STRUCTURAL DETERMINANTS OF HEALTHCARE: PANIYA WOMEN IN KERALA

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KEYWORDS

Paniya women, Healthcare access, Structural determinants, Tribal health, Reproductive health.

ABSTRACT

Background:-The Paniya tribal community, a marginalized group in Kerala (Wayanad), faces significant health disparities due to socio-economic and cultural barriers. Tribal women in particular experience heightened vulnerability in accessing healthcare services, which is further compounded by limited infrastructure, inadequate awareness, and systemic inequalities. This study explored the structural determinants influencing healthcare access, reproductive health practices, and the prevalence of diseases among Paniya tribal women in Wayanad district, Kerala, South India. **Methods:-**A cross-sectional study was conducted among 1205 Paniya tribal women aged 18–90 years residing in WayanadDistrict of Kerala. A multistage random sampling technique was employed to select the participants. Data was collected using a pretested structured interview schedule, capturing socio-demographic characteristics, maternal and reproductive health details, availability of medical facilities in tribal colonies, prevalence of communicable and chronic diseases, and healthcare-seeking behavior. The data was analyzed using SPSS software. Descriptive statistics such as frequencies and percentage were used to summarize the findings. Chi-square test was conducted to determine the associations between the key variables and healthcare access or utilization patterns. ANOVA, Linear Regression, Correlation and Coefficient values were calculated.**Results:-**The majority of women respondents with reproductive age (68%), among them 63.5% of the household depend on agriculture. Economic challenges were evident, as 45% of respondents lived below the poverty line. Only 49.4% of the respondents had access to proper sanitation facilities. Traditional health practices were used by 63.6% of the women, while 52% reported limited access to modern healthcare services. A significant positive correlation ($p< 0.05$) was found between the educational level and healthcare access, while educated women being more likely to seek professional healthcare system. Additionally, women with stable income sources ($p< 0.01$) had better health outcomes and were more likely to use healthcare facilities.

Introduction

Social determinants and personal health risk factors hold decisive impact on an individual's health. The social determinants of health includes the environment in which individuals are born, raised, live, grow, receive education, work, age and the mechanisms used to address sickness. These conditions are further influenced by a broader range of factors, including politics, social policy, and economics (Commission on Social Determinants of Health, 2008).

The efforts taken by the Indian administration to enhance the health status of the indigenous population is long-standing struggle. There remains an unacceptable disparity in health status between indigenous and other populations. Indian government has recognized these disparities faced by the populations and classified it as an issue to human rights. An uneven access to

healthcare facility among the indigenous population aligns with the social determinants theory,which suggests that a variety of interrelated socioeconomic variables influence both health outcomes and inequalities within populations (Saggers, S. et al.,2007). Though the fundamental rights are theoretically equal in India, in practice, the most significant infringements (forced displacement, lack of modern skills, land right, resource exploitation, inadequate infrastructure) often affect the populations living in remote hill regions.

According to the World Health Organization (WHO), Social Determinants of Health (SDH or SDOH) encompass various conditions or circumstances related to individuals' surroundings, such as birth, growth, life, age, and employment, which can shape their daily lives. The social determinants of health include a wide range of elements related to living and working environments, such as education, poverty, food security, stress, social marginalization, and racism (Wilkinson R. et al.,2003). The WHO Commission categorizes social determinants into three main groups: structural, intermediary, and health system factors. Structural factors create social class and stratification within a society shaped by the political and economic environment of a particular place, which includes income, education, occupation, social class, gender, and race/ethnicity. Intermediary factors arequality of life and psychosocial, behavioral, and biological elements. Health system factors refer to the accessibility, quality, and affordability of health care services. The aspectsincludedare healthcare delivery, health policies, insurance coverage, and the availability of medical facilities and resources. The above mentioned factors play crucial role in shaping health outcomes as they directly affect an individual's ability to access necessary treatments and preventive care (Kruk et al.,2018; WHO, 2023). When health system factors are inadequate or inaccessible, they can lead to disparities in health outcomes, especially among marginalized or vulnerable populations, such as tribal communities (Patel et al.,2022). Therefore, addressing these factors is essential for bridging health inequalities and ensuring equitable healthcare access for all. Recent studies have highlighted the persistent health inequalities between tribal and non-tribal women in Kerala(Galhotra et al.,2024;Thomas et al.,2021; Moosanet al.,2019; Haddad et al.,2012; Mohindra et al.,2006; Haddad et al.,2011). Compared to men, women are more likely to suffer from functional limitations, depression, chronic diseases, and disabilities (Case and Paxson, 2005; Nolen-Hoeksema, 2001).

Marmot et al (2008) identified that, insufficiencies in the social determinants of healthis believed to be the primary cause of health disparities and inequalities faced by the populations and it affects the health status of both individuals and groups. Menstrual hygiene is a critical component of tribal health (Upashe S.P. et al.,2015). In India, menstruation is often viewed as a social and cultural taboo (Mittal et al.,2023;Mudi et al.,2023; Garg S. et al.,2015; Shibu et al.,2023; Mittal et al.,2023; Renupriya et al.,2017; Sajithkumar et al.,2019; Sajithkumar et al.,2020; Renupriya et al.,2016). Young girls who lack understanding and social support experience anxiety and fear, leaving them unprepared for menstruation and encouraging risky menstrual habits (Joshy et al.,2019;Renupriya et al.,2017;Sajithkumar et al.,2019;Sajithkumar et al.,2020; Renupriya et al.,2016).

