Determinants of Female Labour Force Participation in Bihar: A Micro-Level Study of Kishanganj District

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Abstract—this research paper examines the determinants of female labour force participation (FLFP) in Kishanganj district, Bihar, based on primary data collected from 400 women respondents aged 15-59 years through structured questionnaire surveys during 2023-2024. Despite Bihar experiencing rapid economic growth of 10-15 percent annually, female labour force participation remains critically low at 26.0 percent in Kishanganj district. This empirical analysis employs descriptive statistics, chi-square tests, and binary logistic regression to identify the key factors influencing participation decisions. The study finds that education, presence of young children, household income, and normative gender constraints all are significant determinants. Participation rises monotonically with education 15.0 percent among illiterate women to 46.4 percent among graduates and peaks in the 25-34 age group 29.1 percent. The poorest household's monthly income less than Rs. 10,000 show the highest participation rate 31.8 percent, driven by economic necessity. Qualitative analysis reveals that multiple interconnected barriers—social norms affecting 67.3 percent of non-participating women), lack of childcare 72.1 percent, infrastructure gaps 54.8 percent, and education deficits 61.9 percent constrain participation. The study recommends multi-sectoral policy interventions including sectoral diversification toward secondary and tertiary sectors, childcare infrastructure development, skill training programs, and gradual transformation of restrictive gender norms to unlock economic potential and accelerate inclusive growth in Bihar.

Index Terms—Female labour force participation, Kishanganj district, logistic regression, gender norms, economic determinants, skill development

Introduction

The relationship between female labour force participation and economic development remains central to development economics and policy discourse. The World Economic Forum (2024) documents that countries achieving higher female labour force participation experience 5-10% greater GDP growth compared to peers with lower participation [1]. Bihar, India's fastest-growing state with gross state domestic product (GSDP) growth averaging 10-15% annually during 2013-

2023, presents a paradox: rapid economic expansion has not translated proportionately into increased female workforce engagement [2].

Kishanganj district in northern Bihar exemplifies this phenomenon. Located adjacent to the Bangladesh border with a population of 1.67 million (Census 2011), Kishanganj economy remains predominantly agricultural with limited industrial infrastructure [3]. The district's female labour force participation rate of 20.38% (Census 2011) ranks it in the moderate category among Bihar's 38 districts, substantially below high-performing districts like Jamui (37.83%) and Supaul (37.13%)[4].

This research addresses a critical gap by conducting a comprehensive empirical analysis of female labour force participation determinants in Kishanganj using primary data from 400 women respondents. The study employs rigorous quantitative methods—descriptive statistics, bivariate chi-square analysis, and multivariate logistic regression—to identify the mechanisms through which socio-economic characteristics, household dynamics, and social norms shape participation decisions.

The significance of this inquiry extends beyond academic interest. Recent estimates suggest that if female labour forces participation in Bihar achieved parity with national averages, the state's GSDP could expand by 5-10% annually, representing approximately ₹2.5-3.0 lakh crore in unrealized economic output [5]. Understanding the specific determinants of low participation in districts like Kishanganj is essential for formulating targeted policy interventions.

Literature Review and Theoretical Framework

Theoretical Foundations

Human Capital Theory, pioneered by Becker (1993), provides the foundational framework for understanding female labour force participation [6]. This theory posits that investments in education and skills enhance worker productivity and earnings potential, thereby increasing the incentive for labour force participation. Applied to female workers, the theory suggests that educational expansion should increase FLFP through two mechanisms: (1) improved earning potential making work more attractive, and (2) expanded occupational opportunities in knowledge-intensive sectors [7].

However, the Sen-Nussbaum capability approach offers critical insights into why education alone does not guarantee participation. This framework emphasizes that economic participation depends not only on individual capabilities (education, skills) but also on social conditions enabling the exercise of these capabilities. In Kishanganj context, women may possess requisite education but face institutional barriers (childcare gaps, unsafe transportation, restrictive norms) that constrain capacity to participate[8].

The household bargaining models developed by Manser and Brown (1980) and extended by Lundberg and Pollak (1996) provide frameworks for understanding how household composition—particularly presence of young children—affects participation decisions through changes in bargaining power and preferences[9]. These models predict that women with young children face

higher opportunity costs of participation through increased domestic responsibilities, reducing equilibrium participation probability.

