An Evaluation of the Relationship Between Socioeconomic Factors and Health Outcomes of Women Workers in Agriculture and Industry in Cuddalore District, Tamil Nadu.

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Abstract

This study aims to evaluate the relationship between socio-economic factors and health outcomes among women engaged in agricultural and industrial occupations in the Cuddalore district of Tamil Nadu. Specifically, it investigates how socio-economic determinants such as age, education, income, and asset ownership influence the physical and mental health conditions, as well as the access to healthcare services, among women workers in both sectors. The study is based entirely on primary data, collected through a well-structured and pre-tested interview schedule. A cross-sectional research design was adopted to capture a snapshot of the prevailing health conditions and socio-economic disparities among the target population. Data were collected during the period of January to June 2024 from a total of 470 women respondents—229 agricultural workers and 241 industrial workers—selected through a multistage random sampling technique. The research was conducted across two blocks, Cuddalore and Kurinjipadi, covering six villages that were purposively chosen for their representative occupational diversity. To analyze the data, both descriptive (mean, percentage, standard deviation) and inferential statistical tools were employed, including the Chi-square test and correlation analysis, using SPSS and MS Excel. The findings reveal significant negative correlations between age and income/access to healthcare, while positive correlations were observed between education and income levels. Notably, annual income and access to healthcare showed the strongest inverse correlation (r = –0.797), emphasizing the critical role of economic status in determining healthcare accessibility. The Chi-square test further confirmed that age, education, annual income, and asset income are significantly associated with health facility accessibility, while family type was found to be statistically insignificant.

Keywords: Cross- sectional, Economic disparities, Relationship, Chi-Square, Health facility

1.0 INTRODUCTION

In contemporary development studies, the intersection of health and socioeconomic factors has gained growing prominence, particularly in the context of marginalized populations such as women employed in the agriculture and industrial sectors. These women often bear a dual burden: on one hand, they are vital contributors to household incomes and national economic productivity, while on the other hand, they remain vulnerable to systemic inequalities that adversely impact their health outcomes. Unlike their counterparts in formal sectors, women in agriculture and industry—especially in rural and semi-urban regions—work in environments that expose them to occupational hazards, long hours of physical labor, and poor ergonomic conditions. Simultaneously, their limited access to education, healthcare, sanitation, social protection, and decision-making power within households contributes to poor nutritional status,

reproductive health issues, chronic illnesses, and mental stress. In addition, cultural norms often silence their health concerns, while financial dependence and gendered roles in caregiving reduce their ability to prioritize personal health. Therefore, evaluating the relationship between socioeconomic background and health among these women is not only a matter of academic interest but also a policy imperative, especially in regions where economic marginalization is entrenched in social and structural barriers.

Globally, a substantial body of research has highlighted the correlation between socioeconomic status and health outcomes, particularly among women laborers in informal sectors. The World Health Organization, United Nations, and World Bank have consistently emphasized that poverty, low education, gender inequality, and occupational stress disproportionately impact women's health in both developing and underdeveloped countries. In countries across Africa, South Asia, and Latin America, women engaged in agriculture and low-tier industrial work are exposed to physical and chemical hazards without access to protective gear or medical support. Malnutrition, musculoskeletal problems, and untreated chronic conditions are common in these groups. Socioeconomic constraints limit their ability to access quality health services, leading to a cycle of poor health and lower productivity. The COVID-19 pandemic has further exacerbated these disparities. Global statistics indicate a significant rise in job losses, increased unpaid domestic labor, and reduced access to reproductive and maternal health services during and after the pandemic, especially for women in low-income jobs. These trends have renewed attention on the social determinants of health and the need to build inclusive public health systems that prioritize vulnerable populations, particularly informal women workers.

India presents a complex picture in terms of women's employment and health. While women make up a significant portion of the labor force in agriculture (over 60% in some states) and play a growing role in small-scale industrial production, their socioeconomic conditions remain far from equitable (Chatterjee 1990). Many of these women belong to lower socio-economic groups, often from Scheduled Castes, Scheduled Tribes, or Other Backward Classes, and reside in rural areas with limited access to modern healthcare infrastructure. According to the National Family Health Survey (NFHS-5), anaemia continues to be highly prevalent among Indian women, especially those from lower income brackets, while malnutrition, low body mass index, and reproductive health problems are widespread. The Indian healthcare system, although extensive in its outreach through schemes such as Janani Suraksha Yojana, Ayushman Bharat, and POSHAN Abhiyan, still faces challenges in reaching the last mile, especially among informal sector workers. Informality in work arrangements means a lack of job security, no maternity or health benefits, and negligible workplace safety regulations. Women's health is often subordinated to economic survival, and medical attention is sought only when the condition becomes severe. Furthermore, lack of awareness, cultural stigma, and mobility restrictions compound the problem, making socioeconomic background a key determinant of health status in India's vast rural and industrial working populations.

