A Study on the Fairness of Housework Division in Chinese Households Based on the Entropy Weight Method: Empirical Analysis from the 2022 CFPS Data

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Abstract

Using data from the 2022 China Family Panel Studies (CFPS), this study selects 11,375 dual-spouse households as the research sample and constructs a comprehensive housework division index via the entropy weight method. The index integrates four dimensions: participation subject, time allocation, content type, and fairness perception, aiming to explore the fairness level of housework division and group differences in Chinese households. The results show that the overall fairness of housework division in Chinese households is relatively low: the mean value of the index (after 10,000-fold linear expansion) is 0.0632, showing a significant right-skewed distribution, with most households concentrated in the "low-fairness" range and only a few achieving relatively balanced division. Significant group differences exist: rural households have a slightly higher housework division index (0.0659) than urban households (0.0608); male respondents have a higher index (0.0660) than female respondents (0.0603); and the high-education group has a significantly lower index (0.0501) than the low-education group (0.0653). The fairness of housework division is jointly influenced by structural factors and perceptual factors, with an obvious "concept-action gap": 74.02% of respondents perceive housework division as "fair", but the low index level indicates this perception mostly stems from normative adaptation rather than objective balance. This study provides empirical evidence for optimizing family labor allocation and promoting gender equality.

Keywords: Housework Division, Fairness, Entropy Weight Method

Competing Interests:
The author declares that there is no conflict of interest.

1. Introduction

Against the backdrop of rising female labor force participation in China, the gendered division of housework remains a critical marker of family equity and social gender equality (Bianchi et al., 2004). Despite progress in gender equality in education and employment, unpaid domestic labor—such as housework and child care—remains disproportionately borne by women, creating a "double burden" that constrains their career development and well-being (Gershuny et al., 2005). Existing research on China's domestic labor division has mostly relied on single-dimensional indicators or subjective evaluations, failing to capture the complexity of housework allocation, which involves participation subjects, time investment, task content, and fairness perceptions (Cooke, 2004). This limitation hinders a comprehensive understanding of housework equity and its mechanisms.

To address this gap, this study constructs a multi-dimensional housework division index using the entropy weight method, integrating eight variables across four dimensions: Participation Subject (spousal contribution satisfaction, intergenerational mutual assistance, domestic service expenditure), Time Allocation (daily housework hours), Content Type (daily task coverage, special housework investment), and Fairness Perception (division fairness evaluation, expenditure decision-making). The analysis uses data from the 2022 China Family Panel Studies (CFPS), focusing on 11,375 dual-spouse households to ensure validity for exploring spousal housework dynamics.

The core objectives are threefold: First, quantify the overall level and distribution of housework division fairness in Chinese households, examining if it exhibits structural inequality as in Western contexts (Sleebos, 2003). Second, analyze group differences in the index across urban-rural, gender, and education dimensions, testing if factors like rural intergenerational support or high-education egalitarian attitudes mitigate inequality (Esping-Andersen et al., 2013). Third, reveal how structural factors and perceptual factors interact to shape housework allocation, shedding light on the "concept-action gap" (Bittman et al., 2003).

Methodologically, this study develops a comprehensive index to overcome single-indicator limitations. Substantively, it enriches cross-national comparisons by exploring China's unique context, complementing findings from Western studies

(Esping-Andersen et al., 2013). Practically, findings inform policies for work-family balance and gender equity, such as expanding affordable domestic services (Fuwa, 2004).

2. Previous studies

International scholarship on housework division focuses on three themes: inequality determinants, cross-national differences, and impacts on family outcomes.

Regarding determinants, early economic theories (Becker, 1981) argued specialization maximizes family utility. However, later studies challenged this: Brines (1994) found U.S. economically dependent men reduce housework to reaffirm masculinity, while Bittman et al. (2003) noted gender often "trumps" economic resources in shaping allocation.

Cross-national research highlights welfare regimes. Nordic countries with universal childcare and gender-equal policies have more balanced division (Esping-Andersen et al., 2013; Geist, 2005), while Southern European and East Asian nations retain traditional norms, increasing female burdens (Hook, 2006; Sleebos, 2003). Fuwa (2004) showed macro-level gender inequality predicts unequal housework across 22 countries.

On family outcomes, Cooke (2004) found German fathers' greater child care participation boosts couples' second-birth likelihood, offsetting maternal employment's negative effect on fertility. Unequal allocation also raises marital conflict and divorce risks, especially among childless couples (Cooke, 2004). Bianchi et al. (2004) added that unequal parental investment in child-rearing exacerbates intergenerational inequality.

Scholars in China have paid considerable attention to the impact of structural factors in their research on housework division. Rural households rely more on intergenerational mutual assistance to share housework, while urban ones depend more on market services (Cao & Qian, 2024). Gender gaps stay stark: women spend more daily housework time than men, even with rising female employment.

Education's role is complex. High-education groups hold more egalitarian attitudes but face work time constraints, lowering subjective fairness (Cao & Qian, 2024). Also, educationally homogamous and hypogamous couples have more equitable allocation than hypergamous ones, yet co-residence with paternal parents rarely eases wives' burden, while maternal parents help daughters in hypogamous marriages.

Existing research has limitations: single-dimensional measurement, few policy links, and

underexplored structural-perceptual interactions. This study uses a multi-dimensional index and CFPS data to fill gaps, contextualizing China's patterns.

