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Age And Gender Differences In General Well-Being And Environmental Influences Among Tribal Adolescents Of Anamalai Tiger Reserve, Tamilnadu

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Abstract
Background: *Tribal adolescents residing in ecologically sensitive zones like the Anamalai Tiger Reserve (ATR) face unique challenges that influence their physical, emotional, social, and school-related well-being. Environmental isolation, limited infrastructure, and socio-cultural practices significantly shape their developmental outcomes. This study explores age- and gender-wise differences in general well-being across four tribal communities, such as Muduvar, Kadar, Malasar, and Malai Malasar of Pollachi Division.*
Objectives: *To assess the general well-being of tribal adolescents across dimensions, compare age and gender wise variations within and between communities, and understand how environmental and socio-cultural factors influence well-being.*
Materials and Methods: *A total of 195 adolescents (aged 12-18) were selected using purposive sampling from 16 tribal settlements in ATR, Pollachi Division. General well-being was assessed using the General Well-Being Scale, developed by Dr. Ashok K. Kalia and Anitha Deswal (2011), which consists of 55 statements under 5-point Likert scale covering four dimensions: physical, emotional, social, and school well-being. Data were analyzed using sdescriptive statistics, t-tests, and ANOVA to compare age and gender across tribal communities.*
Results: *The Majority of the adolescents exhibited average levels of general well-being (76.9%). Gender differences were evident in school well-being, with boys scoring higher in certain communities. Age-wise comparisons inclined in well-being among middle adolescents aged 15-17, followed by an improvement at late adolescence aged 18. Environmental challenges, such as limited access to education, healthcare, and mobility which were reflected as poorer performance in school and physical well-being, particularly among girls.*
Conclusion: *Tribal adolescents' well-being in Annamalai Tiger Reserve is deeply influenced by ecological and cultural constraints. Environmental remoteness, gender roles, and transitional phases affect the well-being of tribal adolescents. Culturally rooted, environment-sensitive awareness or interventions that promote inclusive education, health & well-being, and gender equity are vital for sustainable adolescent development in forest-based communities.*
Keywords: *Tribal adolescents, general well-being, Anamalai Tiger Reserve, age differences, gender disparities, environmental influences.*

INTRODUCTION

As the developmental bridge between childhood and adult life, adolescence is marked by profound changes across multiple domains, often characterized by rapid physical, cognitive, psychological, and social development, which shapes an individual's overall well-being (WHO, 2019). During this period, adolescents establish their identity, values, and social roles, factors that have lasting implications on their health and life outcomes (Steinberg, 2014). General well-being in adolescence encompasses dimensions such as Physical Health, emotional stability, social connectedness, and school engagement. It is increasingly regarded as a vital indicator of developmental success and overall quality of life (Diener et al., 2009).

Well-being is generally defined as a state in which individuals possess the psychological, physical, and social resources required to manage specific challenges in these domains (Huppert & So, 2011). For adolescents, especially those from marginalized and underrepresented communities, these resources may be unequally distributed or even inaccessible. Tribal communities represent one of the most socio-

economically and culturally distinct groups in the country, often residing in remote and ecologically sensitive areas with limited access to quality healthcare, education, and livelihood opportunities. In India, tribals constitute about 21% of the population, which is about 8.6% of the total population (Census of India, 2011), the majority of whom are adolescents and youth.

The Pollachi division of Anamalai Tiger Reserve, located in Tamil Nadu, is home to several indigenous tribal communities, including the Muduvar, Kadar, Malasar, and Malai Malasar. These communities live within forested and mountainous terrain where geographic isolation, poverty, and infrastructural inadequacies significantly influence the health and well-being of adolescents. The socio-environmental context of these forest-dwelling populations adds a layer of complexity, as traditional lifestyles, environmental stressors, and cultural norms intersect with developmental and health-related challenges.

Global studies underscore the vulnerability of indigenous youth. For example, research on Indigenous Australian adolescents revealed significantly poorer health outcomes compared to non-Indigenous peers, marked by higher mortality and psychosocial distress, attributed to historical marginalization and systemic inequalities (Azzopardi et al., 2019). Gender disparities in well-being are also well documented, with adolescent girls frequently reporting higher emotional distress and lower levels of subjective well-being due to cultural expectations, limited access to support systems, and increased exposure to psychosocial stressors (Nolen-Hoeksema & Hilt, 2009; Patton et al., 2016; UNICEF, 2021). Moreover, parental education and occupation are strong predictors of adolescent well-being, often determining access to basic needs and emotional support.