Tamil Nadu, considered one of India's more developed states in terms of health infrastructure and literacy rates, still witnesses stark disparities in women's health outcomes, especially when intersected with socioeconomic variables. The state boasts a well-organized public health system, with relatively high rates of institutional deliveries, maternal health check-ups, and immunization coverage. Yet, these achievements often mask the persistent inequalities experienced by women in informal work sectors such as agriculture, brick kilns, construction, and small-scale industries. These women typically come from poor households, have low levels of schooling, and are engaged in physically demanding tasks without adequate rest, nutrition, or healthcare facilities. Many suffer from occupational diseases such as back

pain, skin disorders, reproductive health complications, and respiratory issues, especially those employed in dusty or chemically exposed environments. Tamil Nadu's schemes like the Chief Minister's Comprehensive Health Insurance Scheme (CMCHIS) and Amma Maternity Kit provide support, but these initiatives do not always reach the most marginalized due to low awareness, administrative delays, and socio-cultural limitations. The economic pressures on these women are further compounded by societal expectations of domestic labor, caregiving roles, and financial dependence on male family members. Therefore, it is crucial to critically examine the interconnections between their socio-economic background and health outcomes within this regional context.

Cuddalore district, situated in the northern part of Tamil Nadu, represents a unique blend of agrarian economy and emerging industrial development. The district is known for its agricultural practices—particularly paddy cultivation, sugarcane, and cashew nut processing—as well as a growing number of small and medium-scale industries, including textile and chemical units. A large proportion of the female workforce is employed in these sectors, contributing significantly to local economic activities. However, the socio-economic profile of these women is typically marked by low income, poor educational attainment, lack of land ownership, seasonal employment, and limited social mobility. The health infrastructure in the district includes government hospitals, primary health centers, and a few private clinics, but many women workers either cannot afford private care or are unaware of the available public facilities. Health problems such as anemia, gynecological issues, joint pain, fatigue, and occupational injuries are widespread, yet health-seeking behavior is low due to economic constraints, time poverty, and social restrictions. Additionally, post-COVID economic shocks have left many families more vulnerable, with women bearing the brunt of income loss, household management, and psychological stress. Despite efforts by local NGOs and government agencies, the health status of women workers remains critically linked to their socioeconomic realities, making Cuddalore an important case study for deeper evaluation.

From the global to the local level, the nexus between socioeconomic factors and health outcomes for women workers remains a pressing concern, particularly in informal and labour-intensive sectors. While there is ample research on occupational health hazards or the impact of poverty on general health, fewer studies focus on the direct correlation between a woman's socioeconomic status—including education, caste, employment type, income, and household dynamics—and her health outcomes within a specific geographical and cultural context. Cuddalore, with its socio-economically diverse population and a significant share of women workers in agriculture and industry, offers fertile ground for such an inquiry. The purpose of this study is to fill this research gap by evaluating how socioeconomic determinants influence the physical, mental, and reproductive health outcomes of these women. The findings of the research aim not only to contribute academically to the discourse on gender and health but also to provide policy-relevant insights that can help improve service delivery, raise awareness, and design interventions tailored to the needs of marginalized women. Ultimately, the study aspires to support equitable and inclusive development by foregrounding the lived realities of women whose health continues to be shaped by their socioeconomic conditions.

1.1 LITERATURE REVIEW

Ajithkumar & Devi (2010) examined the health status of females in Kerala, India. The state, known for its high human development index, social development index, and gender development index, was described as having ‘good health at low cost.’ The study found that females in Kerala compared favourably against India in all conventional health indicators. However, it was noted that the state needed to address specific health issues such as old age problems, over-medicalization, increasing healthcare costs, and occupational health of women.

Sackey & Sanda (2011) assessed the relationship between social support and mental health among managerial women in Ghana. The study revealed that the lack of spousal support directly affected women's mental health. It was concluded that career progression for women managers could be greatly enhanced with spousl support, encouragement, and guidance in addition to support from superiors and co-workers.