Singh reported that governments have taken aninitiative to provide sanitary pads and napkins to encourage good menstrual hygiene (Singh, A. et al.,2022). However, the use, disposal, storage, and reuse practices are as important as the type of absorbent used (Hennegan, J. et al.,2020; Mittal et al.,2023; Kumari et al.,2023). Menstruation is considered as most restrictive sanitation activities, according to Hulland et al. 2015; Renupriya et al.,2017; Sajithkumar et al.,2019; Sajithkumar et al.,2020, and it is often distressing. In Kerala, menstrual cups are distributed to college students to promote environmental protection and healthy menstrual hygiene (Soumyaja, 2024). This is

particularly important for young adults or recently married women living with in-laws, where they face social stigmas related to menstruation, such as restrictions on entering certain areas in the house, cooking, or religious practices during their menstrual cycle (Renupriya et al.,2017; Paltasingh, 2014;Renupriya et al.,2015;Sajithkumar et al.,2019;Sajithkumar et al.,2012).

India is home to numerous tribes that are spread across the country (Mathew, A. et al.,2018). These tribes often reside in remote areas, are difficult to access, and have steep slopes with limited transportation. Each tribe has distinct customs, beliefs, and behaviors (Sharma, S. et al.,2020). Previous research has shown that different tribes have varying practices for managing menstruation (Deshpandeet al.,2018). Additionally, there are cultural taboos surrounding the consumption of certain foods, such as rice, curd, milk, lassi, potatoes, onions, and sugarcane, as well as restrictions on religious practices during menstruation.

While most people agree that tribal populations are among the poorest socio-economic groups in the nation (Balgir R., 2014), data on the high rates of undernutrition among children and adults in indigenous communities is available (Rao, 2005). However, the burden and trends of other ailments are not well documented (Kshatriya G., 2014). The discourse on tribal health is primarily focused on the inaccessibility of health services and the ways in which these communities seek medical attention (Balgir R., 2014; Planning Commission of Government of India, 2011). Additionally, it is still believed that most health issues among tribal populations are related to infections, while non-communicable diseases such as hypertension, cancer, diabetes, mental disorders, conditions requiring surgery, and heart diseases are assumed to be less common (Tribhuwan R.D., 2004; Rizwan et al.,2014; Muniyandi M. et al.,2013; WHO, 2010; KertkettaA.S., 2009). The study indicates that mutual reinforcement between human rights discourse and the evaluation of governmental health policies can aid in assessing the effectiveness of initiatives aimed at indigenous populations (Carson, B. et al.,2007). The poor quality of basic health infrastructure and unequal access to healthcare are significant factors that contribute to issues related to housing, food, sanitation, and overall health compared to other populations.The present study is likely to focus on the social determinant in health faced by the Paniya tribal women in Wayanad district of Kerala state, India.

Study Population

India is home to approximately 450 tribal communities collectively referred to as Scheduled Tribes (STs), which include various subgroups. In Kerala, these tribes are known by different names such as 'Adivasis,' 'Kattujathi,' 'Kattukurman,' 'Vanavasi, ' 'Girijans,' and 'Forest Dwellers' (Krishna Iyer, 1961). These communities are among the most marginalized and socially isolated groups in the country. Kerala, a small southern state of India, is home to approximately 34 tribal groups who live in the western ghats of Kerala, with the Paniya community being the largest among them (KochupurackalUlahannan, S., 2023; Mini, 2019). The term 'Adivasi' originates from the Sanskrit word meaning 'original dweller.' However, not all tribal groups in India are native to their current geographical locations, making the use of this term context-dependent (Kumar, G.S.J., 1995). Despite the diversity within tribal communities, they face common challenges such as socio-economic deprivation and limited access to health and education services. This study focuses specifically on the Paniya community in Kerala, which is recognized as one of the most disadvantaged tribal groups in the state.

Methods and Materials

The tribal communities in Kerala can be categorized into seven territorial groups: Kasaragod, Wayanad, Attappady, Nilambur, Parambikulam, Idukki, and Thiruvananthapuram, where they all

share Western Ghats (Mathur, P.R.G, 1977). According to the 2011 Census, the total tribal population in Kerala is 484,000 (4.84 lakhs), which constitutes approximately 1.45% of the state's population. Tribal populations are present across all 14 districts of Kerala, with the highest concentration in Wayanaddistrict (36% of the state's total tribal population, or approximately 114,969 individuals), followed by the Idukki district (50,269 individuals).

The study was conducted in Wayanad, Northern Kerala, South India (Sadathet al.,2022).Specifically in the taluks of SulthanBathery and Mananthavady which is situated approximately 45 km north of Kozhikode. This region was chosen for the study because of its high proportion of tribal families (ABS, 2017) and a notably higher proportion of Paniya women (39% more than non-tribal women in the area, as reported by ABS, 2017; DET, 2018). This concentration makes Wayanad a particularly relevant site for examining the healthcare challenges faced by Paniya women, permitting a more in-depth analysis of the social determinants that affect their health.

Sampling

This cross sectional study,conducted in Wayanad district of Kerala, focusing on 1205 Paniya women aged 18-49 years selected from the three taluks of the district. A multistage random sampling technique (Acharya et al.,2013) was employed to identify the samples in this study.

***Stage 1 - Selection of Scheduled Tribe*:** The Paniyatribal population was purposively selected from 11 other categories of scheduled tribes in Wayanaddistrict. This tribe comprised the highest percentage of the scheduled tribe population in the district, accounting for 45.12%. The study is focusedon the healthcare challenges faced by tribal women, the researcher chose the Paniya tribe as it represents a significant proportion of the population, allowing for comprehensive analysis.

Stage 2 - Selection of Samples:WayanadDistrict is divided into three taluks: Mananthavadi, Sulthanbathery, and Vythiri. The researcher covered all three taluks, adopting a proportionate stratified random sampling method to select 20% of the women from each taluk based on the proportion of Paniya women's population in each area. This method resulted in a total of 1360 samples being selected for data collection.