Despite these known associations, empirical studies on the general well-being of tribal adolescents in India, especially within ecologically sensitive environments, remain limited. There is a critical need to explore how various dimensions of well-being, namely, physical, emotional, social, and school well-being, manifest within these populations, and how factors such as age, gender, and socio-economic background influence these outcomes.

This study aims to assess the general well-being of adolescents belonging to the Muduvar, Kadar, Malasar, and Malai Malasar communities residing in the Pollachi Division of the Anamalai Tiger Reserve. The analysis is structured around four key dimensions of well-being: physical, emotional, social, and school well-being.

OBJECTIVES

- To assess the overall general well-being of tribal adolescents (aged 12-18 years) across four dimensions: physical, emotional, social, and school well-being.
- To examine the gender and age-wise differences in the general well-being and its dimensions of tribal adolescents across the selected communities.
- To identify community-wise differences in general well-being across Muduvar, Kadar, Malasar, and Malai Malasar tribal groups.

METHODOLOGY

Area of the Study: The study was conducted in the Pollachi Division of the Anamalai Tiger Reserve, located in the Coimbatore District of Tamil Nadu. This area is home to multiple tribal communities, and the study focused on four of them: Muduvar, Kadar, Malasar, and Malai Malasar, residing across 16 identified tribal settlements across different ranges.

Research Design: This research employed an exploratory mixed-methods design to explore the general well-being of tribal adolescents. The design allowed both quantitative assessment and contextual understanding of adolescent experiences across four key dimensions of well-being: physical, emotional, social, and school well-being.

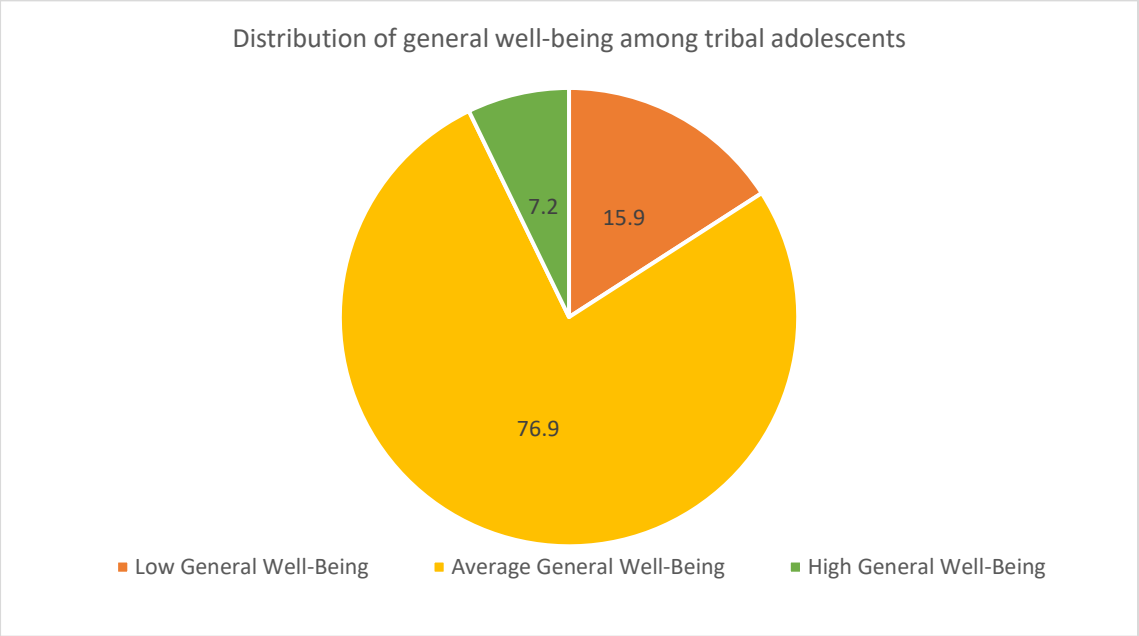
Study Population and Sampling: The study population consisted of tribal adolescents aged 12-18 years, categorized into three developmental stages based on WHO guidelines: early adolescence (12-14 years), middle adolescence (15-17 years), and late adolescence (18 years). A purposive sampling technique using primary data was used to select participants from the settlements, ensuring representation across gender and age groups from diverse socio-economic backgrounds. Initially, a census was conducted across all 16 settlements to gather household and demographic information. Based on inclusion and exclusion criteria, a final sample of 195 adolescents (95 males and 100 females) was selected.