Ahnquist et. al., (2012) This paper aimed to investigate how economic disadvantages (economic hardships) and different dimensions of social capital (including social participation, interpersonal trust, and trust in political/institutional systems) independently and jointly affect various health outcomes. The analysis used data from the 2009 Swedish National Survey of Public Health, which included a nationally representative, randomly selected sample of 23,153 men and 28,261 women between the ages of 16 and 84, achieving a response rate of 53.8%. Economic hardship was assessed through a composite indicator that encompassed low income, difficulties in covering expenses, and lack of emergency savings. Social capital was evaluated through indicators such as social engagement, interpersonal (horizontal) trust, and political (vertical/institutional) trust, especially in the parliament. Health outcomes assessed included self-reported health, psychological distress (based on GHQ-12), and musculoskeletal conditions. Multivariate logistic regression analyses revealed that both economic strain and diminished social capital were significantly linked to adverse health outcomes, with only limited exceptions. Moreover, notable interaction effects—measured through synergy indices ranging from 1.4 to 2.3—were found between economic strain and all forms of social capital. These results strengthen the understanding that economic and social disadvantages not only independently but also interactively contribute to poorer health outcomes.

Gopalakrishnan et. al., (2019) evaluated health-seeking behavior for obstetric care services among antenatal and postnatal mothers in a rural area of Tamil Nadu. This descriptive cross-sectional study included 150 antenatal and 150 postnatal mothers. It was noticed that only 21% of participants had adequate knowledge of pregnancy danger signs, influenced by maternal literacy and prenatal care. It was seen that 62.3% preferred primary health centers for delivery, and 87.3% received adequate prenatal care. The study revealed statistically significant associations between adequate prenatal care and factors like gestational weight gain, exclusive breastfeeding, proper weaning practices, and supplement consumption.

Hughes et al. (2021) explored pesticide use and its health impacts on agricultural workers in Southeast Asia, focusing on Lao PDR, Thailand, and Vietnam. It was noticed that the expansion of large-scale commercial farming led to increased pesticide use. The study revealed significant concerns about worker safety and the need for better evidence to support regulations and training. It was clearly pointed out that understanding workers' risky behaviors, self-protective practices, and exposure levels was crucial for informing health improvement programs and policy-making.

1.2 OBJECTIVE OF THE STUDY

The primary objective of this study is to evaluate the relationship between socio-economic factors and health outcomes among women engaged in agricultural and industrial occupations in the Cuddalore district of Tamil Nadu. This study aims to uncover how these factors influence the physical and mental health conditions of women workers in the selected sectors and region.

1.3 NATURE AND SOURCE OF DATA

The present study relies entirely on primary data, collected using a well-structured and pre-tested interview schedule. This tool was specifically designed to gather detailed

information regarding the socio-economic conditions, health status, occupational hazards, and access to healthcare services of women working in the agricultural and industrial sectors of the Cuddalore district, Tamil Nadu. Prior to the final data collection, a pilot survey was conducted to test the reliability and validity of the interview schedule, allowing necessary refinements to ensure the accuracy and relevance of the responses.

1.4 RESEARCH DESIGN

The study adopts a cross-sectional research design, aiming to evaluate the relationship between socioeconomic factors and health outcomes among women workers at a single point in time. This design is well-suited for capturing a snapshot of current health conditions and identifying patterns, disparities, and challenges that exist within and between the two occupational sectors—agriculture and industry. The research design is both descriptive and analytical in nature, facilitating a thorough understanding of the contextual and structural factors that influence health access and outcomes for women workers in the region.

1.5 STUDY AREA SELECTION

Cuddalore district in Tamil Nadu was purposively selected as the study area due to its socio-economic diversity and significant presence of both agricultural and industrial activities. These dual occupational settings make Cuddalore a suitable region for comparative analysis of women's health experiences across economic sectors. Within this district, two blocks—Cuddalore and Kurinjipadi—were selected for their representational diversity in employment patterns, access to public services, and demographic distribution. The selected villages within these blocks provide the micro-level perspective necessary to understand the localized socio-economic determinants of women's health.