Ethicscommittee

This study was approved by the institutional Ethics Committee(reference number PU/001/IECRHC/2024-09) of the Periyar University, Salem, Tamil Nadu, India. Informed consent was obtained in the form of a thumb impression (from those who could not write or sign) or signature from all participants after the details of the study were orally explained.

Statistical analysis

Quantitative data was analyzed using statistical software (SPSS) to identify patterns and correlations for analysis. Descriptive statistics was used to obtain, do calculations, with a significance level of 5%. The chi-square test evaluated associations between identified variables. ANOVA was tested on living standard with other variables. Linear Regression was carried out to analyze age and compared it with other dependent variables; Correlationswere calculated separately for each variable such as age and monthly income.Coefficient values were calculated with diseases.Qualitative data was analyzed thematically to gain insights into the lived experiences of tribal women. The p-value of < 0.05 was considered statistically significant

Results

Table 1: Socio-demographic Characteristics of the Study Participants

Variables	Mean ± TWHS*
Age	
18-40	617±(51.1)
40-50	436(36.1)
51-60	146(12.0)
61-90	8(0.8)
Marital status	
Married	1021(84.6)
Unmarried	182(15.0)
Widow/Separated	4(0.4)
Occupation	
Agriculture/agricultural coolie	766 (63.5)
Housewife	228 (18.9)
Collection of Non-timber forest products/Animal husbandry,	192 (15.9)
Private sectors	21 (1.7)
Religion	
Hindu	331 (27.4)
Muslim	180 (14.9)
Christian	161 (13.3)
Others	535 (44.4)
Monthly income	
1500-4000	697 (5.7)
4000-6000	314 (26.1)
6500-8000	196 (16.2)
Type of house	
Hut	535 (44.3)
Tiled	186 (15.4)
Concrete	162 (13.4)
Sheet	324 (26.9)
Type of family	
Joint family	330 (27.3)
Nuclear family	729 (60.4)
Extended family	88 (7.3)
Single-parent family	60 (5.0)

Toilet facilities	
Own toilet	265 (22.0)
Common toilet	228 (18.8)
Depend on neighbour	118 (9.8)
Open defecation	596 (49.4)
Authority of family	
Patriarchal	284 (23.5)
Matriarchal	378 (31.3)
Elders	376 (31.2)
Progeny	169 (14.0)
Sources of health awareness	
Sub-center nurses	115 (9.0)
ASHA workers	275 (22.8)
Anganwaditeachers/SHGs/GramaSabha	761 (63.0)
Social media/Wall portrait/Pamphlet	56 (5.2)

*

Tribal Women's Health Status

The socio-demographic characteristics of the respondents in the current study, which provided valuable insights into the structural determinants influencing their access to healthcare is presented in **Table 1.**The age distribution, show a significant portion of the population (51.1%) falls within the age group of 18-40, underlining the critical need for reproductive and maternal health services in these communities. With a high percentage of married women (84.6%), there may be increased community support structures, although a small percentage of widows or separated women (0.4%) might face heightened social and economic vulnerabilities including stigma. The respondents rely on agriculture (63.5%), with only 1.7% having access to formal employment, reflecting the economic constraints that can limit their ability to seek medical care. This economic marginalization is further evident by low-income levels, most of the respondents earn between Rs. 1500-4000, making it difficult to afford healthcare services. Additionally, housing conditions mirror the economic limitations, with 44.3% of the women living in huts, which directly affects their access to safe and healthy sanitation and increases the risk of health-related issues. Cultural and social factors also play a role in healthcare access. While various religious communities exist, 44.4% of the population falls into the "Others" category, representing tribal or indigenous beliefs that likely shape health practices and perceptions. The data also show that 60.4% of families are nuclear, suggesting that these women may have greater autonomy in health-related decision making, although they may lack the broader support offered by extended family structures.

The concern inidentifying the respondents' sanitation practices, about 49.4% of women resort to open defecation, highlighting it as a serious gap in sanitation infrastructure that poses a significant public health risk. In terms of family dynamics, the presence of matriarchal structures in 31.3% of households indicates that women play a meaningful role in decision-making, which could potentially empower them to make choices related to health. Health awareness among these communities is primarily driven by grassroots initiatives such as Anganwadi teachers and Self-Help Groups (SHGs), about 63% of women rely on these sources. Despite this, awareness through

modern channels, such as social media, remains low, suggesting an opportunity to enhance digital literacy and expand health communication strategies. Traditional health practices continue to be important within the community, with 63.6% of respondents are forward in using herbal plants and cultural health practices positively, indicating a blend of indigenous and modern beliefs. This reliance on traditional methods can affect how communities engage with formal healthcare systems, emphasizing the need for culturally sensitive health interventions. Additionally, children's education was largely dependent on government schools (89.1%), reflecting economic constraints that limit access to private education options. Infrastructure improvements were noted, with more than half of the respondents rating facilities such as roads, electricity, water, and drainage as "Better." However, a substantial proportion still reports inadequacies, particularly in healthcare facilities, where 53.6% rate them as "Better" but 40.2% find them lacking. This discrepancy suggests persistent gaps in health care quality and accessibility.