3. Empirical Design

3.1 Data

This study utilizes data from the China Family Panel Studies (CFPS). CFPS is a large-scale, nationally representative longitudinal survey initiated by the Institute of Social Science Survey (ISSS) at Peking University. It collects comprehensive information on Chinese households and individuals, covering various aspects such as family economy, social life, and individual attitudes. For this research, I focus on the 2022 CFPS dataset and extract relevant variables related to housework division and expenditure decision-making. To ensure the validity and reliability of the sample for analyzing spousal housework division, I merge and screen the data to include only households where both spouses have filled out the questionnaires. After meticulous data cleaning, which involves handling missing values and outliers, a valid sample size of 11,375 is obtained for subsequent empirical analysis.

3.2 Measurement method

The entropy weight method is adopted to construct the comprehensive index of housework division. The entropy weight method is an objective weighting approach that determines the weights of variables based on the degree of information entropy. Variables with higher information entropy are assigned higher weights. The specific steps are as follows:

Standardization of Variables: Different types of variables are standardized to eliminate the influence of different measurement units. For ordinal categorical variables and binary variables, range standardization is used:

$$x_{ij}^{'} = \frac{x_{ij} - \min(x_j)}{\max(x_j) - \min(x_j)} (1)$$

Where x_{ij} is the original value of the i-th sample on the j-th variable, and $\min(x_j)$ and $\max(x_j)$ are the minimum and maximum values of the j-th variable, respectively. For continuous variables, range standardization is also employed for consistency.

Calculation of Information Entropy: First, calculate the proportion p_{ij} of the i-th sample's standardized value on the j-th variable:

$$p_{ij} = \frac{x'_{ij}}{\sum_{i=1}^{n} x'_{ij}} \quad (2)$$

Where n is the number of samples. Then, calculate the information entropy e_j of the j-th variable:

$$e_j = -\frac{1}{\ln n} \sum_{i=1}^{n} p_{ij} \ln p_{ij} \text{ (if } p_{ij} = 0, \ p_{ij} \ln p_{ij} \text{ is defined as 0)} \quad (3)$$

Determination of Weights: The weigh w_j of the j-th variable is calculated as:

$$w_j = \frac{1 - e_j}{\sum_{j=1}^{m} (1 - e_j)} \quad (4)$$

Where m is the number of variables.

Construction of Comprehensive Index and Sub-Index: The comprehensive index of housework division is constructed by weighted summation of all standardized variables with their corresponding weights:

$$\text{Housework Division Index} = \sum_{j=1}^{m} x'_{ij} w_j \quad (5)$$

3.3 Index system

To measure housework division, I select four measurement dimensions, including Participation Subject, Time Allocation, Content Type, and Fairness Perception, with specific variables involved as shown in the following table.

Measurement dimensions and variables for housework division analysis

Table 1

Measurement dimension	Variable name	Variable attribute
Participation subject	Spouse's housework contribution satisfaction (SHCS)	Ordinal categorical variable
	Intergenerational housework mutual assistance	Binary variable

	(IHMA) Domestic service employment (DSE)	Continuous variable
Time allocation	Housework participation (HP)	Continuous variable
Content type	Daily housework coverage (DHC)	Binary variable
	Special housework investment (SHI)	Continuous variable
Fairness perception	Division fairness evaluation (DFE)	Ordinal categorical variable
	Expenditure decision (ED)	Ordinal categorical variable

The coding and standardization methods for each variable are as follows:

Spouse's Housework Contribution Satisfaction: It is an ordinal categorical variable, with responses ranging from 1 (very dissatisfied) to 5 (very satisfied). Higher values indicate a more positive perception of the spouse's housework contribution, and positive standardization is adopted.

Intergenerational Housework Mutual Assistance: A binary variable, where 1 represents the existence of housework mutual assistance between parents and children, and 0 represents the absence. Positive standardization is used.

Domestic Service Employment: A continuous variable denoting the monthly expenditure on domestic services. Higher values imply a stronger substitution effect of external services for housework, and positive standardization is employed.

Housework Participation: A continuous variable measuring the average daily housework hours. Higher values mean a higher degree of participation in housework.

Daily Housework Coverage: A binary variable, where 1 indicates coverage of housekeeping and care for family members, and 0 indicates otherwise. Positive standardization is applied.

Special Housework Investment: A continuous variable representing the annual expenditure on housing maintenance or renovation (in yuan). Higher values suggest more periodic investment in housework, and positive standardization is used.

Division Fairness Evaluation: An ordinal categorical variable, with 1 (unfair), 2 (average), and 3 (fair). Higher values indicate a more positive perception of the fairness of housework division, and positive standardization is adopted.

Expenditure Decision: An ordinal categorical variable. It is coded as 0 (complete divergence, where the decision-makers filled by both spouses are inconsistent and at least one decision-maker is non-spousal core), 1 (core divergence, where the decision-makers are inconsistent but both are spousal core), 2 (non-core consistency, where the decision-makers are completely consistent but non-spousal core), and 3 (core consistency, where the decision-makers are completely consistent and spousal core).

4. Empirical Results

4.1 Descriptive statistics

To comprehensively understand the sample characteristics and lay a solid foundation for subsequent analysis of the housework division index, this section presents descriptive statistics from two perspectives: first, an overall overview of all core variables to reflect the general distribution of the sample; second, a grouped comparison based on key characteristic variables to initially explore potential differences in housework-related variables across different groups. The specific results are as follows.

4.1.1 Descriptive statistics of overall sample

Table 2 presents the descriptive statistical results of all core variables in this study, covering four dimensions of housework division and four demographic characteristic variables. The valid sample size after data cleaning is 11,375, which ensures the statistical representativeness of the results for analyzing spousal housework division.

