Article

Gendered Dimensions of Unpaid Activities: An Empirical Insight into Rural Bangladesh Households

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Abstract: Women in Bangladesh are generally perceived as caregivers, often confined within the households to perform various activities, whereas men are perceived as the providers. These complex gendered roles intersect with multiple factors such as household structure, marital status, religion, cultural beliefs, economic shocks, and livelihood opportunities. This study used the feminist political ecology framework to contextualize and analyze time allocated toward unpaid works, culturally accepted as female/gendered activities, and the nuanced power dynamics between men and women within the rural households of Bangladesh. We used the household survey data collected from the Bangladesh Integrated Household Survey of 2015 to create a multiple linear regression model that helps understand the impacts of economic, cultural, and environmental shocks on the total time allocated toward unpaid activities by women within the household. Results suggest women who experienced climate-change shocks such as crop losses due to disasters and non-climatic shocks such as dowry tend to allocate more time toward unpaid tasks. In contrast, women who own their businesses tend to give less time toward unpaid tasks. This study provides guidelines for necessary gender-sensitive national policies to address the United Nation's goal of gender equity and sustainable development.

Keywords: climate change; gender; Bangladesh; feminist political ecology; livelihood; unpaid time allocation

1. Introduction

Achieving gender equality is critical for attaining sustainable development of countries and communities. One of the 17 goals of Sustainable Development (SDGs) of the United Nations (UN) is to achieve gender equality by 2030 [1]. In response to this ambitious goal, a wide array of international and national programs have been undertaken across the world. Most of these interventions so far have targeted developing economies where gender inequalities and patriarchal discriminations are widely practiced and academically studied [2–6].

Within the rural context of Bangladesh, gender inequality stems from a complex intertwining of religion and cultural underpinnings within a rigid patriarchal system where men and women are treated unequally. Households put different valuations on the tasks performed by men and women, which inherently produce gendered workspaces [7]. Women do the unpaid household work within the household, whereas men are treated as the bread earners of the family; there is a total disregard for women who also contribute significantly to bread-earning tasks but are never acknowledged for the same. This unequal treatment restricts women from acquiring necessary human capital skills such as education and critical livelihood skills that can holistically improve the family's life and well-being.

Bangladesh is also known for its vulnerability to climate change, particularly for its rural population and environment [8–10]. Poor people often face the disproportionate consequences of sea-level rise, salinity intrusion, flooding, drought, and erratic rainfall, all of which directly impact agricultural livelihoods, which is the most important lifeline of this vulnerable population [11]. Like most developing economies, women in Bangladesh

have played a significant role in contributing toward agricultural livelihoods throughout history. Because of changing livelihood patterns, men often migrate out of their villages to seek waged jobs, which eventually transfer their roles and responsibilities to the female heads of the families. This process is termed the feminization of agriculture [12]. Change in women's roles and responsibilities within the feminization of agriculture can be linked to increased migration trends, push and pull migration factors, and rural agricultural practices [13]. The amount of work carried out by women also depends on the related household, socio-economic, and cultural elements based on a specific society's expectations from women to provide for their households. These factors can explain important processes concerning women's decision-making power in family and community and how they balance agricultural works with household duties [14].

Many scholars acknowledge that the uneven gendered division of work in rural agricultural households is one of the main reasons for gender inequality and livelihoods vulnerability in Bangladesh [6,15–18]. However, most of this research portrays women as a vulnerable group rather than actors in livelihood processes. Moreover, gender is not just simply a binary entity classifying men and women; instead, it is a dynamic process intersecting power relations, asset dynamics, culture, race/ethnicity, and social status that shapes and produces differential levels of livelihood vulnerabilities [19]. Thus, there is a need for a national-level analysis to understand the complex relationship between gendered time allocation with varying levels of socio-economic shocks and changing responsibilities that shape women's decision-making power in agricultural livelihoods.