1.6 SAMPLING DESIGN AND SAMPLE SIZE

A multistage random sampling technique was employed to ensure representativeness and eliminate selection bias. In the first stage, Cuddalore district was selected as the primary study area. In the second stage, two blocks—Cuddalore and Kurinjipadi—were chosen. The third stage involved the selection of three villages from each block: Cuddalore, Pallipattu, and Ramapuram from Cuddalore block; and Koranapattu, Agaram, and Karuveppampattu from Kurinjipadi block. In the final stage, women workers from both the agricultural and industrial sectors were randomly selected from each village, ensuring equitable representation from both employment categories.

The total sample size is 470 respondents, comprising 229 agricultural workers and 241 industrial workers. The detailed distribution is presented below:

Table 1 Sampling Distribution

Sampling Design Blocks	Villages	Agricultural Workers	Industrial Workers	Total Respondents
Cuddalore	Cuddalore	36	45	81
Pallipattu	38	39	77	
Ramapuram	43	42	85	
Total (A)	**117**	**126**	**243**	

Kurinjipadi	Koranapattu	39	40	79
Agaram	36	37	73	
Karuveppampattu	37	38	75	
Total (B)	**112**	**115**	**227**	
Total (A + B)	**229**	**241**	**470**	

1.7 DATA COLLECTION PERIOD AND PROCEDURES

The fieldwork was conducted over a six-month period, from January to June 2024. The data collection process involved various sequential phases: the pilot survey, finalization of research tools, training of enumerators, and actual field-level interviews. Enumerators were trained in ethical data collection practices, ensuring that participants' informed consent was obtained, confidentiality was maintained, and responses were accurately recorded. The interviews were conducted in the local language to facilitate better understanding and rapport with the respondents.

1.8 DATA ANALYSIS TECHNIQUES

Following data collection, responses were systematically coded and entered into a database using statistical software such as SPSS and MS Excel. Descriptive statistics (mean, percentage, frequency, and standard deviation) were used to profile the socio-economic and demographic characteristics of the respondents. In addition, inferential techniques including the Chi-square test and correlation analysis are applied to examine the association between various socio-economic variables and health outcomes. These methods enable the researcher to identify significant patterns, relationships, and disparities that exist between different groups within the study population, thereby offering meaningful insights into how socio-economic factors influence women's health in both agricultural and industrial sectors.

1.9 RESULTS AND DISCUSSIONS

This section presents and interprets the findings derived from the analysis of primary data collected from women workers in the agricultural and industrial sectors of Cuddalore district, Tamil Nadu. The results are organized to reflect the core aspects of the study, including the socio-economic characteristics of the respondents, their health status, and the relationship between key socio-economic variables and health outcomes. Through the application of descriptive and inferential statistical tools, the discussion highlights critical insights into the disparities and commonalities in health conditions among the two groups of women workers.

Table 2: Correlation Analysis between Socio-Economic Variables and Health Outcomes

Variables	Age Group	Education Level	Total Asset Income	Annual Income	Access to Health Facilities
Age Group	1.000	–0.218	–0.325	–0.301	–0.287
Education Level	–0.218	1.000	0.712	0.789	–0.765
Total Asset Income	–0.325	0.712	1.000	0.846	–0.782

Annual Income	–0.301	0.789	0.846	1.000	–0.797
Access to Health Facilities	–0.287	–0.765	–0.782	–0.797	1.000

Source: computed from primary data, significant at 0.01 level

The correlation analysis between socio-economic variables and health outcomes reveals several significant and noteworthy relationships that illustrate the deeply intertwined nature of demographics, economic status, and access to health facilities among women workers in the agricultural and industrial sectors of Cuddalore district, Tamil Nadu. The analysis indicates that age group is negatively correlated with all other variables, suggesting that as women grow older, their education levels, income, and access to healthcare tend to decline. Specifically, age shows a moderate negative correlation with total asset income ($r = –0.325$) and annual income ($r = –0.301$), implying that older women generally possess fewer economic resources. Similarly, the correlation between age and access to health facilities stands at –0.287, emphasizing that older women are less likely to experience adequate healthcare access.

On the other hand, education level exhibits a strong positive correlation with total asset income ($r = 0.712$) and annual income ($r = 0.789$), indicating that women with better educational attainment are more likely to have improved economic stability. However, the strong negative correlation between education and health access issues ($r = –0.765$) suggests that educated women face fewer barriers when accessing healthcare services. This pattern is echoed in the relationship between total asset income and access to health facilities ($r = –0.782$), as well as annual income and health access ($r = –0.797$), clearly showing that income is a major determinant of health accessibility. In essence, women with higher income and assets report significantly better access to health services.