Descriptive statistics of overall sample（N=11,375）

Table 2

Variable name	Mean (Std. Dev.) / Frequency (Percentage)	Min	Max

SHCS	1(3.74%); 2(5.84%); 3(16.40%); 4(19.52%); 5(54.51%)	1	5
IHMA	0(69.41%); 1(30.59%)	0	1
DSE	14.37(223.54)	0	11,000
HP	2.18(2.01)	0	20
DHC	0(8.04%); 1(91.96%)	0	1
SHI	8,690.26(49382.87)	0	1,100,000
DFE	1(9.57%); 2(25.98%); 3(74.02%)	1	3
ED	0(0.04%); 1(1.45%); 2(14.55%); 3(83.96%)	0	3
Age	50.01(13.21)	20	95
Gender	0(49.88%); 1(50.12%)	0	1
Urban-rural	0(46.32%); 1(53.68%)	0	1
Education years	8.36(4.85)	0	23

a. Housework Division Dimensions

Participation Subject: Regarding spouse's housework contribution satisfaction (SHCS), over half of the respondents (54.51%) reported "very satisfied," while only 9.58% expressed dissatisfaction. This indicates a generally positive perception of spousal housework contributions among the sample. In contrast, intergenerational housework mutual assistance (IHMA) is relatively uncommon: nearly 70% of households (69.41%) do not have such mutual assistance, suggesting that most families rely on internal rather than intergenerational support for housework. For domestic service employment (DSE), the average monthly expenditure is 14.37 CNY, but the standard deviation (223.54 CNY) and maximum value (11,000 CNY) are much larger — this implies that while most households spend little on external housework services, a small number of households have high spending, showing significant inequality in the use of market-based housework substitutes.

Time Allocation: The average daily housework participation time (HP) is 2.18 hours, with a range of 0 – 20 hours. The moderate standard deviation (2.01 hours) suggests that most households have a stable daily housework time investment, while a few households, those with large family sizes or complex care needs spend far more time on housework.

Content Type: Daily housework coverage (DHC) is highly comprehensive: 91.96% of

households cover core tasks such as housekeeping and family care, indicating that daily housework in most families is not limited to basic cleaning but also includes care responsibilities. For special housework investment (SHI), the average annual expenditure is 8,690.26 CNY, but the extremely large standard deviation (49,382.87 CNY) and maximum value (1,100,000 CNY) reflect that periodic housework investment is highly dependent on family economic conditions — high-income households may have large-scale renovation expenditures, while low-income households may rarely invest in such tasks.

Fairness Perception: Division fairness evaluation (DFE) shows a strong positive tendency. 74.02% of respondents believe their housework division is "fair", while only 9.57% perceive it as "unfair". This high level of fairness perception may be related to stable spousal consensus on housework responsibilities. In terms of expenditure decision-making (ED), 83.96% of households are in a state of "core consistency" (both spouses agree the decision-maker is within the spousal core), and the proportion of "complete divergence" (0.04%) is extremely low. This indicates that most families have clear and unified expenditure decision-making authority, which may further support positive fairness perceptions.

b. Demographic Characteristics

Gender and Age: The gender distribution is nearly balanced (female 49.88%, male 50.12%), avoiding sample bias caused by gender imbalance. The average age of respondents is 50.01 years, with a range of 20 – 95 years — this mainly covers middle-aged and elderly groups, which is reasonable because these groups typically have stable family structures and are more likely to bear long-term housework responsibilities.

Urban-Rural and Education: The urban sample accounts for 53.68% and the rural sample for 46.32%, roughly matching China's current urban-rural population structure and ensuring regional representativeness. The average education years are 8.36 years, with a range of 0 – 23 years, which shows that the sample covers individuals with diverse educational backgrounds, from those with no formal education to highly educated groups. This is in line with the actual educational distribution of adult households across different regions and strata in China.

Overall, the sample's distribution of housework-related variables and demographic characteristics is in line with the actual situation of Chinese households. The significant

differences in variables such as DSE and SHI also provide a basis for subsequent grouped analyses of the housework division index. Meanwhile, the high fairness perception and stable decision-making consistency in the sample lay a foundation for exploring the factors influencing housework fairness.

4.1.2 Descriptive statistics by characteristic variables

a. By Urban-Rural

To explore the differences in housework division and fairness perception between urban and rural households, this section presents grouped descriptive statistics of core variables based on the urban-rural attribute. Table 3 reports the mean/percentage of each variable in the two groups, along with the significance of inter-group differences.

Descriptive statistics of core variables by urban-rural（Urban: N=6,106; Rural: N=5,269）

Table 3

Variable name	Urban (Mean/Percentage)	Rural (Mean/Percentage)	p-value (t-test/Chi-square)
SHCS	1(3.83%); 2(6.65%); 3(17.59%); 4(19.85%); 5(52.08%)	1(3.62%); 2(4.90%); 3(15.03%); 4(19.13%); 5(57.32%)	0.000
IHMA	0(71.60%); 1(28.40%)	0(66.86%); 1(33.14%)	0.000
DSE	19.35(263.64)	8.58(165.17)	0.010
HP	1.94(1.79)	2.45(2.21)	0.000
DHC	0(6.75%); 1(93.22%)	0(9.49%); 1(90.51%)	0.000
SHI	10,218.03(59103.90)	6,919.80(34801.27)	0.000
DFE	1(10.48%); 2(17.59%); 3(71.93%)	1(8.52%); 2(15.03%); 3(76.45%)	0.000
ED	0(0.05%); 1(1.41%); 2(13.09%); 3(85.46%)	0(0.04%); 1(1.50%); 2(16.25%); 3(82.22%)	0.000

Intergenerational Housework Mutual Assistance (IHMA): Rural households have a significantly higher proportion of intergenerational housework support (33.14%) than urban households (28.40%). This may be attributed to the closer living distance between family members in rural areas and the relatively underdeveloped market for housework services, leading rural families to rely more on intergenerational help.

