole; the comparison is also subject to potential differences in survey implementation, spanning the apply of computer-assisted interviewing in 2024, in many respects. Within this framework, accordingly, the findings are construed as descriptive changes in reported gender differences rather than statistically established trends or causal effects.

4. Results

4.1. Changes in Gender Participation Gaps

The employment-related participation gap became more favourable to men in six states, with the largest reported change in Arunachal Pradesh (-38.2 percentage points), in real-world scenarios; still caution in construing this change is needed by the relatively high sampling uncertainty of Arunachal Pradesh's 2019 approximations, broadly speaking. Taken together, across the eight northeastern states, table 1 is providing changes in female-male participation gaps between 2019 and 2024.

Mixed patterns were followed by gender differences in unpaid domestic services, and caregiving participation gaps increased in five states, especially Arunachal Pradesh and Meghalaya. Along these dimensions, the female-male participation gap widened in Assam (18.5 percentage points) and Tripura (8.6 percentage points), but narrowed in Sikkim (9.5 percentage points), Mizoram (8.5 percentage points) and Nagaland (8.3 percentage points), to a significant degree.

Table 1: Changes in Female-Male Participation Gaps, 2019-2024 (percentage points)

State	Employment-related	Unpaid domestic	Unpaid caregiving
Arunachal Pradesh	-38.2	+0.4	+25.0
Assam	-1.0	+18.5	-0.9
Manipur	-3.6	+0.9	-5.8
Meghalaya	-7.3	-6.4	+13.1
Mizoram	-2.1	-8.5	+9.2
Nagaland	+5.5	-8.3	-1.7
Sikkim	-2.9	-9.5	+1.8
Tripura	+2.4	+8.6	+0.6

Source: Authors' calculations based on National Statistical Office (2020, 2025), Statement 5.1 of the respective Time Use Survey reports.

Note: Figures represent changes in the female-male participation gap, calculated as (female - male gap in 2024) - (female - male gap in 2019). All estimates refer to persons aged six years and above. Positive values indicate an increase in the signed gap; negative values indicate a decrease. These changes are descriptive and do not establish statistical significance.

4.2. Changes in Daily Time Allocation

Table 2 is revealing that changes in gender participation gaps were not always accompanied by comparable changes in average daily minutes, broadly speaking; In Assam, the domestic-work participation gap widened by 18.5 percentage points, while the matching time-allocation gap increased by only two minutes, on the whole. In Tripura; whereas the daily-minutes gap narrowed by 47 minutes, this participation gap widened by 8.6 percentage points.

The domestic-work time gap augmented most in Arunachal Pradesh (67 minutes) and reduced most in Tripura (47 minutes), to a significant degree; all the contrasting patterns are revealing the importance of analyzing both participation and average time allocation, in actual application. From this perspective, caregiving time gaps increased in seven states, with the largest augments in Meghalaya (22 minutes) and Nagaland (21 minutes).

Table 2: Changes in Female-Male Average Daily Minutes per Person, 2019-2024

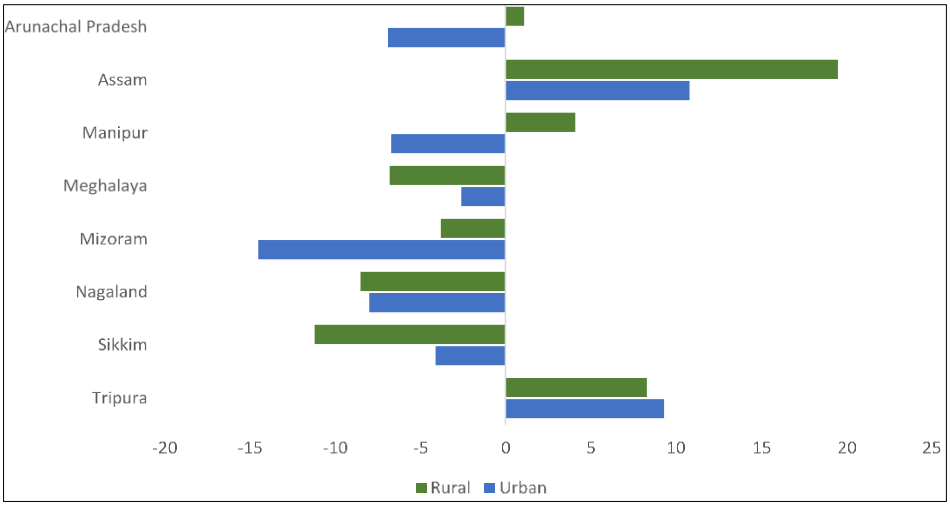
State	Employment-related	Unpaid domestic	Unpaid caregiving
Arunachal Pradesh	-159	+67	+17
Assam	-64	+2	-3
Manipur	-36	+3	+7
Meghalaya	-54	+15	+22
Mizoram	-20	-27	+7
Nagaland	+22	-34	+21
Sikkim	-24	+6	+11
Tripura	+24	-47	+1