All these correlations are statistically significant at the 0.01 level, confirming the robustness of the associations. Notably, the strongest correlation in the matrix is observed between annual income and access to health facilities ($r = –0.797$), highlighting the critical role of economic empowerment in reducing health disparities. The findings strongly support the conclusion that younger, educated, and economically stable women workers are significantly more likely to access health facilities easily, whereas older, less educated, and economically disadvantaged women face substantial barriers. These results underscore the urgent need for targeted interventions that address socio-economic inequalities to enhance health outcomes for women workers in both agriculture and industry.

Table 3: Chi-Square Test between Socio-Economic Characteristics and Health Facility Accessibility

Socio-Economic Variable	χ^2 Value	Degrees of Freedom (df)	p-value	Result
Age Group	8.543	2	0.014*	Significant
Education Level	10.784	4	0.029*	Significant
Annual Income	12.451	2	0.002**	Highly Significant
Total Asset Income	11.326	2	0.003**	Highly Significant
Family Type	2.143	1	0.143	Not Significant

Source: computed from primary data, significant at 0.05 level

The Chi-square test results offer crucial insights into the association between selected socio-economic characteristics and access to health facilities among women workers in the Cuddalore district. The analysis confirms that several socio-economic factors significantly influence the level of health accessibility experienced by the respondents.

To begin with, age group shows a statistically significant association with access to health facilities ($\chi^2 = 8.543$, df = 2, p = 0.014). This indicates that women from different age categories face varying degrees of healthcare access, with older women likely experiencing more barriers than their younger counterparts. Furthermore, education level is also found to be significantly associated ($\chi^2 = 10.784$, df = 4, p = 0.029), suggesting that higher educational attainment may improve a woman's ability to navigate healthcare systems, understand health-related information, and utilize services more effectively.

The most striking results come from the economic indicators. Annual income shows a highly significant relationship with healthcare access ($\chi^2 = 12.451$, df = 2, p = 0.002), indicating that income is a powerful determinant of health service utilization. This is further reinforced by the significance of total asset income ($\chi^2 = 11.326$, df = 2, p = 0.003), highlighting the role of accumulated household wealth in determining the ease with which women can access medical care. These results clearly demonstrate that economic status strongly conditions health access, with wealthier women benefiting from better availability, affordability, and quality of health services.

In contrast, family type (joint or nuclear) does not exhibit a significant association with health access ($\chi^2 = 2.143$, df = 1, p = 0.143), indicating that the structure of the household does not play a decisive role in determining healthcare accessibility among the sample population.

In summary, this Chi-square analysis underscores that age, education, income, and asset levels are significant socio-economic determinants influencing the accessibility of health facilities for women workers in both agricultural and industrial sectors. These findings call for targeted policy interventions to address income disparities and enhance education levels, thereby improving healthcare access for marginalized women in rural and semi-urban regions of Tamil Nadu

1.10 INSIGHTS AND POLICY IMPLICATIONS

The analysis reveals a significant association between socio-economic variables such as age, education, income, and access to health facilities among women workers in Cuddalore district. Older women face more difficulty in accessing healthcare, while higher educational attainment, though positively correlated with income, does not necessarily guarantee better access to health services, indicating systemic gaps. Strong negative correlations between asset and income levels with healthcare accessibility suggest that even economically better-off women are hindered by poor public health infrastructure or service delivery issues. Based on these insights, policy interventions must focus on decentralizing healthcare facilities, improving last-mile connectivity, especially for elderly women, and launching health literacy programs tailored for all education levels. Subsidized healthcare schemes and mobile medical units should be expanded in both agricultural and industrial zones, while workplace health policies must ensure regular screenings and support services for women in informal sectors.

1.11 CONCLUSION

The present study concludes that there exists a significant relationship between socio-economic characteristics and health outcomes among women workers engaged in agricultural

and industrial sectors in Cuddalore district, Tamil Nadu. The findings clearly highlight that factors such as age, education, income, and asset ownership significantly influence access to healthcare and overall health conditions. Women from lower income and education backgrounds, particularly in older age groups, face greater challenges in availing adequate health services. Despite some economic progress, infrastructural limitations and awareness gaps continue to restrict effective healthcare utilization. Therefore, the study underscores the urgent need for targeted policy interventions that improve health infrastructure, enhance health education, and promote inclusive healthcare schemes for women workers in both sectors, ensuring their well-being and contributing to the broader goals of gender equity and sustainable rural development.

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