Domestic Service Employment (DSE): The average monthly expenditure on external housework services in urban households (19.35 CNY) is more than twice that of rural households (8.58 CNY). The larger standard deviation in urban areas also indicates that a subset of urban households uses high-cost market services, reflecting the greater availability and acceptance of market-based housework substitutes in cities.

Spouse's Housework Contribution Satisfaction (SHCS): Rural households have a higher proportion of "very satisfied" responses and a lower proportion of "dissatisfied" responses. This may be because rural housework responsibilities are more clearly aligned with traditional gender roles, reducing spousal disputes over contribution allocation.

The average daily housework participation time (HP) of rural households is 0.51 hours longer than that of urban households. Two factors may explain this difference: first, rural housework often includes agricultural-related tasks that are not required in urban areas; second, urban households' use of market services reduces the time spent on daily chores.

Daily Housework Coverage (DHC): Urban households have a slightly higher proportion of comprehensive daily housework coverage. This may be because urban families are more likely to face dual-career pressures, requiring housework to include both housekeeping and care for children/elderly, whereas rural families may share care responsibilities with extended family members.

Special Housework Investment (SHI): The average annual expenditure on special tasks in urban households is 47.7% higher than that in rural households. The extremely large standard deviation in urban areas (59,103.90 CNY) indicates that high-income urban households invest heavily in housing upgrades, while rural households tend to have lower-cost maintenance needs.

Division Fairness Evaluation (DFE): Rural households have a higher proportion of "fair" perceptions and a lower proportion of "unfair" perceptions. This aligns with the higher SHCS in rural areas, as positive spousal contribution evaluations often translate to stronger fairness perceptions.

Expenditure Decision (ED): Urban households have a higher proportion of "core consistency" and a lower proportion of "non-core consistency". This may be because urban households have more complex expenditure items, requiring clearer spousal consensus on

decision-making authority, whereas rural households may involve extended family members in expenditure decisions, leading to more non-core consistency.

In summary, urban and rural households differ significantly in housework participation patterns: urban households rely more on market services and invest less time, while rural households rely more on intergenerational support and spend more time. These differences also shape variations in fairness perceptions — rural households have stronger positive perceptions of spousal contributions and division fairness, while urban households have more consistent expenditure decision-making. These findings provide a basis for subsequent analyses of the housework division index, particularly for exploring how regional context influences housework equity.

b. By Gender

Gender is a core demographic factor influencing housework division, as traditional gender roles and modern dual-career dynamics often shape spousal participation in housework and perceptions of fairness. This section presents grouped descriptive statistics of core variables by gender. Table 4 reports the mean/percentage of each variable in the two groups, along with inter-group difference significance.

Descriptive statistics of core variables by gender（Male: N=5,701; Female: N=5,674）

Table 4

Variable name	Male (Mean/Percentage)	Female (Mean/Percentage)	p-value (t-test/Chi-square)
SHCS	1(1.25%); 2(2.46%); 3(9.52%); 4(16.49%); 5(70.29%)	1(6.24%); 2(9.24%); 3(23.32%); 4(22.56%); 5(38.65%)	0.000
IHMA	0(67.15%); 1(32.85%)	0(71.68%); 1(28.32%)	0.000
DSE	14.35(223.34)	14.38(223.77)	0.497
HP	1.64(1.90)	2.71(1.98)	0.000
DHC	0(13.65%); 1(86.35%)	0(2.40%); 1(97.60%)	0.000
SHI	8,853.43(50128.69)	8,527.87(48633.08)	0.363
DFE	1(3.70%); 2(9.52%); 3(86.77%)	1(15.47%); 2(23.32%); 3(61.21%)	0.000
ED	0(0.04%); 1(1.47%); 2(14.54%);	0(0.05%); 1(1.43%); 2(14.56%);	0.970

	3(83.95%)	3(83.96%)	

Intergenerational Housework Mutual Assistance (IHMA): Male respondents report a significantly higher proportion of intergenerational housework support (32.85%) than females (28.32%). This may reflect gendered expectations of family support: males often rely on intergenerational help to reduce their own housework burden, while females are more likely to take on primary care responsibilities themselves, reducing the need for external intergenerational support.

Spouse's Contribution Satisfaction (SHCS): There is a striking gender gap in satisfaction. 70.29% of males report "very satisfied" with their spouse's housework contributions, compared to only 38.65% of females. Conversely, females are far more likely to express dissatisfaction. This gap aligns with traditional gender roles: females typically bear more housework responsibilities, leading them to have higher expectations for spousal contributions and thus lower satisfaction when those expectations are unmet, while males have lower standards for their spouse's input.

Domestic Service Employment (DSE): Males and females show no significant difference in monthly expenditure on external housework services. This suggests that the use of market-based housework substitutes is driven more by family economic conditions than gender, as both genders rely on external services to a similar extent when available.

The average daily housework participation time (HP) of females is 1.07 hours longer than that of males —a relative difference of 65%. This aligns with global patterns of gendered housework division, where females remain the primary undertaker of unpaid domestic labor, even in dual-career households. The similar standard deviations for males (1.90) and females (1.98) indicate that while females spend more time overall, the variability in housework time is consistent across genders.

Daily Housework Coverage (DHC): Female respondents have an almost universal coverage of comprehensive daily tasks (97.60% cover housekeeping and family care), compared to 86.35% of males. The 11.25 percentage-point gap highlights gendered task specialization: females are far more likely to take on "care-intensive" housework in addition to basic cleaning, while males often limit their participation to simpler tasks, leading to lower

coverage of comprehensive care responsibilities.