Source: Authors' calculations based on National Statistical Office (2020, 2025), Statement 7.1 of the respective Time Use Survey reports.
Note: Values represent changes in the female-male difference in average daily minutes per person, calculated as (female - male gap in 2024) - (female - male gap in 2019). Estimates include non-participants and refer to persons aged six years and above. These are descriptive changes and should not be interpreted as statistically significant differences.

4.3. Rural-Urban Differences

Rural-urban differences in changes in unpaid domestic-work participation gaps across the eight northeastern states are disclosed by figure 1, in real-world scenarios. In light of this dynamic, Assam recorded augments in both rural (19.5 percentage points) and urban (10.8 percentage points) spaces, on the whole; by comparison, Mizoram experienced reductions in both subfields, with any second greatly larger decline in urban areas (14.5 percentage points).

Different changes were, in practice, laid out by Manipur, with the participation gap widening in rural fields but narrowing in urban areas, in actual application; indeed, appreciable deviation in gendered domestic-work participation across the states and residential settings is uncovered by the findings, to a significant degree.



Source: Authors' calculations based on National Statistical Office (2020, 2025), Statement 5.1 of the respective Time Use Survey reports.
Note: Values represent changes in the female-minus-male participation gap, expressed in percentage points. Positive and negative values indicate increases and decreases in the signed gap, respectively. The changes are descriptive and do not establish statistical significance.

Fig 1: Rural-Urban Changes in Female-Male Unpaid Domestic-Work Participation Gaps, 2019-2024

4.4. Changes in Caregiving Time Gaps

Figure 2 compares female-male gaps in average daily unpaid caregiving minutes across the eight northeastern states in 2019 and 2024 and these gaps increased in seven states, with the largest increases in Meghalaya (22 minutes) and Nagaland (21 minutes). Assam was the only state where the gap decreased and falling from 36 to 33 minutes. Mizoram recorded the largest female-male caregiving time gap in both survey years.

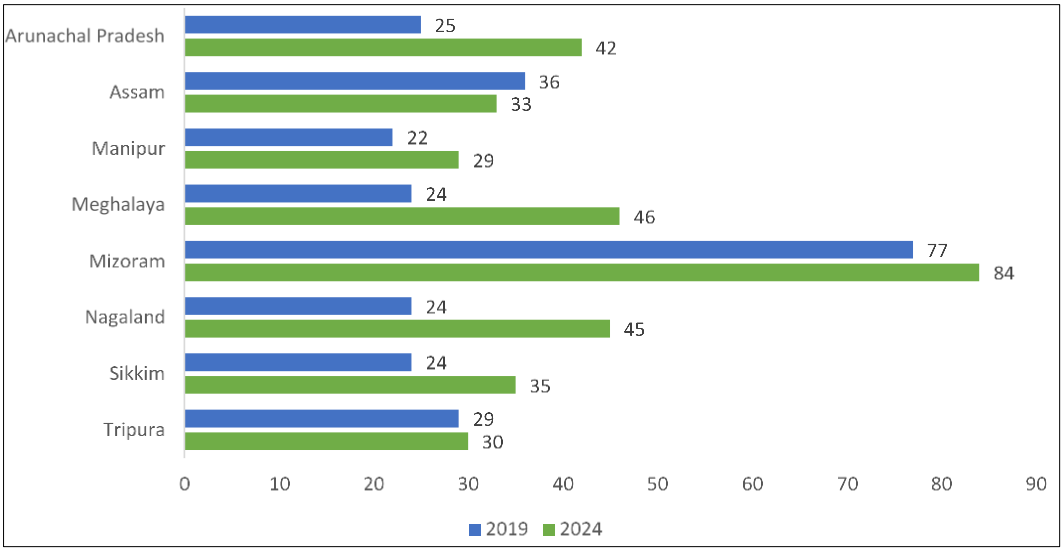
5. Discussion

All these findings are revealing one more great deal of deviation in the changes that have taken place between 2019 and 2024 about gendered patterns of work participation and the allocation of time in the Northeastern states, on the whole; and thus, in favour of men, in six of the eight states the gaps in employment-related participation have moved even more, in actual application. Still, the size of the changes has been very diverse; this degree of fluctuation is showing how essential it is predominantly to look at regional differences rather than to suppose that there is one single pattern of gender inequality; indeed, as earlier studies such as Bordoloi and Bedamatta (2022) [2] and Rani *et al*. (2025) [17] have also pointed out, there are differences in this economic participation of women among the northeastern states. In this broader context, still, the current findings only concern the changes in the survey estimates and are broadly unable to spot the factors that caused them.