Empirical Evidence on FLFP Determinants

Global evidence documents consistent patterns: female labour participation increases with education, declines with presence of young children, and responds to labour market opportunities [10]. Indian studies corroborate these findings. Desai and Joshi (2019) analyzed PLFS data and found education's effect on female participation increased during 2017-2019, while childcare constraints remained significant barriers[11].

Within Bihar specifically, limited district-level studies exist. However, the broader Indian evidence suggests that eastern Indian states (Bihar, Jharkhand, Odisha, West Bengal) consistently show lower female participation than national averages, with complex relationships between agricultural concentration, caste structures, and gender norms [12].

Methodology and Data

Research Design and Sample

This study employs a mixed-methods design combining primary quantitative survey data with qualitative insights. Primary data were collected during 2023-2024 from a sample of **400 women aged 15-59 years** in Kishanganj district using face-to-face structured interviews. The questionnaire (Annexure I in the original thesis) contained four main sections:

Section A: Socio-demographic information (age, religion, caste, marital status, education, family type, income)

Section B: Labour force participation and work characteristics (activity status, occupation type, sector, working hours, earnings)

Section C: Time use and domestic responsibilities (hours on household chores, childcare, mobility constraints)

Section D: Perceptions and constraints (five-point Likert-scale items on gender norms and structural barriers)

Respondents were drawn through random sampling from selected villages and urban wards of Kishanganj. The questionnaire underwent pilot testing (n=40) with Cronbach's alpha reliability coefficient of 0.78 for constraint scales, indicating acceptable internal consistency [13].

Statistical Methods

Descriptive Statistics

Basic frequencies and percentages computed using the standard formula:

$$\text{Percentage} = \frac{\text{Frequency in category}}{\text{Total respondents}} \times 100 \quad (1)$$

For example, if 96 out of 400 respondents fall in age group 18-24, the percentage is: (96/400) × 100 = 24.0%

Bivariate Analysis and Chi-Square Tests

Cross-tabulations examined the association between labour force participation (Y = 1 if working or seeking work; Y = 0 if not in labour force) and categorical explanatory variables (age, education, marital status, etc.). Statistical significance tested using the chi-square statistic:

$$\chi^2 = \sum \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \quad (2)$$

Where is observed frequency in cell i,j and is expected frequency under null hypothesis of independence. Significance judged at 1% ***, 5% , and 10%*** levels.

Binary Logistic Regression

To assess the simultaneous effects of multiple factors on participation probability, a binary logistic regression model was estimated:

$$\log \frac{(1-p)}{p} = \beta_0 + \beta_1 \text{EDU} + \beta_2 \text{AGE} + \beta_3 \text{MAR} + \beta_4 \text{YCHILD} + \beta_5 \text{INC} + \beta_6 \text{NORM} + \varepsilon \quad (3)$$

Where:

P = probability that woman is in labour force (Y = 1)

EDU = education indicator (1 if secondary or above, 0 if below secondary)

AGE = age in completed years

MAR = currently married (1 = yes, 0 = no)

YCHILD = presence of child below 6 years (1 = yes, 0 = no)

INC = household income categories (categorical, with <₹10,000 as reference)

NORM = normative constraint index (average of Likert-scale items)

Exponentiated coefficients interpreted as odds ratios indicating the multiplicative effect on odds of participation [14].

Socio-Economic Profile and Descriptive Findings

Age Distribution

Table 1: Age Distribution of Respondents (N=400). The sample shows concentration in prime working ages 25-44 years (61.0%), making it suitable for analyzing labour force participation determinants.

TABLE: 1 RESPONDENTS AGE- DISTRIBUTION FREQUENCY & PERCENTAGE

Age Group (years)	Number of Respondents	Percentage
15-24	96	24.0
25-34	148	37.0
35-44	96	24.0
45-59	60	15.0
Total	400	100.0

The distribution reveals concentration of respondents in prime working ages (25-44 years), comprising 61.0% of the sample. This concentration is analytically advantageous as these ages encompass critical junctures where decisions about marriage, childbearing, and work interact most strongly.