Special Housework Investment (SHI): Males and females report no significant difference in annual expenditure on special tasks. This is likely because special housework investment is typically a family-level economic decision rather than an individual gendered responsibility, so it is not affected by gender differences in daily housework participation.

Division Fairness Evaluation (DFE): The gender gap in fairness perception is dramatic: 86.77% of males believe their housework division is "fair," compared to only 61.21% of females. Meanwhile, females are more than four times as likely to perceive unfairness. This difference directly mirrors the SHCS gap: males view the status quo as fair, while females perceive greater inequity.

Expenditure Decision (ED): Males and females show nearly identical patterns of decision consistency: the proportion of "core consistency" is 83.95% for males and 83.96% for females, with no significant difference ($p = 0.970$). This suggests that while gender shapes housework participation and fairness perceptions, it does not affect the clarity of spousal consensus on expenditure decision-making—likely because expenditure decisions are often discussed jointly, regardless of individual housework roles.

In summary, gender is a critical determinant of housework division: females bear a heavier burden of daily housework and report lower satisfaction with spousal contributions and fairness, while males rely more on intergenerational support and perceive the status quo as fair. Notably, gender does not influence the use of market services or expenditure decision consistency, indicating that these aspects of housework are driven by family-level factors rather than individual gender roles. These findings provide a key basis for subsequent analyses of the housework division index, particularly for exploring how gender inequality in unpaid labor translates to differences in fairness perceptions.

c. By Education Level

Education level is closely associated with family resource allocation, gender role attitudes, and access to market services—all of which shape housework division patterns. This section groups respondents by education level (high-level: college degree and above; low-level: below college degree) to analyze differences in core housework-related variables. Table 5 reports the mean/percentage of each variable in the two groups, with inter-group

significance tested.

Descriptive statistics of core variables by education level（Low level: N=9,776; High level: N=1,599）

Table 5

Variable name	Low level (Mean/Percentage)	High level (Mean/Percentage)	p-value (t-test/Chi-square)
SHCS	1(3.63%); 2(5.67%); 3(15.78%); 4(18.68%); 5(56.24%)	1(4.38%); 2(6.88%); 3(20.20%); 4(24.64%); 5(43.90%)	0.000
IHMA	0(67.44%); 1(32.56%)	0(81.43%); 1(18.57%)	0.000
DSE	11.21(216.27)	33.63(262.94)	0.000
HP	2.30(2.09)	1.43(1.20)	0.000
DHC	0(8.79%); 1(91.21%)	0(3.44%); 1(96.56%)	0.000
SHI	8,116.56(47949.07)	12,197.75(57267.15)	0.001
DFE	1(9.30%); 2(15.78%); 3(74.92%)	1(11.26%); 2(20.20%); 3(68.54%)	0.000
ED	0(0.05%); 1(1.61%); 2(14.61%); 3(83.74%)	0(0.00%); 1(0.50%); 2(14.20%); 3(85.30%)	0.005

Intergenerational Housework Mutual Assistance (IHMA): Low-education households are much more likely to rely on intergenerational housework support (32.56%) compared to high-education households (18.57%). This difference may be due to two factors. Firstly, high-education individuals often live in nuclear families, for example, relocating to cities for work where extended family members are not present, reducing the availability of intergenerational help. Secondly, low-education households may have more traditional family structures, where intergenerational co-residence and mutual assistance are more common.

Domestic Service Employment (DSE): High-education households spend more than twice as much on external housework services per month (33.63 CNY) as low-education households (11.21 CNY). The larger standard deviation in the high-education group also indicates that a subset of highly educated families uses high-cost market substitutes, such as full-time nannies or professional cleaning services. This reflects their higher income levels and greater acceptance of "outsourcing" domestic labor to save time for work or leisure.

Spouse's Housework Contribution Satisfaction (SHCS): High-education respondents report relatively higher satisfaction with their spouse's housework contributions: 43.90% rate it "very satisfied", while 56.24% of low-education respondents do so. Conversely, low-education respondents are more likely to express dissatisfaction. This may be because high-education couples often hold more egalitarian gender roles, leading to a more balanced housework allocation and thus higher mutual satisfaction. In contrast, low-education couples may adhere more to traditional gender norms, such as expecting females to bear most housework, which increases dissatisfaction when these role expectations are not met.

The average daily housework participation time (HP) of high-education respondents is 0.87 hours less than that of low-education respondents. This difference is mainly driven by two factors. Firstly, high-education households use more market services, such as takeout and laundry services, to replace time-consuming daily chores. Secondly, high-education individuals often have more time-intensive professional jobs, leading them to prioritize work over housework, with market services or spousal coordination filling the gap. The smaller standard deviation in the high-education group also suggests a more consistent time allocation, likely due to more structured work-life schedules.

Daily Housework Coverage (DHC): Low-education households have a slightly higher proportion of comprehensive daily housework coverage. This may be because low-education households are less likely to outsource care tasks, such as child care and elderly care, to market services, so individual households must take on these responsibilities themselves. In contrast, high-education households may use daycares or senior care facilities, reducing the need for in-house care and thus lowering the "comprehensive coverage" of daily tasks.

Special Housework Investment (SHI): High-education households spend more annually on special housework tasks, such as housing renovation and maintenance, than low-education households. The large standard deviation in the high-education group (57267.15 CNY) reflects significant economic disparities within this group. High-income high-education households may invest in large-scale home renovations, while low-education households tend to limit such spending to essential repairs due to lower income levels.

Division Fairness Evaluation (DFE): High-education respondents are more likely to perceive housework division as "fair" (68.54%) than low-education respondents (74.92%). At

the same time, low-education respondents are more likely to view it as "unfair". This is in line with the more egalitarian gender roles of high-education couples: a balanced housework allocation directly translates to stronger fairness perceptions. In contrast, traditional gender norms in low-education households, such as female-dominated housework, may breed feelings of inequity.