This study, thus, addressed this important research question: What are the economic, social, and cultural factors that affect women's time allocation toward unpaid household works within the context of rural agricultural Bangladesh? We used the Multiple Linear Regression (MLR) Model to analyze women's unpaid time allocation, which is impacted by household composition, asset dynamics, adverse economic shocks from climatic changes, as well as positive economic events. This study used a publicly available nationally representative household dataset of the Bangladesh Integrated Household Survey (BIHS) 2015 that collected data of 6500 rural households' time allocation, household composition, livelihood decisions, and socio-economic shocks. A feminist political ecology (FPE) framework helps understand the complex intertwining of gendered knowledge, roles, responsibilities, gendered collective actions, and their contribution toward changing women's decisions in unpaid time allocation.

This study holds significance since a national-level analysis of women's unpaid household burden has not been done yet in the context of rural Bangladesh. The result of this analysis will contribute toward important policy interventions for achieving gender equity and the SDGs. This study could also be useful for cross-country analysis of women's unpaid household work within the context of rural agricultural livelihoods in developing economies. This paper is limited to analyzing women's unpaid household burden because unpaid work impedes women's upward socio-economic mobility. Our analysis only looks at the households with married husbands and wives to draw a comparative analysis of unpaid household work distribution between men and women. Hence, the results should not be used to draw generalized conclusions.

The rest of this paper comprises four additional sections. The second section discusses the feminist political ecology framework and its relationship with women's livelihood decision-making processes. The third section discusses the data sources and methods. The fourth section discusses findings from the data analysis. Finally, the fifth section discusses major empirical findings and conclusions while linking them with prior research and future policy implications.

2. Background Context

2.1. Theoretical Approach

The feminist political ecology (FPE) theoretical framework recognizes gender as an important variable that intersects class, caste, ethnicity, race, and power relations in resource

use and ecological processes [20]. By doing so, FPE links gender, which shapes the factors affecting gendered roles and struggles in environmental changes, livelihood opportunities, and collective efforts, to ensure sustainable development [20–24]. With the FPE framework, we seek to emphasize women's decision-making experiences on unpaid time allocation within changing economic contexts and environmental shocks. As women go through their everyday lives, their livelihood options and lived experiences are complexly intertwined and linked with ecological processes [22].

The FPE comprises three themes that are critical to gender and environment: (i) Gendered science of survival questions the objectivity and assumptions in current literature in defining gender and how it is perceived by locals to create, maintain, and protect a healthy environment; (ii) Gendered rights and responsibilities based on asset dynamics of men and women, and (iii) Gendered collective actions that focus on women's collective roles as a changemaker in the society to have voices in their livelihoods and environmental changes collectively [20]. FPE draws on people's gendered knowledge to survive in their everyday life and raise awareness within their households and communities. Rocheleau et al. (1996) discussed the conflict between the traditional development narrative and women's multidimensional roles in their home and society. Managing daily household activities such as providing for childcare, the health of family members, and preparing food put them in burden and precludes them from doing economic activities [20].

The second theme of FPE, gendered rights and responsibilities, mainly concerns the power relationship between men and women regarding control over resources. The right to control one's labor is also highly gendered [14,25]. We believe that the ownership of assets, managing a livelihood enterprise, and control over the autonomy of income act as bargaining factors for women when allocating unpaid time.

The third FPE theme of gendered collective action talks about women's collective role in their social and political struggles [20]. Women have collectively challenged the established culture to put their rights in the front [20]. They have struggled and resisted by showing the power of resilience in meaningful environmental changes. In doing so, they have redefined the existing narratives to acknowledge women's struggles toward gaining their rights to property, skill development, and other livelihood skills [20].

2.2. Conceptualizing Gendered Unpaid Time Allocation in Bangladesh

Gendered time allocation is closely tied to women's activity space in rural Bangladesh [26]. In a rigid patriarchal system, women's day-to-day activities are confined within the boundaries of their households. They engage in domestic work, cooking and serving, fetching water, child and adult care, cattle rearing, raising poultry, kitchen gardening, and cleaning the homestead. In contrast, men are responsible for work performed in public spaces and earn for their families. Society imposes these distinct activity spaces on men and women through marriage, religion, social upbringing, and imposed gender identity [26,27].