Religion and Caste Composition

Table 2: Religious Composition of Sample (N=400). Muslims form the majority, reflecting Kishanganj district's demographic composition. Religious identity intersects with gender norms affecting participation patterns.

TABLE 2: RELIGION & CASTE COMPOSITION FREQUENCY & PERCENTAGE

Religion	Number of Respondents	Percentage
Muslim	296	74.0
Hindu	104	26.0
Total	400	100.0

The sample reflects Kishanganj's demographic composition, where Muslims constitute 74.0% of the population. Religion is important analytically because it correlates with gender norms: Muslim respondents more frequently cited traditional norms restricting women's mobility and external work (mean normative constraint score: 3.8 vs 2.9 for Hindu respondents, $p<0.05$).

Educational Attainment

Table 3: Educational Attainment of Respondents (N=400). Nearly 75% of women have below-secondary education, with only 7% holding graduate degrees, indicating widespread educational deprivation.

TABLE 3: EDUCATIONAL ATTAINMENT FREQUENCY & PERCENTAGE

Level of Education	Number of Respondents	Percentage
Illiterate	120	30.0
Up to Primary	96	24.0
Middle	84	21.0
Secondary/Higher	72	18.0
Graduate+	28	7.0
Total	400	100.0

Educational attainment shows severe skewing: 30.0% of respondents are illiterate with no formal schooling, and a further 24.0% have only primary education. Only 7.0% are graduates or above. This profile indicates that low educational attainment is widespread and represents a major constraint on access to non-manual and formal sector employment.

Household Income Distribution

Table 4: Distribution of Monthly Household Income (N=400). Approximately 70% of households have monthly income below ₹20,000, indicating pervasive economic vulnerability.

TABLE 4 HOUSEHOLD INCOME DISTRIBUTION FREQUENCY & PERCENTAGE

Monthly Household Income (₹)	Number	Percentage
<10,000	132	33.0
10,000-19,999	148	37.0
20,000-29,999	78	19.5
≥30,000	42	10.5
Total	400	100.0

Household income distribution reveals substantial economic vulnerability: 70.0% of sample households have monthly income below ₹20,000. Only 10.5% report monthly income of ₹30,000 or above. Low household income simultaneously increases necessity for female participation (survival motive) while constraining participation through limited resources for education and childcare support.

Family Structure

Table 5: Type of Family Structure (N=400). Slightly more respondents live in joint/extended families (53%), which provide childcare support but may reinforce conservative gender norms.

TABLE 5: FAMILY STRUCTURE FREQUENCY & PERCENTAGE

Type of Family	Number	Percentage
Nuclear	188	47.0
Joint/Extended	212	53.0
Total	400	100.0

Slightly higher proportion (53.0%) lives in joint/extended families than nuclear families (47.0%). Joint family structures have dual implications for FLFP: they provide informal childcare support from elderly members and co-wives, potentially enabling participation; simultaneously, they concentrate decision-making authority among male elders, potentially reinforcing conservative norms against women's external employment.

Marital Status

TABLE 6 MARITAL STATUS FREQUENCY & PERCENTAGE

Marital Status	Number	Percentage
Never Married	64	16.0
Currently Married	304	76.0
Widowed/Separated	32	8.0
Total	400	100.0

The vast majority (76.0%) are currently married, reflecting early age of marriage in the district. Early marriage restricts educational attainment and concentrates women's time in domestic responsibilities during prime earning years.

FEMALE LABOUR FORCE PARTICIPATION: LEVELS AND PATTERNS

Overall Participation Rate

Labour force status was determined by responses to: "Are you currently doing work for which you receive income?" and "If not, are you seeking or available for work?" Results are classified as follows:

Table 7: Labour Force Status of Respondents (N=400). Overall FLFP rate is 26.0% (combining self-employed/casual and regular salaried workers). Two-thirds of participating women work in informal sector.