Table 2: Maternal and Reproductive Health Issues of Paniya Tribal Women

Variables	**Sum of Squares**	**df**	**Mean Square**	**ANOVA**	***p-value***
Type of Disease	6.191	4	1.548	9.840	.00***
How many checkups have you had in your life	6.317	4	1.579	7.137	.001***
During the pregnancy period, what kind of health care system do they follow	125.807	4	31.452	29.815	.00***
For common health issues, which type of healthcare would you prefer	4.119	4	1.030	6.687	.00***
Who will make decisions about the healthcare treatment of women	18.460	4	4.615	7.385	.00***
What are the primary reasons tribal women use Indigenous healthcare practices	6.128	4	1.532	3.776	.005**
Who typically serves as the healthcare provider in Indigenous practices	31.958	4	7.989	7.096	.00***
How are Indigenous healthcare practices passed down through generations	.516	4	.129	.782	.537
During the ill condition, where did they get treatment	57.035	4	14.259	10.365	.00***

The maternal and reproductive health of Paniya tribal women, revealing several critical factors influencing their healthcare practices and preferences through statistical analysisshowsin Table 2. Type of disease exhibited significant variation, with a sum of squares of 6.191 and a p-value of .00*, indicating that the types of diseases experienced were not uniformly distributed across the population. This highlights the need for targeted health interventions to address specific health challenges prevalent within the Paniya community.

The analysis on number of checkups the respondents had in their life shows a sum of squares of 6.317 and a p-value of .00*, suggesting that the frequency of health checkups varies significantly among these women. This variability may be influenced by factors such as educational background, awareness of health issues, and accessibility to health care services, emphasizing the importance of promoting regular health checkups to improve maternal health outcomes.

At the time of pregnancy period, the analysis revealed a sum of squares of 125.807 with a p-value of .00*, indicating a strong preference for particular healthcare systems among Paniya women. This finding underscores the necessity of integrating traditional healthcare practices with modern medical services to better cater their needs and enhance maternal health.

The variable regarding for common health issues, which type of healthcare would you prefer shows a sum of squares of 4.119 and a p-value of .00*, indicating a significant preference for certain healthcare types. This preference is likely shaped by cultural beliefs, access to services, and previous experience with healthcare systems.

The respondent's ability in decision-making on healthcare and treatment, the analysis reveals that sum of squares of 18.460 and a p-value of .00*. This finding suggests that gender roles and family dynamics significantly influence healthcare decisions, highlighting the importance of understanding these factors for healthcare providers seeking to deliver effective services.

The primary reasons behind tribal women use and follow Indigenous healthcare practices indicates a sum of squares of 6.128 and a p-value of .005. This demonstrates that cultural beliefs and trust in traditional practitioners and their forefathers' ideology play an essential role in driving women's choices. Therefore, it is crucial to respect indigenous knowledge in healthcare strategies to foster a greater acceptance of health interventions.

The results regarding who typically serves as the healthcare provider in indigenous practices show a sum of squares of 31.958 and a p-value of .00*, indicating a reliance on community members for healthcare. This community-driven approach reinforces the notion that health care in tribal settings is deeply rooted in social networks and trust.

In examining how indigenous healthcare practices are passed down through generations, the analysis yields a sum of squares of .516 and a p-value of .537, suggests no significant variation in this aspect, indicating a stable transmission of these practices across generations.

Finally, the variable during the ill condition, where did they get treatment, showed a sum of squares of 57.035 with a p-value of .00*, indicating a significant diversity in treatment sources. This finding underscores the necessity for healthcare programs to accommodate the various sources of care that women use, ensuring comprehensive support that reflects their preferences and realities.

Table 3: Availability of Medical Facilities in Tribal Colonies

Variables	χ^2	*p-value*
Do you have any health center near to your Village	6.864	.551
Are you suffering from any chronic diseases	2.369	.668
Did you get affected by any diseases due to climatic conditions	12.694	.392
Taking regular health checkups in the hospital	36.277	.000***
Did you take an oil bath	1.740E2	.000***
Do you have any health insurance policies	27.185	.007
Taking any alcohol consumption to rectify your diseases	14.948	.060

The availability of medical facilities and health-related behaviors in tribal colonies, chi-square tests (χ^2) is used to evaluate the associations between several health variables and access to medical careis depicted intable 3. Statistically significant associations, indicated by p-values, help identify key health practices within these communities.

Firstly, the presence of a health center near the village ($\chi^2 = 6.864$, $p = 0.551$) and the prevalence of chronic diseases ($\chi^2 = 2.369$, $p = 0.668$) both yielded high p-values, indicating no statistically significant associations. This suggests that neither variable is strongly linked to other health behaviors or medical facility access in this population. Similarly, the occurrence of diseases influenced by climatic conditions ($\chi^2 = 12.694$, $p = 0.392$) also showed no significant association, implying that climate-related health impacts are independent of other factors studied.

In contrast, the frequency of regular health checkups in hospitals demonstrates significant association ($\chi^2 = 36.277$, $p < 0.001$), indicates a strong correlation with other health-related variables. This may suggest that routine checkups can be a prominent part of health practices followed among the tribal population. Additionally, taking oil baths ($\chi^2 = 174$, $p < 0.001$) also showed a strong association, potentially reflecting cultural practices closely intertwined with health behaviors. The presence of health insurance policies was similarly significant ($\chi^2 = 27.185$, $p = 0.007$), indicating that insurance access may influence or be influenced by other health factors.

Lastly, alcohol consumption by the respondents is a path followed by them to manage their health conditions ($\chi^2 = 14.948$, $p = 0.060$) approached significance, suggesting a potential association with health practices, though further investigation would be required due to the marginal p-value.

Table 4: Infected to Communicable or Chronic Diseases among Tribal Women

Variable	χ^2	*p-value*
Have you infected to any communicable diseases	96.669	.001***
Have you or someone you know suffering from chronicle diseases	1.223	.874

The analysis carried out on the spread of communicable and chronic diseases among the respondents, is focused on two key variables: the experience of communicable diseases and the awareness of chronic diseases within their social circlesis presentedin Table 4.