A key point relates to the connection between participation and the actual time spent on any activity, in many respects. In parallel with this, by contrast, in Tripura both the participation gap and the time-allocation gap changed in the

same direction, with the latter decreasing by 47 minutes; these contrasting findings are revealing that a change in the proportion of people carrying out an activity does not always mean that there is a associated change in the average time spent on it; this distinction is strengthening the principal conclusions of Hirway (2015) [9], Gupta and Pattanaik (2023) [7], and Janiso *et al*. (2024) [10] concerning the need to measure unpaid work beyond the usual participation indicators, to a significant degree. In Assam the difference in domestic work participation between women and men rose by 18.5 percentage points. By comparison, the related difference in daily minutes decreased by just two minutes.

Caregiving also is revealing a further significant dimension of gender inequality, since the gap between women and men in average daily caregiving time grew in seven states, most remarkably in Meghalaya and Nagaland, broadly speaking; Mizoram always had the largest gap in caregiving time in both years of the survey, in real-world scenarios. In Assam there was a small reduce. Within this framework, earlier studies have laid out a link between unpaid caregiving duties and women's employment opportunities and well-being in India (Sinha *et al*., 2024; Tripathi *et al*., 2024) [21, 22]; and thus, while, these findings are offering a wider background for understanding caregiving inequalities, the current descriptive assessment can't evaluate any changes in individual caregiving responsibilities or spot the reasons behind them.



Source: Authors' calculations based on National Statistical Office (2020, 2025), Statement 7.1 of the respective Time Use Survey reports.

Note: Values represents the female-male differences in average daily minutes per person spent on unpaid caregiving services for household members. Estimates include participants and non-participants and refer to persons aged six years and above. Positive values indicate that the females spent more time on caregiving than males. The comparison is descriptive and does not establish statistical significance.

Fig 2: Female-Male Gaps in Average Daily Unpaid Caregiving Minutes across Northeast India, 2019 and 2024

Further comparisons between rural and urban subfields are disclosing that the changes in the gap between rural and urban domestic-work participation were not the same, within the states, broadly speaking; In Assam the gap increased in both rural and urban domains. Simultaneously, in Mizoram it lessened in both spaces, the decline being more marked in the urban fields, to a significant degree; previous studies by Shimray (2004) [20] and Ellena and Nongkynrih (2017) [6] are stressing the significance of local social institutions and gender roles when it comes to understanding household responsibilities in Northeast India. Even though these studies are offering applicable regional background, they do not account for the changes that have emerged between the two survey rounds; the findings must therefore be treated with caution since they are grounded in published amass approximations from autonomous cross-sectional surveys. Both sampling uncertainty and differences in how the surveys were, in effect, ran also are preventing direct comparisons from being made; indeed, altogether, the findings are implying that it is essential to look at both participation and the amount of daily time allocated when assessing gender inequalities.

6. Conclusion

The study looks at changes in the gender gaps in employment-related activities, unpaid domestic services and unpaid caregiving, across the eight Northeastern states of India applying the published assessments from the 2019 and 2024 Time Use Surveys, broadly speaking; appreciable deviation across the states and across the activity types is uncovered by the findings, in real-world scenarios. Within this framework, the gap in employment-related activity participation moved further in favour of men in six states, and the gap in unpaid domestic work participation was mixed.

More critically, the changes in participation rates did not always track with the changes in average daily time, to a significant degree. Under these conditions, the rural/urban comparisons also disclosed differences, within the states so again it was significant to look at both indicators in distinct geographical contexts, in actual application.

All these findings do lend support to the apply of disaggregated time employ data in the investigation of gender inequalities and in the development of gender sensitive policy debates. This assessment is purely descriptive and is grounded in published accumulate projections from two

separate survey rounds. Taken together, future work applying individual level data and suitable statistical procedures could go on to investigate the socioeconomic factors which might be associated with these differences and assess the significance of those factors statistically.

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