TABLE 7: EMPLOYMENT STATUS FREQUENCY & PERCENTAGE

Status	Number	Percentage
Not in Labour Force	296	74.0
Self-Employed/Casual Workers	68	17.0
Regular Salaried	36	9.0
Total	400	100.0

Combining working and seeking work categories, **the overall female labour force participation rate in the sample is 26.0%** (104 out of 400 women). This falls substantially below male participation rates (typically 75-80% in rural Bihar) and below many other Indian states [15]. Among participating women, approximately two-thirds are self-employed or casual wage workers, while one-third hold regular salaried positions, indicating dominance of informal and insecure work arrangements.

Age-Specific Participation Rates

Age-specific participation rates computed as:

$$\text{Participation rate by age} = \frac{\text{Number in labour force in age group}}{\text{Total women in age group}} \times 100$$

Table 8: Age-Specific Female Labour Force Participation Rates. Participation peaks in prime working ages 25-44 (28-29%), reflecting intersection of marriage, childbearing, and economic necessity.

TABLE 8 FEMALE PARTICIPATION RATE BY AGE GROUP (15 TO 59)

Age Group (years)	Total Women	In Labour Force	Participation Rate (%)
18-24	96	21	21.9
25-34	148	43	29.1
35-44	96	27	28.1
45-59	60	13	21.7
Total	400	104	26.0

Participation peaks in the 25-34 (29.1%) and 35-44 (28.1%) age groups and is lower among youngest (18-24: 21.9%) and oldest (45-59: 21.7%) cohorts. Chi-square test confirms age significantly associates with participation: $\chi^2 = 5.42$, $p < 0.05$. The pattern reflects that women participate most actively during prime earning years when they balance childbearing/childcare with economic necessity, while early marriage and declining work capacity in older ages reduce participation.

Education and Participation

Table 9: Female Labour Force Participation by Education Level. Participation increases monotonically from 15.0% (illiterate) to 46.4% (graduate+), with slope particularly steep above secondary level.

TABLE 9 EDUCATION'S EFFECT ON PARTICIPATION EXAMINED THROUGH CROSS-TABULATION:

Education Level	Total Women	In Labour Force	Participation Rate (%)
Illiterate	120	18	15.0
Primary	96	22	22.9
Middle	84	23	27.4
Secondary/HS	72	28	38.9
Graduate+	28	13	46.4
Total	400	104	26.0

The relationship is strongly positive and monotonic: participation triples from 15.0% among illiterate women to 46.4% among graduates. Chi-square test confirms statistical significance: $\chi^2 = 18.76$, $p < 0.01$***. This powerful association reflects that education: (1) increases earning potential, making work economically rational; (2) expands occupational opportunities in non-manual sectors; (3) may weaken adherence to restrictive gender norms (mean normative constraint score for graduates: 2.3 vs 4.1 for illiterate women, $p < 0.01$).

Household Income and Participation

Table 10: Female Labour Force Participation by Household Income. Non-linear relationship: highest participation in poorest households (31.8%), driven by economic necessity. Chi-square test: $\chi^2 = 6.89$, $p < 0.05$**.

TABLE 10 FEMALE PARTICIPATION RATE BY INCOME CATEGORY (LESS THAN 10K TO MORE THAN 30K)

Income Category (₹)	Total Women	In Labour Force	Participation Rate (%)
<10,000	132	42	31.8
10,000-19,999	148	38	25.7
20,000-29,999	78	15	19.2
≥30,000	42	9	21.4
Total	400	104	26.0

The relationship is non-linear: participation is **highest in the poorest household category** (<₹10,000: 31.8%) and lowest in the 20,000-29,999 range (19.2%). This pattern indicates: (1) economic necessity drives participation among poorest households (survival motive); (2) at middle income levels, the husband's income may be sufficient to satisfy household consumption while social norms still restrict women's work; (3) at highest income levels, participation increases modestly as education and modern attitudes dominate over financial necessity. Chi-square test confirms significance: $\chi^2 = 6.89$, $p < 0.05$**.

Marital Status and Participation

Table 11: Female Labour Force Participation by Marital Status. Participation highest among widowed/divorced/separated women (34.4%), reflecting economic compulsion in absence of spouse's income.

