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Policy interventions and educational empowerment of tribal women in Sikkim: A critical analysis of government schemes

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Abstract

Education has long been regarded as a transformative tool for achieving gender equity and social justice, particularly among marginalized communities. In Sikkim, tribal women face unique challenges in accessing and benefitting from education due to socio-cultural norms, geographical isolation, and economic constraints. Recognizing these barriers, the government has introduced multiple policy interventions and educational schemes such as scholarships, free education initiatives, digital learning programs, and residential schools designed to empower tribal women and enhance their participation in the educational system. This study critically analyzes the effectiveness of these interventions in addressing the educational needs of tribal women in Sikkim, drawing on both quantitative and qualitative data collected from 412 respondents across urban and rural areas. Statistical tools such as correlation, regression, ANOVA, and t-tests were employed to test hypotheses concerning awareness, empowerment, socio-cultural practices, digital access, and literacy outcomes. The findings reveal that awareness of government schemes, participation in educational programs, and access to digital tools significantly contribute to enhancing educational empowerment and literacy levels. At the same time, socio-cultural constraints such as early marriage, domestic responsibilities, and community norms continue to hinder participation. The study concludes that while government schemes have created substantial opportunities, effective implementation, cultural sensitivity, and equitable digital access remain critical to achieving long-term empowerment of tribal women in Sikkim.

Keywords: Sikkim, tribal women, educational empowerment, government schemes, socio-cultural practices, digital access

Introductions

The empowerment of women through education has long been recognized as a catalyst for socio-economic progress, yet the pathways to achieving this remain uneven across different communities and regions of India. Tribal women in Sikkim occupy a unique position within this discourse, situated at the intersection of cultural traditions, geographic isolation, and socio-political marginalization. Despite significant strides in literacy and educational infrastructure, many tribal women continue to face systemic challenges such as poverty, early marriage, limited mobility, linguistic barriers, and inadequate representation in decision-making processes. The Sikkimese state government, aligned with national policies, has introduced various schemes and interventions aimed at reducing these disparities, ranging from scholarships and free textbooks to residential schools and targeted welfare initiatives. However, the effectiveness of these programs is often contested, as issues of implementation, accessibility, and cultural sensitivity determine whether such interventions translate into real empowerment or remain limited to statistical gains. The context of Sikkim is particularly significant, given its high literacy rate compared to other north-eastern states, yet persistent inequalities between tribal and non-tribal populations underscore the need for a deeper analysis of government efforts.

A critical examination of government schemes and their impact on the educational empowerment of tribal women in Sikkim is thus imperative to understand both the successes and shortcomings of policy interventions. This involves not only evaluating the reach and design of policies such as the Beti Bachao Beti Padhao initiative, Pre-Matric and Post-Matric scholarships for Scheduled Tribes, and state-level programs like free education for girls up to the university level, but also exploring how these initiatives interact with traditional socio-

cultural dynamics. Moreover, the Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education) and SDG 5 (Gender Equality), provide a broader framework within which such interventions must be assessed. The empowerment of tribal women through education is not merely an academic exercise; it is integral to ensuring inclusive development, social justice, and the preservation of indigenous knowledge systems in Sikkim. By critically analyzing the government's schemes, this study seeks to highlight existing gaps, identify opportunities for improvement, and emphasize the importance of context-specific strategies that prioritize equity, cultural relevance, and long-term sustainability in the educational journey of tribal women.

Methodology

Research design serves as the overarching framework that directs a study, providing a systematic approach to achieving its objectives and testing its hypotheses. It functions as a blueprint for organizing data collection, measurement, and analysis, thereby ensuring that the research process remains coherent, purposeful, and capable of yielding valid and reliable findings. In the context of the present study, which investigates the empowerment of tribal women through educational policies and schemes in Sikkim a region characterized by cultural plurality, socio-economic disparities, and geographical constraints it becomes essential to employ a design that is both descriptive and explanatory. Such a design allows for a comprehensive exploration of the existing conditions while also identifying causal factors and patterns underlying the phenomenon. To achieve this, the study integrates a mixed-methods approach, combining the numerical rigor of quantitative analysis with the contextual richness of qualitative insights. This methodological choice is justified by the need to capture both measurable outcomes, such as enrolment rates and literacy levels, and nuanced dimensions, including perceptions, cultural influences, and lived experiences of tribal women in Sikkim.