Marriage in rural Bangladesh is a life-changing experience for women when they leave their parents' home to start new lives at their in-laws' home. Young married women experience the highest degrees of mobility restrictions and the least freedom in decision-making abilities compared to women from other age groups and/or marital statuses [26]. Religious customs such as "Purdah" restrict the mobility of young women from well-off backgrounds. The age difference between husband and wife also dictates women's ability to think about their well-being and aspirations [26]. Women from poorer economic backgrounds usually do not adhere to these traditions and work as a maid or other physically labor-intensive jobs to earn for their families [26].

From a very young age, families and societies train women in rural Bangladesh to become good housewives. Skills such as cooking, handicrafts, home maintenance, and raising the livestock are transferred from mother to daughter. These trainings and cultural impositions often shape a women's gendered identity as a caregiver for her family. Society brands and accepts these tasks as feminine and conforming to patriarchy [26]. However, these works do not get recognition as economic entities because they are not monetized and

valued in the larger society [28]. In addition, the rural community largely looks down upon women who do not conform to these social norms and those who challenge patriarchy.

Research also suggests that women continue to negotiate their unpaid time allocation based on their broader socio-economic status and their perceived satisfaction toward unpaid work [29]. One study suggests that in rural Bangladesh, women who conform to patriarchal norms are not concerned about the high amount of unpaid household works, whereas women who do not conform to patriarchal expectations are continuously stressed and less satisfied with unpaid work [29]. Women who own property and have autonomy in livelihood decisions are less concerned about unpaid work and more concerned about their financial well-being [27].

Having good infrastructure also helps women to reduce their unpaid time allocation. Women with access to drinking water and electricity spend less time on cooking, cleaning, and other domestic work [30]. Access to popular media and mobile phones increase women's opportunities toward renegotiating gendered roles within the family and society [30].

These studies suggest that women's unpaid time allocation in rural Bangladesh depends on a complex array of social, cultural, religious, and economic factors. However, most of these studies are conducted at micro scales, looking at particular regions or localities of Bangladesh. This study revisits the problem of gendered division in unpaid time allocation from a national perspective. Thus, our use of nationally representative data to examine the gendered dimensions of unpaid time allocation can help expand the existing body of contemporary feminist literature by contributing toward sustainable policies toward gender equity.

3. Data Source and Methods

3.1. Data Source

This study analyzed gendered disparities in rural households' unpaid time allocation using the BIHS 2015 dataset. BIHS is an open-source database comprising 6500 nationally representative households collected by the United States Aid for International Development (USAID) and the International Food Policy Research Institute (IFPRI) in 2015. This dataset includes detailed household-level information on household composition, migration, rural livelihoods, asset dynamics, time allocation, external economic shocks, and gendered livelihood decision-making power statistically representative at the national level [31]. This data source is publicly available at the IFPRI database, making it easily accessible and useful for empirical analyses concerning various economic inequalities in Bangladesh [32].

3.2. Methods

This study aimed to find out important economic, social, and cultural factors that affect women's unpaid time allocation in everyday life within the context of rural agricultural Bangladesh. To achieve these objectives, we first filtered out the dataset that contained married household heads in the family. This step ensured homogeneity within the sampled data for this analysis. Thereafter using the RStudio, we extracted 4015 households that were eligible for this study. We used the Multiple Linear Regression (MLR) model to explore the relationship between women's unpaid time allocation with household composition, male outmigration, economic shocks (such as dowry and climate change shocks), and women's decision-making dynamics (such as asset ownership, autonomy in production, and female enterprise). An MLR model explains the relationship of a dependent variable with one or more independent variables.