Inclusion and Exclusion Criteria:
Inclusion Criteria: Adolescents aged 12-18 years who were permanent residents of the selected tribal settlements in the Pollachi Division.
Exclusion Criteria: Adolescents outside the specified age range, those living with parents outside the settlements, temporary residents, and individuals with observable disabilities were excluded from the study.
Ethical Considerations: Before data collection, ethical approval was obtained from the Institutional Human Ethical Committee (Approval No. AUW/IHEC/HD-22-23/XMT-05). Additional permissions were secured from the District Adi Dravidar and Tribal Welfare Officer (Coimbatore District), the Principal Chief Conservator of Forests (PCCF), and the Chief Wildlife Warden (CWW). Confidentiality, anonymity, and the right to withdraw from the study at any stage were strictly upheld.
Tool Used: The General Well-Being Scale, developed by Dr. Ashok K. Kalia and Anitha Deswal (2011), was used to assess adolescents' well-being. This standardized tool consists of 55 statements covering four dimensions: physical, emotional, social, and school well-being. The scale provided a structured and comprehensive measurement of well-being specific to the tribal adolescent population.
Statistical Analysis: The analysis used descriptive statistics to understand various aspects of well-being in tribal communities. Independent sample t-tests examined gender differences, while one-way ANOVA was applied for age comparisons. Frequencies and percentages displayed the overall distribution patterns. This method helped identify significant differences and provided insights into environmental, developmental, and gender factors affecting adolescent well-being.

RESULTS AND DISCUSSION

I. Distribution of General Well-Being Among Tribal Adolescents

Figure 1: Distribution of general well-being among tribal adolescents (N = 195)