Expenditure Decision (ED): High-education households have a higher proportion of "core consistency" and a lower proportion of "non-core consistency". This may be because high-education couples often engage in more open communication about family finances, leading to a clearer consensus on spousal decision-making authority. In contrast, low-education households may involve extended family members, such as parents, in expenditure decisions more frequently, increasing the likelihood of non-core consistency.

In summary, education level shapes housework division through three key channels: resource access, gender role attitudes, and family structure. These differences collectively result in less housework time, higher satisfaction, and stronger fairness perceptions among high-education respondents. These findings are crucial for subsequent analyses of the housework division index, as they highlight how educational stratification reinforces or mitigates inequalities in domestic labor.

4.2 Results of housework division index measurement

4.2.1 Overall distribution of housework division index

The housework division index is constructed to quantify the fairness and balance of domestic labor allocation, with higher values indicating more balanced and equitable division. It should be noted that the statistical data of the index presented in this section have been obtained by linearly expanding the original measurement results by 10,000 times. This adjustment was made because the original index values were concentrated in the decimal range, which is not conducive to intuitive reading. Since this study only focuses on comparative analysis between different groups, the expansion operation does not affect the validity of the comparative results. This section analyzes the overall distribution characteristics of the index based on the expanded descriptive statistics (Table 6) and kernel density plot (Figure 1), so as to reveal the macro pattern of domestic labor allocation in the

sample.

Overall statistics of housework division index

Table 6

Statistic	Housework division index
Mean	0.0632(0.0527)
Median	0.0317
Min	0.0012
Max	0.4966
Q1 (25th Pctl)	0.0279
Q3 (75th Pctl)	0.1294

From the descriptive statistics in Table 6, the housework division index presents three prominent characteristics that deserve attention. First, the overall equity level of domestic labor allocation in the sample is relatively low. The mean value of the index is 0.0632, with a standard deviation of 0.0527—this indicates that even after expanding the data, the overall level of the index is still at a low level, and there is a certain degree of dispersion within the sample. The low average value of the index essentially reflects the unbalanced status of domestic labor allocation in most families: the burden of housework is not evenly distributed between family members, and there is a phenomenon of "single-person bearing" in varying degrees. In addition, the minimum value of the index is only 0.0012, which means that a small number of families have an extremely unbalanced division of housework—almost all domestic labor is undertaken by one member, and the sense of equity in the family's labor allocation is extremely weak.

Second, there is significant internal differentiation in the fairness of housework division among the sample families. The 75th percentile of the index (Q3 = 0.1294) is nearly 4.6 times the 25th percentile (Q1 = 0.0279), and the maximum value (0.4966) is more than 413 times the minimum value. This huge gap directly reflects the obvious differences in the mode of domestic labor allocation among different families. On the one hand, some families with high index values have achieved a relatively balanced division of housework—family members may reasonably allocate labor according to their own time, energy and professional

characteristics, and the sense of fairness in labor allocation is strong. On the other hand, most families with low index values are still in a state of severe imbalance in housework division—this may be affected by factors such as traditional gender roles, family structure, and economic conditions, leading to the concentration of housework burden on specific members. This differentiation also lays a foundation for the subsequent analysis of group differences in the index.

Third, the central tendency of the index shows a typical right-skewed distribution. The median of the index (0.0317) is far lower than the mean (0.0632)—this statistical feature indicates that the index values of most families are concentrated in the low range, and the relatively high mean value is mainly pulled up by a small number of high-value samples. In other words, the "average fairness level" calculated by the mean cannot fully represent the actual situation of most families. If we only focus on the mean, we may overestimate the overall equity of housework division in the sample. Therefore, in the follow-up analysis, we need to pay more attention to the distribution of low-index families, and explore the reasons for their unbalanced labor allocation, so as to put forward more targeted suggestions for optimizing family housework division.