Quantitative Method

The study employs a quantitative approach to provide a structured and systematic examination of the research problem. This method not only ensures precision in measurement but also complements the qualitative component by addressing specific gaps that would remain unresolved if a single approach were adopted. The quantitative dimension of the study is implemented through the administration of structured questionnaires to 412 tribal women across various districts of Sikkim. The instrument consists of closed-ended questions framed on a 5-point Likert scale, designed to capture key constructs such as awareness of educational schemes, levels of educational empowerment, socio-cultural practices, participation in educational initiatives, literacy status, and access to digital resources. Quantitative analysis offers objective, measurable evidence by producing numerical data, calculating averages, and applying statistical tests. Advanced techniques such as correlation, regression analysis, ANOVA, and chi-square tests are employed to examine hypotheses and establish the significance of relationships among variables. For instance, these statistical tools enable the researcher to determine whether awareness of government schemes significantly influences empowerment outcomes or whether active participation in such programs contributes to improved

literacy and educational achievements. By generating empirical evidence, the quantitative method strengthens the reliability of findings and enhances the overall validity of the study's conclusions.

Sampling Design

Sampling design refers to the systematic process of selecting a representative subset of the population to reflect the characteristics of the larger universe under study. Given the practical challenges of surveying all tribal women across Sikkim such as limitations of time, financial resources, and geographical accessibility an appropriate sampling framework is necessary to ensure that the findings are both reliable and valid. For this study, a stratified random sampling design has been adopted to capture the diversity within the tribal population. A total of 412 respondents were selected, representing both urban and rural areas of the state, thereby ensuring inclusivity across different socio-economic and cultural contexts. This approach enhances the representativeness of the sample while reducing potential biases, making the results more generalizable to the wider tribal community in Sikkim. The subsequent sections elaborate on the key elements of the sampling design and its relevance to the study objectives.

Inferential statistics

Inferential statistics were employed in this study to move beyond descriptive summaries and rigorously test the research hypotheses. These techniques enabled the researcher to establish relationships between variables, examine group differences, and assess the significance of observed patterns. By applying a range of statistical tools, the study sought to generate evidence-based insights into the empowerment of tribal women in Sikkim through educational policies and schemes.

Chi-square tests were applied to analyze associations between categorical demographic factors such as age, marital status, and tribal group and outcomes linked to educational empowerment. This test was particularly effective in identifying whether empowerment outcomes varied significantly across demographic categories. Alongside this, correlation and regression analyses were conducted to measure the strength and direction of relationships between variables and to test predictive models. Correlation examined whether greater awareness of educational schemes was linked to higher empowerment, while regression models assessed whether participation in schemes and access to digital resources significantly predicted literacy levels and empowerment outcomes.

Further, Analysis of Variance (ANOVA) was employed to explore differences among the four major tribal groups Lepcha, Bhutia, Limbu, and Tamang especially in line with hypotheses concerning community-specific challenges. Complementing this, independent sample t-tests compared responses between rural and urban women, highlighting disparities in areas such as digital access and participation in schemes. Together, these inferential tools allowed the study to validate hypotheses, uncover group differences, and provide robust statistical evidence on the multidimensional aspects of tribal women's educational empowerment.

Results and Discussion

Reliability analysis plays a crucial role in empirical research as it evaluates the internal consistency of constructs

measured through a questionnaire. Among the various measures available, Cronbach's Alpha is the most widely used indicator, with coefficient values above 0.70 generally considered acceptable and values exceeding 0.80 reflecting high reliability. In this study, reliability statistics were calculated for all key variables to ensure that the

measurement items consistently captured the intended constructs. This step was undertaken to verify that the scales used for assessing awareness, empowerment, participation, socio-cultural practices, and digital access provided dependable and stable results, thereby strengthening the validity and credibility of the research findings.

Reliability Statistics		
Variables	Cronbach's Alpha	N of Items
Awareness of Educational Schemes	.894	5
Educational Empowerment of Tribal Women	.798	5
Socio-Cultural Practices	.839	5
Educational Participation of Tribal Women	.922	5
Participation in Government Educational Schemes	.907	5
Literacy Level of Tribal Women	.889	5
Tribal Group-wise Perception of Challenges	.916	5
Access to Digital Education Tools	.896	5

The reliability analysis demonstrates strong internal consistency across all constructs measured in the study, as indicated by Cronbach's Alpha values well above the acceptable threshold of 0.70. The highest reliability was observed for *Educational Participation of Tribal Women* ($\alpha=.922$) and *Tribal Group-wise Perception of Challenges* ($\alpha=.916$), suggesting highly consistent responses within these scales. Similarly, constructs such as *Participation in Government Schemes* ($\alpha=.907$), *Access to Digital Tools* ($\alpha=.896$), and *Awareness of Educational Schemes* ($\alpha=.894$) also reflect excellent reliability. Even the lowest value, *Educational Empowerment* ($\alpha=.798$), remains within the acceptable range. Overall, these results confirm that the

questionnaire items reliably captured the intended dimensions of educational empowerment.