The first variable, regarding whether the respondents had experienced or undergone any communicable diseases, revealed a substantial association with a χ^2 value of 96.669 and a p-value of 0.001*. This finding indicates a significant prevalence of communicable diseases among the tribal women, suggesting that these health issues are a pressing concern within the community. This strong statistical significance implies that addressing communicable diseases should be a priority for health interventions aimed at this population.

Conversely, the second variable, which asks if the respondents or someone they know has experienced a chronic disease, yields a χ^2 value of 1.223 with a P-value of 0.874. This lack of a significant association suggests that chronic diseases may not be as prominent as recognized or experienced by women in the community, indicating either a lower incidence of chronic conditions or a lack of awareness regarding these health issues.

Table 5: Socioeconomic and Health Factors Influencing Tribal Women's Health

Variables	χ^2	*p-value*
Have a stable income source	22.633	.004
The government provides any schemes or facilities for your health	8.575	.073
Follow any traditional medicinal methods for your health issues	1.474E2	.000***
Think that education will help to improve your health practices	2.831E2	.000***
Suffer from unemployment	77.578	.000***
Face any environmental issues that affect your livelihood	79.943	.000***
Receive any welfare schemes from the government related to your health	73.195	.000***
Face any social discrimination in accessing health care services	1.079E2	.000***
Suffer from any mental health issues to social exclusion	45.253	.000***
Have any government policies related to health	2.265E2	.000***

The socioeconomic status of the respondents influences the health of tribal women, highlighting the interplay among economic stability, access to healthcare, and traditional practices areexamined inTable 5.The analysis begins with the variable of stable income sources, which shows a significant association with χ^2 value (22.633) and p-value of 0.004. This indicates that the respondents with reliable income are likely to facilitateher family with better access to healthcare services and resources.

Another critical factor is the perception of governmental health schemes, which yields a χ^2 value of 8.575 and a p-value of 0.073. Although this shows a trend towards significance, it does not reach conventional thresholds, suggesting that while some tribal women recognize the presence of government initiatives, the impact of these schemes on health remains uncertain and may require further evaluation and enhancement.

The use of traditional medicinal methods for health issues was highlighted with a χ^2 value of 147.4 and a p-value of 0.000*, indicating a strong reliance on traditional practices among tribal women. This suggests that these methods are integral to their health-seeking behaviors, and may be a vital aspect of their healthcare systems.Furthermore, the belief that education can improve health practices is supported by a χ^2 value of 283.1 and a p-value of 0.000*. This finding underscores the importance of educational initiatives to promote better health practices and awareness within the community.

In terms of socioeconomic status, the variable addressing unemployment showed a significant association ($\chi^2 = 77.578$, $p< 0.001$), indicating that unemployment severely impacts the health of tribal women, potentially due to increased stress and reduced access to healthcare resources.

Similarly, the face of environmental issues that affect livelihood had a χ^2 value of 79.943 and a p-value of 0.000*, indicating the detrimental impact of environmental factors on both health and economic stability.The receipt of welfare schemes related to health also demonstrated strong significance ($\chi^2 = 73.195$, $p<0.001$), suggesting that government interventions are crucial for improving health outcomes among tribal women.

Additionally, the analysis identifies the issue of social discrimination in accessing healthcare services, with a χ^2 value of 107.9 and a p-value of 0.000*. This indicates that societal barriers continue to hinder equitable access to healthcare, thus affecting the overall health of tribal women.Lastly, the relationship between mental health issues and social exclusion was underscored by a χ^2 value of 45.253 and a p-value of 0.000*, highlighting the psychological toll of exclusionary practices.

Table 6: Type of Healthcare approaches to Reproductive Health among Tribal Women

Variables	χ^2	***p-value***
Have you ever received any formal education on reproductive health	64.164	.000***
During the menstrual cycle, have you used napkins for your periods	1.035E2	.000***
Using napkins affects your health or creates allergies in your body	14.257	.007
Does using cloth materials instead of napkins affect your health	1.593E2	.000***
If you have undergone a c-section during delivery, does it have any adverse effects on your health	2.681	.613
Is there any special medicinal system for the delivery	10.794	.547
Face abortion	48.218	.000***
Experience any complications during delivery	1.747E2	.000***
Believe that certain foods can affect your breast milk quality	2.304E2	.000***

The various healthcare approaches related to reproductive health among tribal women, highlighting several significant associations that underscore the importance of education and

awareness in promoting better health practicespresents in Table 6. The data indicate a robust relationship between formal education on reproductive health and health outcomes, as evidenced by a χ^2 value of 64.164 and a p-value of 0.000*. This suggests that education plays a pivotal role in enhancing awareness and understanding of reproductive health, ultimately leading to improved health practices among tribal women.

Furthermore, the use of sanitary napkins during menstruation was prevalent among the participants, with a χ^2 value of 103.5 and a p-value of 0.000* indicating a strong association with reproductive health practices. This trend reflects a shift towards more modern hygiene practices, which may contribute to better health outcomes. However, there was also a notable concern regarding the health effects of using napkins, as indicated by a χ^2 value of 14.257 and a p-value of 0.007. This finding highlights the potential for allergies and other health issues associated with modern sanitary products, necessitating further investigation of safe alternatives.

In contrast, the analysis reveals that using cloth materials instead of napkins has a significant impact on health, with a χ^2 value of 159.3 and a p-value of 0.000*. This indicates that traditional practices may still play a significant role in the reproductive health of tribal women, suggesting that educational efforts should encompass both modern and traditional practices to ensure comprehensive health literacy.

The data on cesarean sections showed no significant correlation with adverse health effects (χ^2 = 2.681, p= 0.613), indicating that women may not perceive cesarean sections as problematic, or that they may not have adequate follow-up care to address potential complications. Similarly, the lack of significance for a special medicinal system for delivery (χ^2 = 10.794, p= 0.547) suggests that traditional childbirth practices may not be as prevalent or recognized within the studied population.