A simplistic representation of MLR is shown below:

$$y_i = a_0 + a_1 x_{i1} + a_2 x_{i2} + \cdots + a_P x_{i_P} + e_i \text{ for } i = 1, 2, 3 \ldots n \ldots (i) \tag{1}$$

where:

$$y_i = response\ variable \tag{2}$$

$$a_0 = intercept \tag{3}$$

$$a_1, a_2, \ldots, a_P \ are \ coefficients \ for \ the \ independent \ variables, \ and \tag{4}$$

$$e_i = residual \ error \tag{5}$$

The dependent variable for our study was the female unpaid time measured in hours (y_i). It was computed by summating the total hours spent in groceries/shopping, sewing/weaving, cooking, domestic work, and child/adult care.

The independent variables included different aspects of household structure, negative economic shocks, and positive economic events. The household structure included gender of household head, presence of in-laws, male outmigration status, religion, dependency ratio, age, education, pregnancy status, breastfeeding status, log-transformed annual household income, current savings status, household electricity status, and food consumption score. The variable representing the female household head (gender) was coded into a categorical variable. We created similar categorical variables for religion, presence of in-laws in the family, male outmigration, pregnancy status, breastfeeding status, household's current savings status, and household electricity status. Total annual income was log-transformed to address the skewness of income data. The food consumption score—a household's total calory intake in the last seven days—was used as a proxy for the household's food security [33]. The household hunger scale is an indicator of food depravity in food-insecure regions [34]. It measures if families have been challenged by starvation [34].

We used two different variables to indicate climate change-induced negative shocks. The first one was the incidence of crop losses due to disasters (flooding, drought, cyclones, erosion, etc.). The second one was the incidence of asset losses (livestock, property, homestead) due to disasters. We used variables related to non-climatic shocks, such as dowry payment and sudden medical expenses. Variables recognized as positive economic events for women included women's ability to speak in public, female asset ownership, female autonomy in production, and female enterprise within the household. All of these variables are coded as categorical variables.

4. Results

4.1. Summary of the Household Characteristics

The summary statistics of 4015 households provided a comprehensive picture of household composition within the sampled data. Of all married-coupled families, 97.7% were male-headed households, whereas the rest, 3.3%, were women-headed households. In terms of religion, 88% of households were Muslims, 11% were Hindus, and 1% were Christians. In 9.7% of households, the in-laws lived within the household. Only 7.3% of total households had experienced male outmigration, with males having shifted permanently to another region for livelihoods. These patterns have been explained in scholarly works that link such permanent migrations with large investments [18,35,36]. In terms of annual household income, 68.4% of all households earned less than USD 1500 a year (1 USD = 84 BDT, Bangladeshi Taka), whereas the median annual household income was USD 1100 (Table 1). Educational attainment was also low for women in the sampled households, with 37.3% of all female household heads not having attended any school and another 37% having attained only primary level education. The median dependency ratio of households was 66.67%, which is an important indicator to understand the degree to which women are engaged in adult care and childcare (Table 1). The median age of the female-headed households was 38 years. In terms of savings status, 66% of the respondents saved money for emergency purposes, whereas 34% did not save any money. It is also important to note that 40% of the respondents did not have electricity in their homestead during the survey.

Table 1. Summary of household characteristics.

Household Characteristics	Mean	Median	Minimum	Maximum
Annual Household Income (USD)	1432	1100	0	42,800
Total Household Member	5	5	2	21
Age of Female Head	38	38	18	73
Dependency Ratio	0.75	0.66	0	5.0
Food Consumption Score	67.7	66	24.5	112
Household Hunger Scale	5.86	6	3	6

Source: Authors, 2021.

4.2. Economic Shocks and External Events

Table 2 presents the summary of economic shocks and external events experienced by the respondents. Regarding economic shocks due to climatic events such as drought, flooding, erosion, and cyclones, 1.3% of the households reported that they lost significant property and livestock within the last five years of this baseline survey. On the other hand, 5.3% of the households reported crop losses due to disasters.

Table 2. Economic shocks and external socio-economic events reported by households.

Economic Shocks and opportunities	Reported Proportion
Climate Change Shocks	
Loss of asset to disasters	0.013
Loss of crops to disasters	0.053
Non-Climatic Negative Shocks	
Female giving dowry during marriage	0.847
Providing medical expenses	0.157
Female Livelihood Decision	
Female enterprise	0.762
Female asset ownership	0.88
Female access to credits	0.549
Female autonomy in livelihood	0.811
Female public speaking ability	0.59
Female Health Conditions	
Pregnancy	0.032
Breastfeeding	0.157

Source: Authors, 2021.