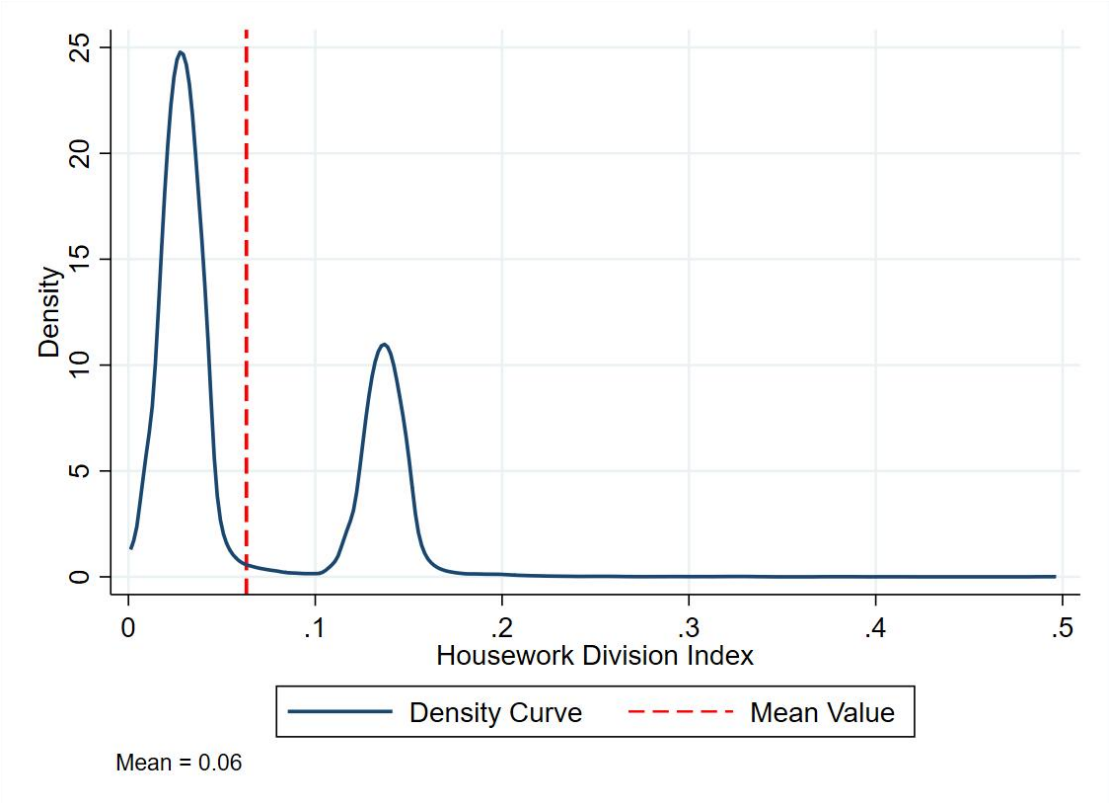

Figure 1 Kernel density of housework division index

The kernel density plot (Figure 1) further visualizes the distribution characteristics of the index, making the above statistical rules more intuitive and concrete. On the one hand, the density curve shows a sharp peak in the low-value region and a long and flat tail extending to the right. This shape is a typical manifestation of the right-skewed distribution, which corresponds to the statistical rule of "mode < median < mean"—it directly shows that most families are clustered in the "low-equity" interval, while only a few families reach the "relatively balanced" level. This distribution pattern is similar to the "low-income concentration + small number of high-income groups" in the income distribution of residents. Its essence reflects the structural inequality of domestic labor in Chinese families: traditional gender role concepts and the concealment of domestic labor jointly maintain this unbalanced distribution state.

On the other hand, the density curve shows a weak secondary peak near the high-value region. This implies that the sample may have a potential "dual structure" in the division of housework. On the one hand, the majority of families are trapped in the traditional unequal division mode—women are still the main bearers of housework, and the sense of equity in labor allocation is relatively weak. On the other hand, a small number of families have broken the traditional mode and formed a more balanced division pattern. Combined with the findings of Section 4.1.2 to replace family labor, thus reducing the burden of housework on a single person and promoting the improvement of the index value.

In addition, the red vertical line marking the mean (0.0632) in the figure is significantly to the right of the peak of the density curve. This visual difference further confirms the deviation between the mean and the actual distribution of most samples. For the research on the equality of domestic labor, this deviation reminds us that we should not only rely on overall statistical indicators to judge the fairness of housework division, but also combine the distribution characteristics of specific groups to conduct in-depth analysis.

The distribution characteristics of the housework division index also reflect the realistic dilemma faced by the allocation of domestic labor in contemporary Chinese families. First, the traditional "wife-dominated" housework pattern is still persistent. The concentration of the index in the low-value region shows that even with the popularization of gender equality

concepts and the improvement of women's social status, the actual division of housework has not been significantly optimized.

Second, the particularity of "invisible labor" further exacerbates the imbalance of the index. As mentioned in relevant studies, domestic labor not only includes visible tasks such as cleaning and cooking, but also includes invisible tasks such as emotional care, child-rearing guidance and family communication. Due to the "perceptual gap" of invisible labor, men often underestimate the workload of women in housework, which leads to the coexistence of "objective imbalance of labor allocation" and "subjective recognition of fairness" in many families. This kind of "cognitive inconsistency" further maintains the low-level equilibrium of the housework division index, making it difficult for the index to improve significantly.

However, it is worth noting that the existence of high-value samples and the secondary peak in the density curve also show that the unequal division pattern of housework is not unbreakable. In practice, factors such as the improvement of women's economic status, the popularization of gender equality education, and the development of the domestic service market may all promote the shift of the index distribution to the right, that is, the overall fairness of housework division is improved. This provides empirical support for the subsequent research on the influencing factors of the housework division index, and also points out the direction for policy intervention to promote the equality of family labor.

In summary, the housework division index presents an overall pattern of "low average, high differentiation, and right-skewed concentration" in the sample. This distribution pattern not only confirms the structural inequality of domestic labor in Chinese families, but also reflects the hidden "concept-action gap" in the process of promoting gender equality—while the concept of gender equality has been widely recognized, the actual division of housework has not yet achieved corresponding progress. The following sections will further analyze the differences in the housework division index among different groups and explore the key factors affecting the fairness of housework division, so as to provide a more comprehensive empirical basis for optimizing family labor allocation.

4.2.2 Housework division index by characteristic variables

To further explore how demographic characteristics shape the fairness of housework division, this section analyzes the differences in the housework division index across three

key characteristic variables — urban-rural attribute, gender, and education level — based on Table 7. The t-test results confirm that the inter-group differences in the index are statistically significant, and the specific patterns and underlying mechanisms are discussed as follows.

Statistics of housework division index by characteristic variables

Table 7

Group Category	Group	Sample Size	Mean (Std. Dev.)	p-value (t-test)
Urban-rural	Urban	6,106	0.0608(0.0526)	0.000
	Rural	5,269	0.0659(0.0527)	
Gender	Male	5,701	0.0660(0.0533)	0.000
	Female	5,674	0.0603(0.0519)	
Education level	High level	1,599	0.0501(0.0462)	0.000
	Low level	9,776	0.0653(0.0534)	

As shown in Table 7, the mean housework division index of rural households is significantly higher than that of urban households, with a statistically significant difference. Although the absolute gap (0.0051) is small, it aligns with the group differences in housework-related variables observed in Section 4.1.2, and its implications can be interpreted from two perspectives:

First, rural households rely more on intergenerational support to optimize labor allocation. Section 4.1.2 noted that rural households have a higher proportion of intergenerational housework mutual assistance — the participation of extended family members reduces the burden of housework on spouses alone, thereby improving the overall balance of division. In contrast, urban households are more likely to live in nuclear families, with limited access to intergenerational help; while they spend more on market services, the substitution effect of market services is uneven, so the overall index fails to surpass rural areas.