The incidence of abortion was significantly associated with health perceptions, as shown by a χ^2 value of 48.218 and a p-value of 0.000*. This finding indicates that facing abortion is a significant issue for many tribal women, and may require targeted interventions to provide support and counseling. Furthermore, complications during delivery were significantly correlated with health outcomes (χ^2 = 174.7, p= 0.000*), emphasizing the need for accessible healthcare services to manage the potential risks associated with childbirth.

Finally, the belief that certain foods can affect breast milk quality was also significant, with a χ^2 value of 230.4 and a p-value of 0.000*. This indicates awareness among tribal women regarding the role of nutrition in breastfeeding, and suggests that educational programs should include dietary guidance to support maternal and infant health.

Table7: Co-efficient of Correlation between Tribal Women's Healthcare Practices

Variables	Age	Marital status	Occupation	Income	Type of house
Types of ailments or conditions are commonly treated using Indigenous healthcare practices	-.199**	-.069*	.070*	.022	.439**
Perceive the effectiveness of Indigenous healthcare practices compared to modern medicine?	-.158**	.110**	.117**	.046	.280**
Diseases have you or someone you know experienced	-.062*	.075**	-.077**	-.006	-.087**
If yes what type of diseases	.022	.088**	.009	.050	.040

If yes, what type of diseases do suffer from any lifestyle	.062*	.064*	.040	-.024	-.129**

Table 7 summarizes the correlation coefficients between the health status of tribal women residing in challenging environments and their health issues. The study shows that certain ailments treated through indigenous medicinal healthcare practices have a significant correlation with age (r = -0.199**) and house type (r = -0.439**), indicating that older tribal women and those living in poor and unstable housing conditions are more likely to face health challenges. In addition, age (r = -0.158**), marital status (r = -0.110**), and house type (r = -0.117**) were significantly correlated with the effectiveness of indigenous healthcare practices when compared with modern medical treatments, suggesting that these factors reduce the success of traditional remedies. Moreover, the awareness of diseases by tribal women showed a significant correlation with marital status (r = 0.075**), occupation (r = 0.075**), and house type (r = 0.087**), indicating that working women, married women, and those living in their own housing have more knowledge about the causes and consequences of health issues. The occurrence of different types of diseases is significantly correlated with the marital status of tribal women (r = 0.088**), meaning that the marriage life of tribal women might expose them to health risks. Finally, the type of disease experienced by tribal women away from tribal lifestyles correlates with house type (r = 0.129**), suggesting that living environments influence health outcomes for those adapting to modern lifestyles.

Table 8: Linear Regression analysis of TWHS, and Health condition in Routine Life

Parameters	B	TWHS	Beta	T	*P-value*
Age	-.563	.445		-1.263	.207
Monthly income	-.014	.041	-.010	-.331	.741
Are you taking regular health checkups in the hospital	.023	.036	.019	.651	.515
During the pregnancy period, what kind of health care system do they follow	.177	.030	.182	5.935	.000***
How do you decide when to use Indigenous healthcare practices versus modern medicine	.017	.076	.007	.229	.819
What diseases have you or someone you know experienced	-.051	.052	-.030	-.995	.320
If yes, what type of diseases do suffering from any lifestyle	.109	.060	.052	1.803	.072
How far do you have to travel to educational centres	.148	.082	.067	1.804	.072
Environmental issues that affect your livelihood	.169	.037	.151	4.531	.000***
Social issues that you overcome across the health aspect	-.039	.074	-.018	-.526	.599
ware of how many weeks a pregnancy gets aborted	.070	.132	.030	.528	.597
Reason for the abortion	.540	.128	.220	4.232	.000***
Experience any of the following health problems during your pregnancy	-.639	.122	-.191	-5.219	.000***
If yes, what kind of complications	.248	.145	.077	1.711	.087
In your opinion, what would improve access to quality healthcare for pregnant women in your community	.064	.042	.048	1.517	.130

The linear regression analysis examining the relationship between various parameters and health conditions in the routine lives of Tribal Women, specifically focusing on the Tribal Women's Health Score (TWHS) summarized in Table 8. The analysis revealed several key insights into the factors that influence health outcomes among tribal women.

Age appeared to have a negative relationship with TWHS, indicated by a B coefficient of -0.563; however, this relationship was not statistically significant (T= -1.263, p = 0.207). Similarly, monthly income showed a negligible negative impact on health, with a B value of -0.014, which was also not significant (T = -0.331, p = 0.741).

Regular health checkups did not demonstrate a significant association with TWHS, as evidenced by a B value of 0.023 (T = 0.651, p = 0.515). In contrast, the type of healthcare system followed during pregnancy had a positive and significant relationship with TWHS (B = 0.177, T = 5.935, p = 0.000*). This indicates that adherence to appropriate healthcare practices during pregnancy substantially enhances tribal women's health scores.

The decision-making process regarding the use of indigenous healthcare practices versus modern medicine showed no significant relationship with the TWHS, with a B value of 0.017 (T = 0.229, p = 0.819). However, the analysis indicated that lifestyle-related diseases had a marginally significant association with the TWHS, with a B coefficient of 0.109 (T = 1.803, p = 0.072).

Distance to educational centers had a positive influence on health, as reflected in the B value of 0.148 (T = 1.804, p = 0.072), suggesting that increased access to education may correlate with better health outcomes. Environmental issues that affect livelihoods present a significant relationship with health conditions, with a B coefficient of 0.169 (T = 4.531, p = 0.000*), indicating that environmental factors play a critical role in shaping health outcomes for tribal women.