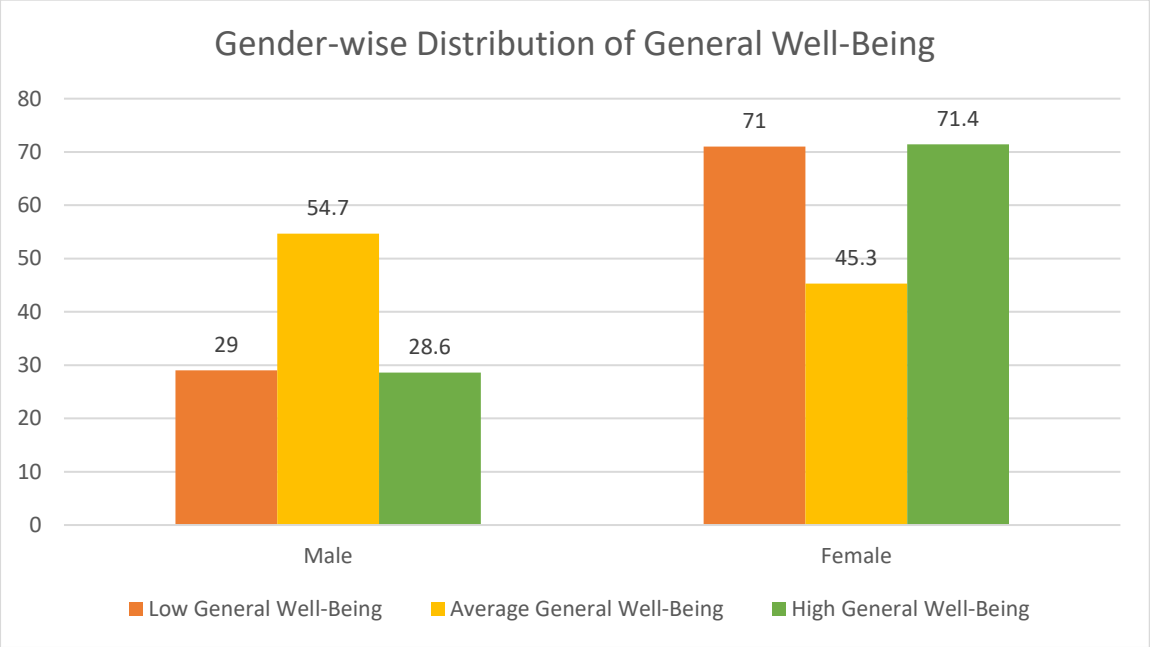


The pie chart reveals that 76.9% of tribal adolescents in the Anamalai Tiger Reserve reported average general well-being, while 15.9% had low well-being and only 7.2% reported high well-being, which indicates that most of the adolescents are moderately adjusted across physical, emotional, social, and school wellbeing domains; however, a significant number experience diminished well-being. The predominance of average well-being among tribal adolescents reflects a balance between cultural resilience and environmental adversity. While strong community ties support moderate well-being, limited access to education, healthcare, and resources prevents many from reaching high well-being. A small group remains vulnerable due to compounded socio-economic and developmental stressors.
Similar trends have been reported in other marginalized and environmentally isolated populations. Azzopardi et al. (2019) and Patton et al. (2016) found that adolescents in under-resourced and Indigenous

settings often face poor well-being due to limited access to developmental support systems. In tribal areas like the Anamalai Tiger Reserve, factors such as geographic isolation, socio-economic hardship, and restricted access to education and healthcare contribute to these outcomes (Xaxa, 2008; Sarker, 2010; Kirmayer et al., 2011). However, the predominance of average well-being levels may indicate the resilience fostered by strong cultural ties and ecologically grounded lifestyles. Bronfenbrenner's ecological model (1979) reinforces the importance of both social and environmental contexts in shaping adolescent development, highlighting the need for holistic, context-sensitive interventions tailored to the realities of forest-dwelling tribal youth.

II. Gender-wise Distribution of General Well-Being Among Tribal Adolescents in the Anamalai Tiger Reserve

Table 2: Gender-wise Distribution of General Well-Being Among Tribal Adolescents in the Anamalai Tiger Reserve



The gender-wise distribution of general well-being among tribal adolescents reveals notable differences. Among males (n = 95), the majority (54.7%) reported average general well-being, while 28.6% reported high well-being, and 29% reported low well-being. In contrast, among females (n = 100), a higher proportion (71.4%) were in the high well-being category, yet a concerning 71% also fell in the low well-being group, with only 45.3% in the average category.

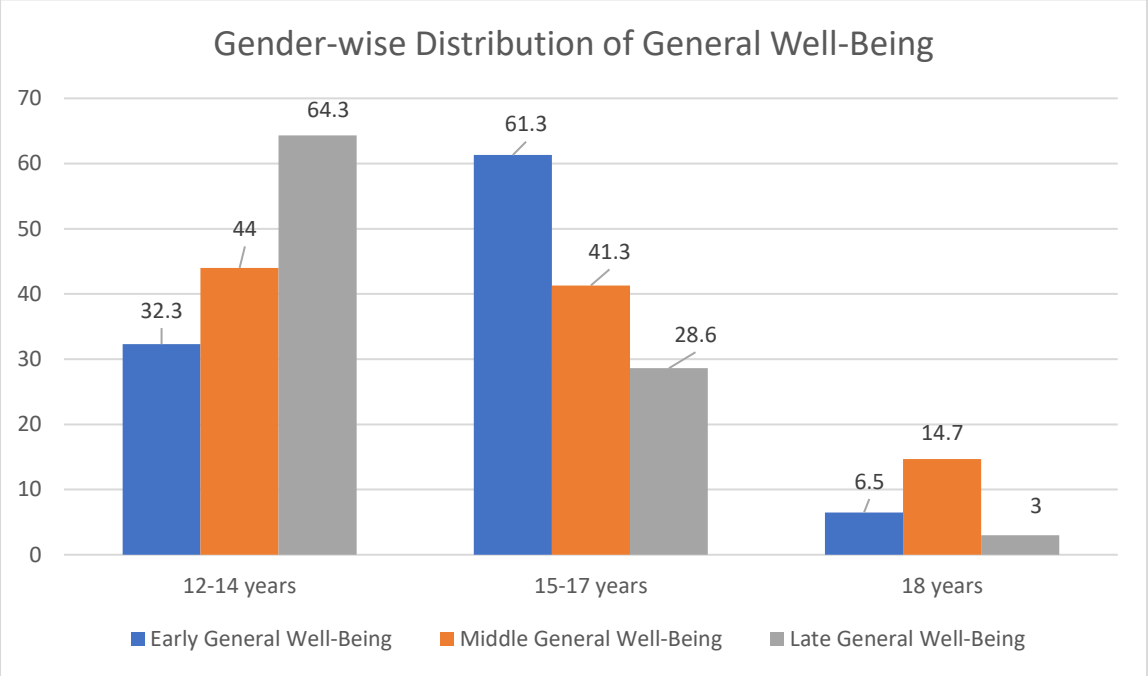
These findings suggest that female adolescents often face heightened emotional and social pressures such as household responsibilities, societal expectations, and restricted mobility, which can either diminish their well-being or, in supportive environments with access to education, schools, and external exposure, enhance it. This dual impact explains their higher representation in both the low and high well-being categories. In contrast, male adolescents typically enjoy greater freedom, mobility, and outdoor engagement, contributing to a more stable and average well-being profile. However, their emotional experiences may be underreported due to limited expression or inadequate support systems, resulting in fewer instances of very high well-being. Overall, female adolescents appear more influenced by the extremes of their environment, while male adolescents tend to exhibit a more consistent, moderate level of well-being.