Second, rural housework division adheres more to traditional role norms, reducing disputes. Rural households have a higher proportion of "very satisfied" with spousal contributions and a lower proportion of "unfair" perceptions. This is because rural housework

responsibilities are more aligned with traditional gender roles, and clear role expectations reduce spousal conflicts over contribution allocation—even if the actual time investment is unbalanced, the sense of fairness derived from normative consistency boosts the index.

Notably, the standard deviations of the index in urban and rural areas are nearly identical, indicating that the internal dispersion of housework division fairness is consistent across regions—both have a mix of "balanced" and "unbalanced" families, with no significant difference in the degree of internal differentiation.

There is a significant gender gap in the housework division index: the mean value for male respondents is 0.0057 higher than that for female respondents, and the difference is statistically significant. This gap essentially reflects the perceptual divergence between genders in housework fairness, which is closely linked to the gendered pattern of housework participation:

From the perspective of objective labor input, Section 4.1.2 shows that females spend 1.07 hours more on daily housework than males, and have a far higher proportion of comprehensive task coverage—females bear a heavier burden of unpaid domestic labor. However, from the perspective of subjective evaluation, males have a much higher satisfaction with spousal contributions and a lower proportion of "unfair" perceptions. This discrepancy arises because males often underestimate the workload of "invisible labor" and hold lower expectations for their own housework input—they perceive the status quo as fair even when females bear more responsibilities, leading to higher index values.

In addition, the standard deviation of the index for males (0.0533) is slightly larger than that for females (0.0519), suggesting that male perceptions of fairness are more variable. This may be due to differences in male role cognition: some males with egalitarian attitudes actively participate in housework and report high fairness, while others adhere to traditional norms and still view female-dominated housework as fair—two extremes expand the internal dispersion of male respondents' index values.

Contrary to intuitive assumptions, the mean housework division index of high-education groups is significantly lower than that of low-education groups, with a substantial absolute gap (0.0152) and statistical significance. This result seems to conflict with the "high education promotes gender equality" hypothesis, but it can be explained by the structural constraints and

perceptual adjustments faced by high-education households:

On the one hand, high-education individuals face greater time pressure from professional work, limiting their housework participation. Section 4.1.2 shows that high-education respondents spend 0.87 hours less on daily housework than low-education groups — while high-education households use more market services, the substitution effect of market services cannot fully offset the lack of personal participation.

On the other hand, high-education groups have higher fairness expectations, lowering their tolerance for imbalance. Low-education groups are more likely to accept traditional gender roles, so they report higher fairness even with unbalanced division. In contrast, high-education couples hold more egalitarian ideals — they expect equal participation in housework, so even minor imbalances are perceived as unfair, resulting in lower index values.

The smaller standard deviation of the index for high-education groups further confirms this: high-education couples share similar egalitarian attitudes, so their perceptions of fairness are more consistent; low-education groups include both traditional and modern families, leading to greater internal dispersion.

5. Conclusion

This study constructs a comprehensive housework division index using the entropy weight method based on the 2022 China Family Panel Studies (CFPS) data (N=11,375), and explores the distribution characteristics of the index and its group differences across urban-rural, gender, and education level dimensions. The key findings are as follows:

First, the overall level of fairness in housework division among Chinese households is relatively low, with a significant right-skewed distribution. The mean value of the housework division index (after expanding the original data by 10,000 times) is 0.0632, and the median (0.0317) is far lower than the mean — indicating that most families are concentrated in the "low-equity" interval, while only a small number of households achieve relatively balanced division. The kernel density curve further confirms this pattern: the curve peaks in the low-value region and extends a long tail to the right, reflecting structural inequality in domestic labor allocation. Additionally, the huge gap between the maximum (0.4966) and minimum (0.0012) index values suggests severe internal differentiation among families, which is closely related to differences in resource access and role perceptions.

Second, the housework division index exhibits significant differences across demographic groups. In terms of urban-rural attributes, rural households have a slightly higher index (0.0659) than urban households (0.0608), driven by more intergenerational housework mutual assistance and clearer traditional role norms, which reduce spousal disputes. In terms of gender, male respondents report a higher index (0.0660) than female respondents (0.0603) — a gap rooted in perceptual divergence: males underestimate the workload of "invisible labor" and hold lower expectations for their own housework input, while females, as the main undertakers of unpaid labor, have higher fairness standards. In terms of education level, high-education groups have a significantly lower index (0.0501) than low-education groups (0.0653) — this counterintuitive result stems from two factors: high-education individuals face greater work time pressure, limiting their housework participation, and they hold higher egalitarian expectations, making them less tolerant of even minor imbalances.

Third, the fairness of housework division is shaped by the interaction of structural factors and perceptual factors. Structural factors such as intergenerational support, market service substitution, and work time constraints directly affect the objective allocation of housework; while perceptual factors such as role norms and fairness expectations further adjust subjective evaluations of fairness. Notably, the "concept-action gap" is prominent: although 74.02% of respondents perceive their housework division as "fair", the low index level indicates that this subjective perception may be based on normative adaptation rather than objective balance—especially males and low-education groups, who are more likely to accept unbalanced division due to traditional role cognition.

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