In Bangladesh, marriage is described as an economic transaction or strategy for improving capital accumulation through the dowry system [37]. Dowry is illegal in Bangladesh as it forces the bride's family to give a huge amount of money and property to the groom's family. Among the female-headed households, 84.7% reported having given dowry to their in-laws during their marriage, which is quite alarming and social malpractice. Medical expenses also comprise a big economic shock for a rural agricultural household. Most of the families cannot cover the medical costs and often fall into debt. In total, 15.7% of the households recognized illness and associated medical expenses to have hampered their well-being.

Female livelihood decision-making power is an important indicator of women's empowerment and livelihood equity. It depends on gendered asset dynamics, female enterprise, female autonomy over livelihood decisions, access to credit, and their ability to speak out in the public sphere. Among the female household heads, 76.2% reported having their livelihood ventures in the household. Women in rural Bangladesh contribute to livestock rearing, homestead gardening, poultry farming, and various other activities that add to household income [38]. Female asset ownership is also high among female household heads, around 88%. Different types of assistance from NGOs (non-profits) and microfinance practices have contributed to women's access to loans and their ability to

speak and take leadership positions in village cooperatives publicly. In total, 54.9% of all women reported having access to credits, and 59% reported having the ability to speak in public speaking. The pregnancy and breastfeeding status of women also determines the time allocation in their everyday household work. In the sampled households, 3.2% reported having pregnant women, and 15.7% reported having women with breastfeeding children.

4.3. Time Allocation in Unpaid Household Work

Table 3 provides a contrasting picture of unpaid household work allocation between men and women in the rural agricultural context of Bangladesh. On average, women allocated 7.66 h to their day-to-day domestic activities and other household works, whereas men allocated only 1.06 h toward unpaid tasks. On average, out of all types of unpaid activities, females spent 46.21% and 30.81% of their 7.66 h every day on two major activities: domestic work and cooking; for these same activities, an average, males spent 47.17% and 0.94% of their time, equaling merely 0.50 h and 0.01 h, respectively. Likewise, based on Table 3 and Figure 1, the most contrasting activity was cooking, where women put 99.6% of their time whereas men put only 0.04% of their time. Of all the different unpaid household tasks, men were more likely to contribute to groceries and services (40.56%, Table 3) and in those activities they equaled the contribution of women in terms of hours. It is worth noting that buying groceries is an activity performed in *public* spaces outside of the confinements of a household. Hence, men's contribution toward such activities is largely linked with their *public* space performance.

Table 3. Mean hours of gendered time allocation in unpaid household work.

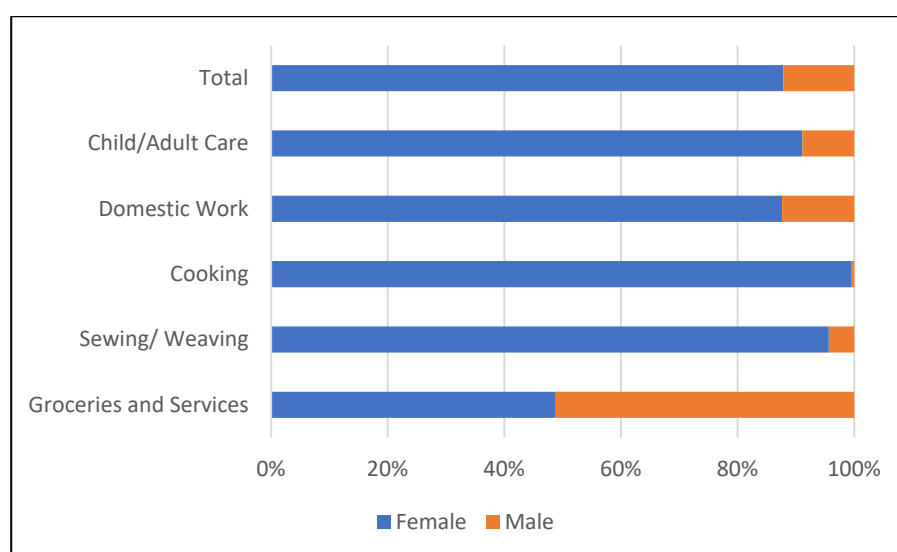| Description	Female	Male
Groceries and Services	0.41 (5.35%)	0.43 (40.56%)
Sewing/Weaving	0.22 (2.87%)	0.01 (0.94%)
Cooking	2.36 (30.81%)	0.01 (0.94%)
Domestic Work	3.54 (46.21%)	0.5 (47.17%)
Child and Adult Care	1.13 (14.75%)	0.11 (10.38%)
Total Unpaid work	7.66 (100.00%)	1.06 (100.00%)