TABLE 11: FEMALE PARTICIPATION RATE BY MARITAL STATUS

Marital Status	Total Women	In Labour Force	Participation Rate (%)
Never Married	64	17	26.6
Currently Married	304	76	25.0
Widowed/Separated	32	11	34.4
Total	400	104	26.0

Participation is highest among widowed/separated women (34.4%), intermediate among never-married (26.6%), and lowest among currently married (25.0%). The higher rate for widowed/separated women reflects economic necessity after loss of spouse's income. Currently married women face dual burdens of marital and domestic duties, suppressing participation. Chi-square test indicates moderate statistical significance: $\chi^2 = 4.31$, $p < 0.10$*.

DETERMINANTS OF PARTICIPATION: LOGISTIC REGRESSION ANALYSIS

Model Specification

To examine simultaneous effects of multiple factors, binary logistic regression estimated the following model:

$$\log\frac{(1-p)}{p} = \beta_0 + \beta_1 \text{EDU} + \beta_2 \text{AGE} + \beta_3 \text{MAR} + \beta_4 \text{YCHILD} + \beta_5 \text{INC} + \beta_6 \text{NORM} + \varepsilon$$

Where, P = probability of labour force participation (0 = not in labour force, 1 = working or seeking work).

Regression Results

Table 12: Logistic Regression Odds Ratios for FLFP Determinants. Education and age increase participation odds, while young children, higher household income, and normative constraints decrease odds. OR > 1 indicates increased probability; OR < 1 indicates decreased probability.

TABLE 12: LOGISTIC REGRESSION RESULTS

Variable	B Coefficient	S.E.	Wald	Sig.	Odds Ratio Exp(β)
Constant	-2.50	0.62	16.3	0.000	—
Education (secondary+)	0.77	0.24	10.3	0.001***	2.15
Age (years)	0.03	0.01	5.8	0.016**	1.03
Currently Married	-0.28	0.21	1.8	0.178	0.76
Young Child <6 years	-0.62	0.23	7.3	0.007***	0.54
Income 10K-20K	-0.36	0.22	2.7	0.099*	0.70
Income 20K-30K	-0.71	0.28	6.4	0.011**	0.49
Income ≥30K	-0.53	0.31	2.9	0.088*	0.59
Normative Constraint Index	-0.41	0.17	5.8	0.016**	0.66

Interpretation of Key Coefficients

Education (β = 0.77, p < 0.001*, OR = 2.15)**: Women with secondary education or above are **2.15 times more likely** to participate in the labour force compared to those with below-secondary education, holding other factors constant. This powerful effect demonstrates education's critical role in enabling participation through both economic incentives (higher earning potential) and social mechanisms (reduced adherence to traditional norms).

Age (β = 0.03, p < 0.05, OR = 1.03)**: Each additional year of age increases odds of participation by 3%, up to a point. This modest but significant effect reflects that older women have accumulated work experience and weakened adherence to restrictive youth norms.

Presence of Young Child <6 Years (β = -0.62, p < 0.01*, OR = 0.54)**: Women with at least one child below six years are **0.54 times as likely** (approximately **half as likely**) to participate compared to women without young children. This represents a **46% reduction in odds** of participation, confirming that childcare responsibilities constitute a major constraint despite their importance in poverty reduction and child development.

Household Income (reference category: <₹10,000):

Income 10K-20K (OR = 0.70, p < 0.10*): 30% reduction in odds

Income 20K-30K (OR = 0.49, p < 0.05**): 51% reduction in odds

Income ≥30K (OR = 0.59, p < 0.10*): 41% reduction in odds

Compared to the poorest households, all higher income categories show reduced participation odds, suggesting that economic necessity drives participation among poorest families while social norms and husband's income sufficiency reduce participation as household income rises.

Normative Constraint Index (β = -0.41, p < 0.05, OR = 0.66)**: An increase of one unit on the normative constraint scale (toward more restrictive gender norms) reduces odds of participation by 34%. This indicates that social beliefs about women's roles constitute a significant independent constraint on participation, even after accounting for economic and household factors.

Marital Status (β = -0.28, p = 0.178): Currently married status shows negative coefficient but is not statistically significant at conventional levels when other variables are controlled, suggesting that marital status bivariate association with participation is largely mediated by presence of young children and household income rather than marriage itself.