This gender disparity in well-being among tribal adolescents may stem from intersecting socio-cultural and environmental stressors. Female adolescents in indigenous communities often face psychosocial stress, gender discrimination, restricted mobility, and limited access to education and healthcare, all of which contribute to lower well-being (Nolen-Hoeksema & Hilt, 2009; UNICEF, 2021). However, supportive family environments and cultural resilience can enable some girls to report higher well-being despite these challenges (Kirmayer et al., 2011). In forest-based communities, environmental limitations such as poor infrastructure, limited health services, and lack of youth engagement spaces further impact adolescent

well-being (Azzopardi et al., 2019). Girls are especially affected due to greater restrictions on outdoor access and social participation (Patton et al., 2016).

III. Age-wise Distribution of General Well-Being Among Tribal Adolescents in the Anamalai Tiger Reserve

Table 3: Age-wise Distribution of General Well-Being Among Tribal Adolescents in the Anamalai Tiger Reserve



The table shows how general well-being varies across three age groups: early (12-14 years), middle (15-17 years), and late adolescence (18 years). Among those with high well-being, most (64.3%) were in early adolescence, while only 28.6% were in middle adolescence and 7.1% in late adolescence. Similarly, 44% of adolescents with average well-being were in early adolescence, compared to 41.3% in middle and 14.7% in late adolescence. Conversely, low well-being was most common in middle adolescence (61.3%), followed by early (32.3%) and late adolescence (6.5%). These findings suggest that early adolescents reported higher well-being, while middle adolescents seem to be the most vulnerable, aligning with global patterns in adolescent development and stress exposure.

Early adolescents in the Anamalai Tiger Reserve reported higher levels of general well-being compared to their middle and late adolescent counterparts. This can be attributed to their continued emotional reliance on family and lesser exposure to external stressors such as academic pressure, identity struggles, and future uncertainty. In contrast, middle adolescents face increased psychosocial demands, including peer influence, educational expectations, and identity formation, challenges that are further intensified in tribal settings with limited systemic support (Patton et al., 2016; Azzopardi et al., 2019). Late adolescents, transitioning into adulthood, often take on responsibilities like work or caregiving without adequate institutional or emotional support, potentially leading to stagnation in well-being. According to Bronfenbrenner's ecological systems theory (1979), the growing complexity of adolescents' interactions with their environments can strain well-being over time, especially in under-resourced communities. Younger adolescents, relatively shielded from such pressures, benefit from stable family environments and emotional protection, resulting in higher perceived well-being (UNICEF, 2021).

IV. Gender-Wise Differences in General Well-Being Dimensions Across Tribal Communities in the Anamalai Tiger Reserve, Tamil Nadu

Table 1 presents a gender-wise comparison of four dimensions of general well-being physical, emotional, social, and school well-being, across four tribal communities: Muduvar, Kadar, Malasar, and Malai Malasar. While most gender differences were statistically non-significant ($p > .05$), notable exceptions were observed in school well-being among the Muduvar ($p = .030$) and Kadar ($p = .001$) communities, where males showed significantly higher scores compared to females.