Source: Authors, 2021.

Figure 1. Percentage of unpaid time allocation between men and women within the household.

4.4. The Impact of Economic Shocks on Unpaid Time Allocation of Female Heads

Table 4 provides the results of the MLR model. This model regresses female unpaid household time, our dependent variable, with household and socio-economic factors.

Surprisingly, religion and education did not show significant association with female unpaid household work, which may be indicative of the fact that no matter what religion or educational background, women's contribution toward unpaid work was not differentiated along these dimensions, which, in itself, points toward separation of gendered roles and responsibilities in rural Bangladesh. However, we found other household attributes such as age of the female head, dependency ratio, household head gender, annual household income, food consumption score, household hunger scale, household electricity status, and current saving status of households to have a statistically significant association with female unpaid time allocation. Contrary to our assumption, the MLR model failed to capture any association between the presence of in-laws or male outmigration with women's unpaid time allocation. We need further investigations to find an explanation of these patterns.

Table 4. Factors affecting female unpaid time allocation.

Factors	Estimate	SE	*t*-Value	*p*-Value
Intercept	4.04	0.69	5.83	0.000 ***
HH Head Gender Male	0.48	0.28	1.70	0.090 .
HH Religion Hindu	−0.05	0.13	−0.40	0.689
HH Religion Christian	−1.19	0.79	−1.49	0.134
In-Laws Present (Yes)	−0.008	0.14	−0.06	0.954
Male Outmigration (Yes)	0.08	0.16	0.49	0.61
Pregnant (Yes)	−0.86	0.24	−3.58	0.000 ***
Breastfeeding (Yes)	1.41	0.12	11.04	0.000 ***
Dependency Ratio	0.40	0.07	5.51	0.000 ***
Female Head Age	−0.02	0.004	−5.72	0.000 ***
Female Education No School	−0.10	0.10	−1.08	0.28
Female Education Secondary	−0.02	0.11	−0.18	0.85
Log Annual HH Income	0.068	0.02	2.45	0.014 *
Current Savings (Yes)	−0.22	0.09	−2.42	0.015 *
Food Consumption Score	0.013	0.002	5.39	0.000 ***
Household Hunger Scale	0.32	0.09	3.61	0.000 ***
Household Electricity (Yes)	−0.30	0.09	−3.44	0.000 ***
Female Enterprise (Yes)	−0.27	0.10	−2.65	0.008 **
Autonomy in Decision (Yes)	−0.25	0.11	−2.33	0.019 *
Female Asset Own (Yes)	0.18	0.13	1.37	0.168
Female Public Speak (Yes)	0.18	0.08	2.12	0.033 *
Female Access Credit (Yes)	0.04	0.08	0.52	0.605
Medical Expenses (Yes)	−0.23	0.11	−2.06	0.038 *
Dowry Own Marriage (Yes)	0.35	0.12	2.91	0.003 **
Crop Failure to Disaster (Yes)	0.59	0.18	3.23	0.001 **
Lost Asset to Disaster (Yes)	−0.08	0.36	−0.23	0.818

Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1. Residual standard error: 2.625 on 3989 degrees of freedom. Multiple R-squared: 0.1172, Adjusted R-squared: 0.1116 F-statistic: 21.18 on 25 and 3989 DF, *p*-value: $< 2.2e^{-16}$. Note: SE or Standard Error is the standard deviation of the sampling distribution. The t-statistic is the ratio of the departure of the estimated value of the factor from its hypothesized value to the standard error. The p-value is the probability of finding the observed results when the null hypothesis is true. Source: Authors, 2021.