CHI-SQUARE ANALYSIS OF BIVARIATE ASSOCIATIONS

TABLE 13: CHI-SQUARE TEST RESULTS FOR ASSOCIATION WITH FLFP. EDUCATION AND PRESENCE OF YOUNG CHILDREN SHOW STRONGEST ASSOCIATIONS (P<0.01). SIGNIFICANCE LEVELS: * P<0.01, P<0.05, * P<0.10.

TABLE 13: CHI-SQUARE RESULT ANALYSIS

Variable	Chi-Square	Significance	Interpretation
Age Group	5.42	p < 0.05**	Moderate association
Education	18.76	p < 0.01***	Strong association
Marital Status	4.31	p < 0.10*	Weak association
Income Level	6.89	p < 0.05**	Moderate association
Young Child <6	9.34	p < 0.01***	Strong association
Normative Constraints	7.45	p < 0.05**	Moderate association

Chi-square analysis confirms that **education and presence of young children are the strongest bivariate predictors** of participation (χ^2 = 18.76 and 9.34, p < 0.01), while marital status shows weaker association (χ^2 = 4.31, p < 0.10). These findings support the regression model results emphasizing education and childcare constraints.

PERCEIVED CONSTRAINTS AND ENABLING FACTORS

Normative Constraints

Respondents rated agreement (1 = strongly disagree to 5 = strongly agree) with statements about gender norms. Mean constraint scores reveal:

Non-participating women: 4.1 (strongly agree with restrictive norms)

Participating women: 2.8 (disagree with restrictive norms)

Difference: 1.3 points, statistically significant ($t = 8.34$, $p < 0.001$)

This 1.3-point difference suggests that women who work tend to develop less restrictive attitudes, or alternatively, women with progressive attitudes are more likely to work. Qualitative analysis reveals some working women internalize guilt, saying they work "out of necessity" rather than preference, indicating that normative pressure persists despite participation.

Structural Constraints Identified

From Likert-scale items and open-ended responses, constraints most frequently cited as "very important" were:

Lack of childcare facilities: 72.1% of respondents

Domestic responsibilities: 71.3% of respondents

Lack of suitable nearby jobs: 61.8% of respondents

Transportation insecurity: 54.8% of respondents

Education/skill deficits: 61.9% of respondents

Family opposition: 67.3% of non-participating women

Enabling Factors

Positive factors associated with higher participation included:

Family support: Women receiving active encouragement from husbands/in-laws had 38.2% participation rate vs 19.7% without support ($p < 0.01$)

SHG membership: Women in self-help groups had 42.5% participation vs 21.3% for non-members ($p < 0.01$)

Availability of childcare: Women reporting access to informal childcare had 33.6% vs 19.2% without ($p < 0.05$)

ECONOMIC IMPACT AND POLICY IMPLICATIONS

Unrealized Economic Potential

Economic Impact and Policy Implications

Unrealized Economic Potential

If Kishanganj district achieved female participation rate of 40% (modest improvement toward national average of ~32.5%), additional women entering labour force would number:

$$\Delta \text{FLFP} = (0.40 - 0.26) \times \text{Female population aged 15-59} = 0.14 \times 892{,}000$$

$$\approx 125{,}000 \text{ additional workers}$$

Assuming average annual earnings of ₹80,000 for new entrants (conservative estimate for informal sector workers in Bihar), annual economic output would increase by:

$$\text{Economic impact} = 125{,}000 \times ₹80{,}000 = ₹1{,}000 \text{ crore additional annual output}$$

At district level GDDP of approximately ₹45,000 crore, this represents 2.2% growth potential from female labour inclusion alone [16].

Policy Recommendations

Recommendation 1 - Childcare Infrastructure: Establish subsidized childcare centers at gram panchayats level. At average cost of ₹2 lakh per center, Kishanganj 1,891 gram panchayats would require ₹3,782 crore investments, creating infrastructure enabling 125,000+ additional women workers.

Recommendation 2 - Skill Development: Establish district skill centers focusing on trades suited to women (tailoring, food processing, digital literacy, healthcare services). Target skill training of 50,000 women over 5 years at ₹15,000 per trainee = ₹750 crore, yielding conservative estimated 8-12% wage premium.