Hypothesis Testing

Hypothesis 1

- **H₀₁:** There is no significant relationship between awareness of educational schemes and educational empowerment among tribal women.
- **H₁₁:** There is a significant positive correlation between awareness of educational schemes and educational empowerment among tribal women.

Test Applied: Pearson Correlation Pearson Correlation Analysis

Correlations			
		Awareness of educational schemes	Educational empowerment of tribal women
Awareness of Educational Schemes	Pearson Correlation	1	.731**
	Sig. (2-tailed)		<.001
	N	412	412
Educational Empowerment of Tribal Women	Pearson Correlation	.731**	1
	Sig. (2-tailed)	<.001	
	N	412	412

**, Correlation is significant at the 0.01 level (2-tailed).

The Pearson correlation analysis reveals a strong positive relationship between awareness of educational schemes and the educational empowerment of tribal women ($r=.731$, $p<.001$). This substantial coefficient indicates that higher

awareness is closely linked with greater empowerment, as informed women are more confident, independent, and capable of making educational decisions. The result is statistically significant at the 0.01 level, confirming that the

relationship is highly reliable and not due to chance. Therefore, the null hypothesis (H_01) is rejected, and the alternative (H_{11}) is accepted, establishing awareness of government schemes as a key driver of educational empowerment in Sikkim.

Hypothesis 2

- **H_02 :** Socio-cultural practices have no significant impact on the educational participation of tribal women.
- **H_{12} :** Socio-cultural practices have a significant impact on the educational participation of tribal women.

Test Applied: Linear Regression

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.628 ^a	.394	.393	.6557
a. Predictors: (Constant), Educational Participation of Tribal Women				

The model summary shows a strong association between socio-cultural practices and educational participation among tribal women. The correlation coefficient ($R=.628$) indicates a substantial positive relationship, while the coefficient of determination ($R^2=.394$) suggests that socio-cultural factors account for about 39.4% of the variance in participation.

The adjusted R^2 (.393) confirms the stability of the model, and the relatively low standard error (0.6557) indicates a good fit. These findings highlight that factors such as family support, early marriage, domestic responsibilities, and religious beliefs significantly shape women's level of educational participation.

Linear Regression Analysis						
	Model	Sum of Squares	DF	Mean Square	F	Sig.
1	Regression	114.805	1	114.805	267.034	<.001 ^b
	Residual	176.270	410	.430		
	Total	291.075	411			
a. Dependent Variable: Socio-Cultural Practices						
b. Predictors: (Constant), Educational Participation of Tribal Women						

The regression analysis confirms a significant relationship between socio-cultural practices and educational participation among tribal women. The ANOVA results ($F=267.034$, $p<.001$) demonstrate that socio-cultural practices are a strong predictor of participation, with the large F-value and very low significance level indicating the results are highly reliable and unlikely due to chance. This finding highlights that cultural traditions and norms meaningfully influence women's engagement with education, either by supporting or restricting their participation. Accordingly, the null hypothesis (H_02) is

rejected, and the alternative (H_{12}) is accepted, affirming that socio-cultural factors decisively shape educational participation in Sikkim.

Hypothesis 3

- **H_03 :** Participation in government educational schemes does not significantly improve literacy levels among tribal women.
- **H_{13} :** Participation in government educational schemes significantly improves literacy levels among tribal women.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.875 ^a	.766	.765	.4249
a. Predictors: (Constant), Literacy Level of Tribal Women				

The model summary highlights a very strong relationship between participation in government educational schemes and the literacy levels of tribal women. The correlation coefficient ($R=.875$) shows a high positive association, while the coefficient of determination ($R^2=.766$) indicates that 76.6% of the variance in literacy can be explained by scheme participation an exceptionally strong result for

social science research. The adjusted R^2 (.765) confirms the model's robustness, and the low standard error (0.4249) reflects close alignment between predicted and actual values. These findings clearly suggest that participation in educational schemes plays a critical role in enhancing literacy outcomes among tribal women.