DIMENSIONS	GENDER	COMMUNITIES															
		MUDUVAR				KADAR				MALASAR				MALAI MALASAR			
		Mean	SD	t/F	Sig	Mean	SD	t/F	Sig	Mean	SD	t/F	Sig	Mean	SD	t/F	Sig
Physical Well-Being	Male	43.18	5.17	1.630	.120	41.95	6.51	.186	.853	43.68	5.41	1.059	.294	41.95	5.96	-.058	.954
	Female	38.90	6.82			41.57	6.97			42.16	5.62			42.03	6.04		
Emotional Well-Being	Male	48.09	8.48	.845	.408	49.15	9.67	.894	.377	51.88	6.58	.372	.711	49.59	8.41	-.460	.647
	Female	44.80	9.37			46.70	8.34			51.19	7.55			50.53	8.50		
Social Well-Being	Male	50.82	9.61	-.359	.724	58.10	8.88	.066	.948	55.88	9.18	-.564	.575	59.46	8.73	-.197	.845
	Female	52.90	16.43			57.91	9.60			57.43	11.49			59.87	8.13		
School Well-Being	Male	43.36	6.28	2.348	.030	50.80	7.16	3.501	.001	48.16	7.61	.447	.657	47.23	7.72	-.526	.601
	Female	34.40	10.83			42.74	7.83			47.00	11.36			48.17	6.78		
Total Well-Being	Male	185.45	19.09	1.089	.290	200.00	21.93	1.672	.102	199.60	20.38	.283	.778	198.23	20.03	-.472	.638
	Female	171.00	39.29			188.91	21.47			197.78	27.28			200.60	21.46		

In terms of overall well-being, male adolescents tended to report slightly higher mean scores across most communities, although these differences were not statistically significant. For instance, among Kadar adolescents, males had a mean total well-being score of 200.00, while females scored 188.91. Similarly, among the Malai Malasar, females showed a slightly higher overall score than males, contrary to other groups.

Table 1: Gender-Wise Differences in General Well-Being Dimensions Across Tribal Communities

This pattern suggests that environmental, socio-cultural, and gender-specific roles in tribal societies influence well-being outcomes. In tribal contexts like Anamalai, males often receive greater mobility, access to education, and participation in forest-related economic activities, which can enhance domains like school and physical well-being (Xaxa, 2008; Sarker, 2010). Conversely, girls may face greater domestic responsibilities, early marriage expectations, and limited educational support, particularly pronounced among Muduvar and Kadar communities, impacting their school-related well-being.

Yet, the non-significant gender gaps in emotional and social well-being across many communities may reflect the resilience and supportive cultural networks inherent in tribal life, which foster emotional bonding and social integration regardless of gender (Kirmayer et al., 2011).

V. Age-Wise Differences in General Well-Being Dimensions among Tribal Adolescents Across Communities in the Anamalai Tiger Reserve

Table 2 depicts the age-wise comparison of general well-being dimensions across Muduvar, Kadar, Malasar, and Malai Malasar tribal adolescents shows subtle variations across the early adolescence (12-14 years), middle adolescence (15-17 years), and late adolescence (18 years). Although none of the differences are

statistically significant (p > .05), a few trends are significant.**Table 2: Age-Wise Differences in General Well-Being among Tribal Adolescents across Tribal Communities**

DIMENSIONS	AGE	COMMUNITIES															
		MUDUVAR				KADAR				MALASAR				MALAI MALASAR			
		Mean	SD	t/F	Sig	Mean	SD	t/F	Sig	Mean	SD	t/F	Sig	Mean	SD	t/F	Sig
Physical Well-Being	12-14 years	44.00	5.83	2.925	.079	42.94	6.95	.626	.540	44.39	6.09	2.435	.096	41.77	5.28	.095	.910
	15-17 years	37.38	6.37			41.40	6.91			41.70	4.82			42.33	6.82		
	18 years	42.25	3.40			39.50	5.28			40.43	4.58			41.50	5.50		
Emotional Well-Being	12-14 years	48.11	7.72	2.374	.122	49.24	8.98	.371	.692	51.75	8.56	.648	.527	49.68	8.69	.284	.754
	15-17 years	41.88	9.58			46.65	8.95			51.93	5.48			49.77	8.54		
	18 years	52.25	6.29			47.83	9.99			48.57	6.70			52.13	7.31		
Social Well-Being	12-14 years	52.22	14.78	1.164	.335	58.71	8.29	.937	.400	59.07	11.47	2.149	.126	58.35	8.65	1.521	.226
	15-17 years	47.50	11.35			56.25	10.06			53.70	9.72			61.60	8.36		
	18 years	59.50	10.66			61.83	8.35			59.71	7.54			57.25	6.81		
School Well-Being	12-14 years	37.22	9.54	1.648	.220	49.53	7.83	2.057	.141	48.79	9.37	.486	.617	48.65	7.18	1.168	.317
	15-17 years	37.38	10.55			44.00	9.04			46.11	11.21			46.13	7.25		
	18 years	46.75	4.35			46.17	6.40			47.43	7.37			49.38	7.74		
Total Mental Health	12-14 years	181.56	30.69	2.243	.135	200.41	20.54	1.413	.255	204.00	27.52	1.320	.275	198.45	20.98	.044	.957
	15-17 years	164.13	30.99			188.30	23.14			193.44	21.96			199.83	21.24		
	18 years	200.75	14.82			195.33	21.51			196.14	19.39			200.25	18.37		