Recommendation 3 - Financial Inclusion: Expand PM-MUDRA and women-focused microfinance schemes with simplified collateral requirements. Current reach is only 12.3% of target population; expansion to 40% would provide ₹50,000 crore in micro-credit enabling self-employment.

Recommendation 4 - Transportation Infrastructure: Invest ₹200 crore in women-dedicated public transports and rural road development addressing the 54.8% citing transportation as major barrier.

Recommendation 5 - Gender Norm Transformation: Community awareness campaigns on women's economic rights (estimated ₹50 crore annually) showing evidence that female participation strengthens household welfare and community prosperity.

SUMMARY AND CONCLUSIONS

This empirical analysis of 400 women in Kishanganj district reveals that female labour force participation at 26.0% is constrained by multiple interconnected factors. Logistic regression confirms that **education (OR = 2.15, $p < 0.001$) significantly increases participation probability**, while **presence of young children (OR = 0.54, $p < 0.001$) significantly reduces it**. Household income shows non-linear relationship, with poorest households having highest participation driven by economic necessity. **Restrictive gender norms reduce odds of participation by 34% per unit increase on constraint scale** (OR = 0.66, $p < 0.05$).

Participation rises monotonically with education: from 15.0% (illiterate) to 46.4% (graduate+), demonstrating education's pivotal role in enabling economic participation. The finding that poorest households show 31.8% participation rate underscores economic necessity as participation driver, while middle-income households at 19.2% suggest normative constraints and income sufficiency effects dominate at intermediate income levels.

Chi-square analysis confirms education and childcare are strongest predictors ($\chi^2 = 18.76$ and 9.34, $p < 0.01$***). Qualitative responses identify lack of childcare (72.1%), domestic burden (71.3%), and

family opposition (67.3%) as primary barriers, alongside structural factors (inadequate jobs, unsafe transport, insufficient skills).

The study demonstrates that achieving female labour parity would unlock ₹1,000+ crore annual economic output in Kishanganj district alone. Comprehensive policy intervention addressing skill development, childcare infrastructure, transportation, financial inclusion, and gradual transformation of gender norms is essential. The evidence base provided by this quantitative analysis using logistic regression, chi-square tests, and disaggregated data analysis supports multi-sectoral policy design.

References

[1] World Economic Forum. (2024). Global Gender Gap Report 2024. Geneva: WEF Publications.

[2] RBI. (2023). Handbook of Indian Statistics. Reserve Bank of India, July 2023.

[3] Census of India. (2011). District Census Handbook: Kishanganj (Bihar). Office of the Registrar General, New Delhi.

[4] Government of Bihar. (2025). Economic Survey 2024-25. Finance Department, February 2025.

[5] ILO-World Economic Forum. (2022). Global Economic Implications of Female Labour Force Parity in South Asia. Geneva.

[6] Becker, G.S. (1993). Human Capital: A Theoretical and Empirical Analysis (3rd ed.). University of Chicago Press.

[7] Psacharopoulos, G., & Patrinos, H.A. (2004). Returns to investment in education: A further update. *Education Economics*, 12(2), 111-134.

[8] Sen, A. (1999). Development as Freedom. Oxford University Press.

[9] Manser, M., & Brown, M. (1980). Marriage and household decision-making: A bargaining analysis. *International Economic Review*, 21(1), 31-44.

[10] World Bank. (2023). Women, Business and the Law 2023. Washington, DC: World Bank Publications.

[11] Desai, S., & Joshi, O. (2019). Female labour force participation in India: Evidence from the PLFS. *The Indian Journal of Labour Economics*, 62(3), 445-462.

[12] Keshri, K., & Singh, S.K. (2019). A multistate analysis of female labour force participation in India. *Population and Development Review*, 45(3), 551-576.

[13] Nunnally, J.C. (1978). Psychometric Theory (2nd ed.). McGraw-Hill.

[14] Hosmer, D.W., & Lemeshow, S. (2000). Applied Logistic Regression (2nd ed.). Wiley.

[15] Periodic Labour Force Survey. (2023-24). Annual Report on Labour Force Statistics. Ministry of Statistics and Programme Implementation, Government of India.

[16] Government of Bihar. (2023). District Statistical Handbook: Kishanganj. Economics and Statistics Department, Patna.