During pregnancy, women allocated 0.86 h less for their unpaid household works. However, women with breastfeeding children put in 1.41 h more toward unpaid household work. Interestingly, an increase in annual household income was associated with an increase in female's unpaid time allocation. For every 10% increase in yearly income, unpaid time allocation increased by 0.07 h.

Women who owned their business enterprises allocated less time on unpaid household chores than women who did not own business enterprises. It also worked likewise in terms of autonomy in livelihood decision-making. However, asset ownerships did not have any effect on unpaid time allocation. The same held true for access to credits for investment in livelihood opportunities. We found a positive relationship between unpaid time allocation with the ability to public speaking. This could be interpreted as a situation wherein women who could speak in public spaces were more aware of their household

time allocation. Accordingly, they accounted for their unpaid household works at the time of data collection/survey.

Female household heads reporting crop failure due to disasters allocated more hours toward unpaid work. We did not find any statistical significance with asset losses to disasters. Interestingly, women who paid dowry during their own marriage were allocating 0.35 h more in unpaid works. Women gave less time toward unpaid work when they faced medical expenses and illness. This was due to the fact that most of the time, female household heads were liable to illness due to increased workloads, making it difficult for them to perform their household tasks in the same way they did when they were healthier.

It is important to note that the adjusted R-squared value of 0.1116 suggests that the MLR model can only explain 11.16% of the total variation in female unpaid household work. Thus, other potentially confounding factors need to be studied in this case. However, the F statistics of 21.18 on 25 and 3989 degrees of freedom with a p-value of 0.000 indicated a robust MLR model.

5. Discussion, Conclusions, and Policy Implications

In Bangladesh, gender inequalities are socially constructed [3,21]. Traditionally, women in Bangladesh face social and religious sanctions. They have been relatively illiterate and poorer, underprivileged, disadvantaged, and are often marginalized [39]. Bangladesh represents a "classic patriarchal" society, often restricting women from making meaningful decisions for their well-being. Such socially prescribed roles prevent women from making significant decisions such as attaining educational degrees and livelihood skills [40].

The narratives of these unequal treatments of gender are reflected in our analysis. From a very early age, women are taught to do the unpaid household chores within the family, and men are taught to earn livelihoods for the family. This societal norm has created two distinct spaces for men and women within the same household [26]. Men engage in activities conducted largely in public spheres, whereas women are responsible for works performed largely within the domestic boundaries inside homes. Based on our analysis, women allocated 6.6 h more toward unpaid activities compared to men in daily household chores. Similar results were presented in other studies as well. In a study conducted by Jain (2015), women in rural Bangladeshi households spent six hours every day on household chores [41]. Moreover, women worked four hours more per day than men in Bangladesh [41]. Among the different unpaid household services, men allocated an equal amount of time to that of women in grocery shopping or other services, mostly because these tasks were performed outside in public spaces, which men attend more frequently than do women. Cooking is an essential life skill, and yet men were dependent on women to prepare food, and their contribution toward this task was the least among all other types of unpaid duties. This was also reflected in the linear regression model, where women's unpaid household time increased with the increase of food consumption score. It is often women who think about the household's nutritional needs and food security every day. That is why the increase of the household hunger scale also potentially increases women's allocation of unpaid time.