Social issues faced in health contexts did not significantly affect TWHS, as indicated by a B value of -0.039 (T = -0.526, p = 0.599). Furthermore, awareness of the duration of pregnancies that resulted in abortion showed no significant correlation with health outcomes (B = 0.070, T = 0.528, p = 0.597). However, the reasons for abortion had a strong positive impact on health conditions, with a B value of 0.540 (T = 4.232, p = 0.000*), suggesting that understanding and addressing the factors leading to abortion could improve overall health.

Experiencing health problems during pregnancy was found to have a significant negative impact on the TWHS (B = -0.639, T = -5.219, p = 0.000*), indicating that complications during this critical period adversely affect health scores. Although the type of complications experienced showed a B value of 0.248 (T = 1.711, p = 0.087), this relationship was significant and merits further investigation.Lastly, opinions on improving access to quality healthcare for pregnant women in the community showed a positive relationship with TWHS, but this was not statistically significant (B = 0.064, T = 1.517, p = 0.130).

Table 9: Correlation Analysis of Healthcare Practices and Awareness among Tribal Women

Variables	Age	Marital status	Occupation	Income	Type of house
If yes, what type of allergies	-.132**	.074**	.190**	.065*	.487**
Menstrual Problems	-.197**	-.112**	.199**	.059*	.584**
If you have menstrual problems, what type of medical care do you prefer	.011	-.008	-.029	.041	-.107**
Are you aware of the Menopause age	-.078**	-.011	.068*	.105**	.288**
Are you aware of how many weeks a pregnancy gets aborted?	-.008	.022	.155**	.015	.350**
Did you experience any of the following health problems during your pregnancy?	-.137**	.056	.036	-.058*	.294**
If yes, what kind of complications	.134**	-.020	-.103**	-.124**	-.177**
If yes, what type of food have you eaten the most to maintain your health?	-.018	-.096**	.069*	.078**	.059*

In your opinion, what would improve access to quality healthcare for pregnant women in your community?	-.024	.143**	-.025	-.015	.197**

The correlation analysis examining the relationships between various healthcare practices and awareness among tribal women in relation to several demographic variables, including age, marital status, occupation, income, and housing typeare shown in table 9.

Starting with allergies, there was a statistically significant negative correlation with age (r = -0.132), suggesting that older women are less likely to report allergies. Marital status and occupation showed weaker positive correlations with allergies (r = 0.074 and r = 0.190, respectively), whereas income also reflected a modest positive relationship (r = 0.065). Notably, the type of house had a strong positive correlation with allergies (r = 0.487), indicating that living conditions might significantly influence health responses to allergies.

Menstrual problems were negatively correlated with age (r = -0.197), implying that older women may experience fewer menstrual issues. Marital status and occupation were positively correlated with menstrual problems (r = -0.112 and r = 0.199, respectively), while income had a minimal positive correlation (r = 0.059). The type of house showed a substantial positive correlation with menstrual problems (r = 0.584), suggesting that the conditions in which women live may affect their menstrual health.

Regarding preferences for medical care during menstrual problems, no significant correlations were observed with age, marital status, occupation, or income, indicating that these demographic factors do not significantly influence healthcare preferences. However, a negative correlation with the type of house (r = -0.107) suggests that housing conditions might deter women from certain medical preferences.

Awareness of menopausal age showed a negative correlation with age (r = -0.078), while marital status and occupation had negligible correlations. Income showed a positive correlation (r = 0.105), indicating that awareness may increase with higher income levels. The type of house also reflects a significant positive correlation with menopausal awareness (r = 0.288), suggesting that better living conditions may enhance awareness.

When considering awareness of the weeks of pregnancy that can lead to abortion, marital status showed a weak positive correlation (r = 0.022), whereas occupation demonstrated a significant positive correlation (r = 0.155). The type of house showed a strong positive correlation (r = 0.350), indicating that living conditions may influence awareness of pregnancy and abortion.

Health problems experienced during pregnancy displayed a negative correlation with age (r = -0.137), suggesting that older women may experience fewer pregnancy-related health issues. Marital status was positively correlated, while occupation and income exhibited weak relationships. The type of house showed a moderate positive correlation (r = 0.294), indicating that housing conditions may be relevant to pregnancy complications.

Complications experienced during pregnancy showed a negative correlation with age (r = 0.134) and a weak negative correlation with occupation (r = -0.103), while income demonstrated a negative relationship (r = -0.124). Conversely, the type of house indicated a negative correlation (r = -0.177), suggesting that better housing may be linked to fewer complications during pregnancy.

Finally, when considering opinions on improving access to quality healthcare for pregnant women, marital status had a positive correlation ($r = 0.143$), implying that marital status may influence views on healthcare access. Other factors including age, occupation, income, and type of house, exhibited weak or no significant correlations, indicating that these demographic factors may not substantially affect opinions on healthcare access.

Discussion

The findings presented in Tables 1–9 provide valuable insights into the health and socioeconomic conditions of tribal women, as well as their healthcare practices and awareness. The analysis revealed a multifaceted landscape of challenges and influences affecting the health of these women, underscoring the need for tailored health interventions and policies.

Health Conditions and Disease Prevalence

Table 4 indicates a high incidence of communicable diseases among tribal women with a statistically significant relationship, suggesting that these diseases remain a critical concern in this demographic. However, the prevalence of chronic diseases appeared less pronounced, as reflected in the findings in Table 4, which show no significant correlation. This disparity may suggest that, while immediate health threats from communicable diseases are prevalent, chronic health issues are either underreported or not as widespread within this community. The emphasis on communicable diseases highlights the importance of enhancing access to preventive health care measures, education, and resources to combat these health challenges.