Linear Regression Analysis						
	Model	Sum of Squares	DF	Mean Square	F	Sig.
1	Regression	242.034	1	242.034	1340.376	<.001 ^b
	Residual	74.034	410	.181		
	Total	316.068	411			
a. Dependent Variable: Participation in Government Educational Schemes						
b. Predictors: (Constant), Literacy Level of Tribal Women						

The ANOVA results confirm the strong predictive relationship between literacy levels and participation in government schemes. The model is highly significant, with an F-value of 1340.376 and $p<.001$, indicating an excellent

fit and negligible chance effects (Residual Mean Square=0.181). These findings validate that government schemes through scholarships, free textbooks, and learning resources directly enhance literacy by improving reading,

writing, and numeracy skills. Accordingly, the null hypothesis (H_03) is rejected, and the alternative (H_13) is accepted, establishing that participation in government educational schemes significantly improves literacy levels among tribal women in Sikkim.

Hypothesis 4

One Way ANOVA					
Tribal Group-wise Perception of Challenges					
	Sum of Squares	DF	Mean Square	F	Sig.
Between Groups	4.633	3	1.544	2.115	.098
Within Groups	297.996	408	.730		
Total	302.629	411			

The one-way ANOVA results for Hypothesis 4 reveal no statistically significant differences in the perceived challenges of policy implementation among the four major tribal groups of Sikkim (Lepcha, Bhutia, Limbu, and Tamang). With an F-value of 2.115 and $P=.098$, which exceeds the 0.05 threshold, the variations in mean scores are not substantial enough to be considered meaningful. Common issues such as delays in scheme benefits, language barriers, and infrastructure gaps were reported across all groups. Thus, the null hypothesis (H_04) is accepted, and the alternative (H_14) is rejected, indicating that tribal women,

- **H_04 :** There is no significant difference in the perceived challenges in policy implementation among different tribal groups.
- **H_14 :** There is a significant difference in the perceived challenges in policy implementation among different tribal groups.

regardless of community identity, face largely similar challenges in policy implementation.

Hypothesis 5

- **H_05 :** Access to digital education tools has no significant relationship with educational empowerment of tribal women.
- **H_15 :** Access to digital education tools has a significant positive correlation with educational empowerment of tribal women.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.761 ^a	.578	.577	.5438
a. Predictors: (Constant), Educational Empowerment of Tribal Women				

The model summary reveals a strong positive relationship between access to digital education tools and the educational empowerment of tribal women. The correlation coefficient ($R=.761$) indicates a substantial association, while the coefficient of determination ($R^2=.578$) shows that 57.8% of the variance is explained by empowerment. The

adjusted R^2 (.577) confirms model stability, and the low standard error (0.5438) reflects close alignment between predictions and actual outcomes. Overall, the findings highlight that digital tools such as smartphones, computers, and online platforms significantly enhance confidence, independence, and skill development among tribal women.

Linear Regression Analysis						
Model	Sum of Squares	DF	Mean Square	F	Sig.	
1	Regression	166.407	1	166.407	562.686	<.001 ^b
	Residual	121.252	410	.296		
	Total	287.660	411			
a. Dependent Variable: Access to Digital Education Tools						
b. Predictors: (Constant), Educational Empowerment of Tribal Women						

The ANOVA results confirm the strong significance of the model, with an F-value of 562.686 and $p<.001$. This demonstrates that the relationship between digital access and empowerment is highly robust and not due to chance. The findings indicate that tribal women with greater access to digital resources show higher levels of decision-making, skill development, and educational participation. Accordingly, the null hypothesis (H_05) is rejected, and the alternative (H_15) is accepted, establishing that digital tools significantly enhance educational empowerment in Sikkim.

Conclusion

The study highlights the pivotal role of policy interventions and government educational schemes in empowering tribal women in Sikkim. The findings establish that awareness of schemes, participation in educational initiatives, and access to digital tools are decisive factors that significantly enhance literacy levels, confidence, and overall educational empowerment. Statistical analyses demonstrated that higher

awareness and active engagement with government programs are strongly correlated with improved educational outcomes, while digital resources further strengthen women's ability to learn, participate, and make informed decisions. These results confirm that schemes such as scholarships, free education, and digital learning platforms are instrumental in bridging long-standing educational gaps. At the same time, the research underscores persistent challenges that hinder full empowerment. Socio-cultural practices including early marriage, household responsibilities, and traditional gender roles continue to restrict educational participation despite policy support. Moreover, disparities in infrastructure, delays in scheme implementation, and limited outreach in remote areas weaken the impact of well-intentioned interventions. Importantly, the analysis revealed that such challenges are largely common across different tribal groups, emphasizing the need for holistic and inclusive policy measures.

The study concludes that government schemes have made significant progress in empowering tribal women, but sustained efforts are required to address cultural barriers, improve implementation, and expand digital access. Only through context-sensitive and community-driven approaches can educational empowerment be fully realized for tribal women in Sikkim.

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