Another study found that women experience negative feelings while cooking, cleaning, and fetching water or collecting firewood [29]. However, women experienced positive feelings while caring for their children and elders [29]. Adult and childcare are other tasks within the rural contexts of Bangladesh performed largely by women. Women contribute to more varieties and significantly larger shares of unpaid duties, including those with increased dependency ratios. Pregnant women tend to allocate less time toward household chores because of their health conditions. Still, once they have breastfeeding children, their allocation of time increases by 1.41 h toward unpaid tasks. This pattern conforms to another study that found that women, on average, spent two hours extra every day on childcare if they had children under five years of age [41].

From a feminist political ecology framework, roles and responsibilities within the household is a function of household asset dynamics [20]. The negotiation power to create more equitable and balanced livelihood opportunities depends on women's livelihood decision-making ability. Our analysis found that women who owned business enterprises allocated less time on unpaid work, concentrating more of their time on livelihood opportunities. However, asset ownership did not have any effect on unpaid time allocation. This can be argued by the type of assets women own within the household. Land ownership is difficult for women in Bangladesh [18]. A study found that households prefer transferring liquid assets or jewelry to women rather than land assets because men are afraid of the land being sold away and that might impede their privacy [18].

Women who provided dowries in their own marriage put more time toward unpaid household work. This can be explained by the fact that a dowry is a social stigma. Families that exercise dowries during marriage do not have the necessary awareness compared to women who do not bring a dowry. Around 84.7% of all females in this sample reported giving a dowry in their marriage, and their roles and responsibilities were more confined to household chores, most of which were unpaid. Dowry payment significantly reduces asset holdings of the households [18]. The tradition of dowry causes an immense financial burden that is reflected in time allocation of women within the household.

Climate change-induced disasters also affected women's unpaid work when the households experienced crop losses. In rural Bangladesh, land is either owned by husbands or jointly owned [18]. Land also has low liquidity. Crop losses directly affect household income negatively. Women are forced to sell non-land assets, often their jewelry and other liquid assets that they brought in their dowry [18]. These actions eventually reduce their bargaining power within the households, further disenfranchising them of decision-making power, making them more vulnerable in emergencies.

Women's leadership and collective actions in rural contexts of Bangladesh are manifested in rural cooperatives and village microfinance committees. Several studies stated that engagement in microfinance enabled rural women to partake in financial literacy and household savings [39,42,43]. According to our findings, 59% of women had access to short-term microcredit loans, and 59% had the ability to speak in public. However, contrary to popular beliefs, we did not find any significant relationship between access to loans with unpaid household work. Still, our analysis found that women who could speak in public tended to allocate more time to unpaid works. This could result from survey data response bias, as women who can speak in public are more aware of the time they allocate toward household chores. Hence, they might have correctly reported their actual time toward unpaid tasks. This aspect, however, is our generic understanding and needs further qualitative investigation.

In summary, this paper analyzed the relationship between unpaid household time allocation among males and females with varying household characteristics and economic shocks within the rural agricultural context of Bangladesh. Using a nationally representative household sample of 4015 married families, we found women allocating 7.66 h in unpaid household works whereas men allocated only 1.06 h, on average. This unequal gendered distribution of unpaid household work results from the social construct that men are supposed to work outside and earn livelihoods. In contrast, women are expected to take care of all household responsibilities performed inside domestic spaces. Unpaid household work such as cooking, domestic work, and child/adult care is crucial for household sustenance. However, it is given secondary status in the rigid patriarchal society of Bangladesh. By disregarding the economic valuation of significant hours of women's unpaid work and a lack of acknowledgment of the variety of unpaid tasks that women perform, this society at large is at risk of not being able to create an economically sustainable and socially just society. This holds true in Bangladesh's rural communities, as illustrated above in our detailed analysis and regression model. Through our use of the MLR model, we examined different household parameters and economic shocks on females' unpaid time allocation.

We found that the unpaid time allocation changed with changing roles and responsibilities of female heads within the household.

This research helped us understand the complex livelihood decision-making process of women in rural Bangladesh. Apart from unpaid work, further analysis is needed to examine the complex ways in which different economic shocks and household characteristics might affect women's leisure and paid time allocation. This might provide us with a comprehensive picture of women's day-to-day activities to better understand different socio-economic and cultural barriers.

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