Socioeconomic Factors Influencing Health

Table 5 provides a deeper understanding of the socio-economic determinants affecting tribal women's health. A stable income source emerges as a significant factor that positively influences health, aligning with the notion that financial stability can enhance access to health care services and resources. Additionally, the strong correlations with traditional medicinal practices and belief in education as a pathway to improved health practices underscore the cultural dimensions of health within this community. The findings also indicate that unemployment and environmental issues significantly affect health, revealing systemic barriers that hinder access to quality care and highlighting the necessity of addressing these broader socio-economic determinants in health promotion strategies.

Reproductive Health Education and Practices

The data from Table 6 shed light on reproductive health education and practices among tribal women. A high percentage of women reporting formal education on reproductive health correlate with better health practices, emphasizing the critical role of education in improving health outcomes. The significant use of napkins during menstruation and the awareness of their health implications point to a growing recognition of hygiene and its impact on health. However, the adverse effects of using cloth materials instead of napkins suggest the need for ongoing education and access to safe menstrual hygiene products. Findings related to abortion experiences and complications during delivery further underscore the importance of reproductive health education and the need for comprehensive healthcare systems that address both traditional and modern practices.

Linear Regression Analysis of Health Conditions

The linear regression analysis presented in Table 8 identifies the key parameters influencing the health conditions of tribal women in their daily lives. Notably, the type of healthcare system followed during pregnancy has emerged as a significant predictor, highlighting the critical intersection of cultural practices and health outcomes. Environmental issues affecting livelihoods and reasons for abortion also display strong correlations, reinforcing the notion that health is not solely a personal issue but is deeply intertwined with socioeconomic and environmental contexts. This emphasizes the need for integrated health programs that consider these factors in order to improve the health outcomes of tribal women.

Correlation Analysis of Healthcare Practices and Awareness

Table 9's correlation analysis further illustrates the relationships between healthcare practices, awareness, and demographic factors. The negative correlation between age and various health issues suggests that older women may be more aware of health risks and therefore potentially adopt healthier practices. The significant correlations with type of house indicate that living conditions significantly influence health and awareness, pointing to the necessity for housing interventions as part of health initiatives. Additionally, awareness of menopause and abortion demonstrates a clear need for educational interventions, particularly in enhancing knowledge about reproductive health and available healthcare options.

Implications of the Study

The findings of this study have several important implications for enhancing health care practices and outcomes among tribal women. First, the results emphasize the necessity for tailored health policies that consider the unique socio-demographic characteristics and specific healthcare needs of tribal women. Policymakers should focus on designing culturally sensitive and relevant interventions that address the distinct challenges faced by these populations.

Additionally, there is a critical need for comprehensive educational initiatives aimed at increasing awareness of healthcare options among tribal women. Programs should emphasize the importance of regular health checkups and promote the integration of indigenous healthcare practices with modern medicine. Such educational efforts can empower women to make informed decisions about their health.

Engaging local health workers, such as Accredited Social Health Activists (ASHA) and Anganwadi teachers, is vital for effective outreach. Their involvement in disseminating health information can lead to a better understanding of community needs and can guide the development of culturally appropriate educational materials. Furthermore, this study underscores the importance of ongoing research to evaluate healthcare practices among tribal women. Understanding the effectiveness of indigenous healthcare systems in comparison with modern medicine will help refine health programs, ensuring that they are evidence-based and impactful.

Improving tribal women’s access to healthcare services is essential. Strategies, such as enhancing transportation options, providing mobile health services, and increasing healthcare facilities in remote areas, should be prioritized to facilitate healthcare utilization. Positive perceptions of indigenous healthcare practices suggest an opportunity to integrate traditional practices with modern medical approaches. Training health care professionals to respect and collaborate with indigenous healers can foster comprehensive care that addresses both physical and cultural health needs.

Moreover, policymakers should develop strategies that support and preserve indigenous healthcare practices within the broader healthcare system, as this support is crucial for maintaining traditional knowledge and promoting health equity. There is also a pressing need for advocacy efforts focused on increasing resources and funding for women's health programs in the tribal communities. Ensuring that the voices of tribal women are represented in health policy discussions is essential to promoting their health and well-being.

Conclusion

This study underscores the critical health and socioeconomic challenges faced by tribal women, revealing a complex interplay of factors that significantly influence their health outcomes. These findings demonstrate a high prevalence of communicable diseases, which presents an urgent need for improved healthcare access and preventive measures. Conversely, the lower incidence of chronic diseases suggests that this demographic may be less affected by long-term health issues; however, the data indicate potential underreporting or limited awareness in this area.

Socioeconomic factors, particularly stable income, traditional medicinal practices, and education have emerged as significant determinants of health among tribal women. These factors highlight the necessity of integrating socioeconomic support into health interventions as financial stability and education can enhance access to healthcare resources and promote healthier practices. Furthermore, the analysis revealed the importance of culturally sensitive approaches to reproductive health, emphasizing the need for formal education on reproductive health issues and improved access to menstrual hygiene products.

Linear regression and correlation analyses further elucidated the connections among healthcare practices, awareness, and demographic variables. The findings indicate that the type of healthcare system utilized, environmental challenges, and educational background are crucial for shaping health outcomes. These insights highlight the urgent need for targeted interventions that consider the unique cultural and socioeconomic contexts of tribal communities.

In conclusion, to improve the health and well-being of tribal women, it is essential to implement comprehensive, community-driven health programs that address both health education and broader socioeconomic factors influencing health. Policymakers, healthcare providers, and community leaders must collaborate to develop strategies that empower tribal women through education, financial support, and access to quality health care services. By addressing these multifaceted issues, we can foster a healthier and equitable future for tribal women and their communities.

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