Physical Well-Being scores are generally higher among the youngest group (12–14 years), particularly among Muduvar and Malasar adolescents. A gradual decline is observed in the 15-17 group, with slight recovery or stabilization in the 18-year adolescence. Emotional Well-Being appears strongest among 18 year olds, especially in Muduvar and Malai Malasar communities, possibly reflecting increased maturity and coping mechanisms with age. Social Well-Being increases steadily with age in most communities. Adolescents aged 18 in all groups scored higher, suggesting social integration may improve with developmental age. School Well-Being is relatively high among 18-year-olds, possibly due to reduced academic pressure as they complete schooling or have more defined educational goals. Overall General Well-Being peaks in the 18-year group across all communities (except a slight dip in Malasar), suggesting age-related psychosocial development and environmental adaptation. One of the reasons is developmental maturity, where older adolescents may better adapt to their environment, handle emotional stress, and engage more in social networks (Bronfenbrenner, 1979; Hardcastle et al., 1981). The other reason is educational transitions, where adolescents completing or exiting school may experience reduced academic stress, leading to better perceived school and emotional well-being (Roeser & Eccles, 2014). Cultural expectations where Tribal adolescents often take on more responsibility as they age, which could increase a sense of purpose and competence, thus improving their emotional and social well-being.

CONCLUSION

This study examined the general well-being of tribal adolescents residing in the Anamalai Tiger Reserve by analyzing differences across age, gender, and community. While the overall well-being scores were within the average range, notable differences emerged, particularly in school and physical well-being, where gender disparities were more pronounced. Males tended to report higher school well-being in certain communities (e.g., Kadar), whereas females, especially among the Muduvar tribe, reported significantly lower school well-being, potentially reflecting gendered access to education and societal roles. Age-wise differences, although statistically non-significant, revealed meaningful trends: adolescents aged 12-14 showed higher emotional and social well-being across most communities, which gradually declined during the 15-17 age group, signifying growing psychosocial stressors in this age. Interestingly, the 18-year-olds demonstrated a slight rebound in well-being, possibly due to their increasing autonomy and adaptation to community expectations.

These findings emphasize how environmental factors uniquely shape adolescent well-being in forest-dwelling tribal communities. The remoteness of settlements, limited infrastructure, and traditional lifestyle deeply influence access to healthcare and nutrition. Particularly, the forest ecosystem, while providing a cultural and economic lifeline, also poses challenges in ensuring consistent delivery of developmental services (UNESCO, 2020).

Hence, awareness programs or interventions must be environmentally sensitive, gender-responsive, and community-driven. Policies should prioritize mobile education units, eco-health camps, and culturally relevant life skills programs to bridge gaps in adolescent well-being without disrupting ecological balance. Collaborative efforts involving forest departments, tribal welfare agencies, and local communities are vital to ensure that developmental outcomes are sustainable and inclusive.

RECOMMENDATIONS

- Promote environment-integrated well-being programs that align ecological conservation with the psychosocial development of tribal adolescents.
- Incorporate health and wellbeing education and sustainability practices into tribal school systems to build ecological awareness and resilience.
- Encourage policy-level integration of well-being, education, and forest governance to address adolescent development from a holistic, eco-social lens.

LIMITATIONS

- The study did not assess specific environmental variables such as pollution, biodiversity loss, or water quality that may impact adolescent well-being.
- Due to logistical and seasonal constraints, longitudinal environmental influences on well-being could not be evaluated.

- The analysis did not explore daily environmental interactions (e.g., forest resource use, outdoor exposure) that may influence physical or emotional states.
- A cross-sectional design limits causal interpretation of how environmental changes affect long-term adolescent development.

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