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Impact of School Meal Programs on the Nutritional Status and Dietary Habits of Tribal Adolescent Girls in Wayanad District

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ABSTRACT: School meal programs play a vital role in addressing nutritional needs of adolescent girls from tribal communities, particularly in regions like Wayanad district of Kerala. This paper examines the impact of these programs on the nutritional status and dietary habits of tribal adolescent girls studying in Government Model Residential Schools. The study analyses changes in food consumption patterns, nutrient intake, and key nutritional indicators following the implementation of mid-day meal and hostel-based feeding initiatives.

Findings indicate that school meal programs have contributed to improved dietary diversity and increased intake of essential nutrients among the participants. Regular provision of balanced meals has helped reduce the prevalence of undernutrition and micronutrient deficiencies. However, variations exist in the extent of impact based on meal acceptance, cultural food preferences, and overall dietary habits outside the school environment. Some girls continue to show gaps in iron, calcium, and vitamin intake despite program participation.

The analysis highlights both positive outcomes and areas requiring attention, such as improving meal quality, addressing cultural acceptability, and extending nutritional benefits beyond school hours. Geographical and socio-cultural factors in Wayanad influence the effectiveness of these programs, underscoring the need for context-specific adaptations. The study emphasises that well-designed school meal initiatives can serve as an important tool for enhancing nutritional well-being and supporting healthy development of tribal adolescent girls.

KEYWORDS: School meal programs, Nutritional status, Dietary habits, Tribal adolescent girls, Wayanad district, Mid-day meals, Micronutrient deficiencies, Residential schools.

I. INTRODUCTION

School meal programs have long served as an important intervention for improving nutrition among school-going children and adolescents, particularly in developing countries where undernutrition remains a significant public health concern. These programs typically provide free or subsidised meals during school hours, aiming to enhance attendance, reduce hunger, and support physical and cognitive development. In India, initiatives such as the Mid-Day Meal Scheme have evolved over the years to include not only basic calorie provision but also efforts to ensure balanced nutrition through inclusion of pulses, vegetables, and micronutrient-fortified foods. The programs are especially critical in tribal and remote areas where access to diverse and nutritious food is often limited due to geographical isolation, economic constraints, and traditional dietary patterns.

Wayanad district in Kerala presents a unique context for studying the effectiveness of school meal programs among tribal adolescent girls. The district is home to several indigenous tribal communities, many of whom continue to rely on forest-based livelihoods and traditional food systems. Adolescent girls in these communities face multiple layers of vulnerability, including higher rates of undernutrition, anaemia, and limited access to healthcare and education. The Government Model Residential Schools in Wayanad have implemented structured meal programs as part of their efforts to provide holistic education and care to tribal students. These schools offer a controlled environment where the impact of consistent meal provision on dietary habits and nutritional status can be systematically examined.



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The nutritional needs of adolescent girls are particularly important during the critical growth phase of puberty. This period is marked by rapid physical development, increased iron requirements due to menstruation, and the laying down of nutritional reserves for future pregnancy and lactation. Inadequate nutrition during adolescence can have long-lasting consequences on health, reproductive outcomes, and overall quality of life. Tribal girls in Wayanad often come from households where traditional diets may be rich in certain local foods but deficient in key micronutrients such as iron, calcium, vitamin A, and protein. School meal programs have the potential to bridge these gaps by introducing diverse food items and ensuring regular consumption of balanced meals.

Examining dietary habits provides valuable insights into how school meals influence overall food consumption patterns. This includes understanding meal acceptance, portion sizes, food preferences, and the extent to which school-provided nutrition complements or replaces home-based diets. Many tribal families follow traditional food practices that may not always meet the recommended dietary allowances for growing adolescents. The introduction of school meals can lead to gradual changes in food choices and eating behaviours, potentially improving dietary diversity and nutrient intake.

Nutritional outcomes from such programs are typically assessed through anthropometric measurements, biochemical indicators, and clinical signs of deficiency. Improvements in height-for-age, weight-for-age, and body mass index, along with reduction in anaemia prevalence, serve as key markers of program effectiveness. In the context of Wayanad, where environmental factors such as high rainfall, hilly terrain, and limited market access influence food availability, the role of school meals becomes even more significant in ensuring consistent nutrition.

The geographical setting of Wayanad, with its forested hills and scattered tribal settlements, adds another layer of complexity. Distance from schools, seasonal migration for work, and cultural beliefs around food can affect participation and utilisation of meal programs. Understanding these contextual factors is essential for evaluating the true impact of school-based interventions on tribal adolescent girls.

This examination of school meal programs in Wayanad district contributes to the broader discourse on nutrition-sensitive education initiatives. It highlights how structured feeding programs can serve as an important tool for addressing malnutrition among vulnerable adolescent populations. The insights gained can inform policy refinements and program design for similar contexts across the country, ultimately supporting the goal of improving nutritional well-being and empowering tribal girls through better health and education outcomes.

II. PATTERNS OF SCHOOL MEAL UTILIZATION AND DIETARY HABITS

School meal programs in the Government Model Residential Schools of Wayanad district have become an integral part of daily routines for tribal adolescent girls. Participation levels remain consistently high, with most students consuming the provided meals on a regular basis. The structured timing of meals aligns well with the school schedule, ensuring that girls receive at least one nutritious meal during the day. Many students report that the school meals constitute a significant portion of their daily food intake, particularly for those coming from households with limited food diversity. The hot cooked meals, typically served at lunchtime, include rice, dal, vegetables, and occasional non-vegetarian items, which are generally well accepted by the majority of girls.

Consumption patterns show interesting variations across different schools and age groups. Younger adolescent girls tend to consume larger portions of the staple rice and dal combination, while older girls show more selective eating behaviours, sometimes leaving out certain vegetable preparations. The inclusion of eggs or chicken in the menu on specific days is highly appreciated and usually fully consumed. However, some traditional food preferences influence acceptance levels. Girls from certain tribal communities show greater liking for locally familiar ingredients, while others are gradually adapting to new food items introduced through the school program.

Changes in overall dietary intake are evident when comparing the food consumption patterns before and after joining the residential schools. Many girls report an increase in the frequency of meals and greater inclusion of pulses, vegetables, and milk in their daily diet. The school meals have introduced greater food diversity compared to the predominantly cereal-based diets at home. Items such as leafy greens, seasonal vegetables, and fortified foods have become more regular in their consumption, contributing to improved micronutrient intake. The provision of mid-morning snacks and evening meals in hostels has further helped in reducing hunger gaps and stabilising energy levels throughout the day.



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Food diversity has shown marked improvement among most participants. Traditional tribal diets, which often rely heavily on millets, tubers, and forest produce, have been supplemented with a wider variety of foods through the school program. This diversification is particularly beneficial for adolescent girls who require higher amounts of iron, calcium, and protein during their growth phase. Many girls have started incorporating fruits and dairy products more regularly, which were previously consumed only occasionally at home. The school environment has also encouraged better eating habits, such as washing hands before meals and maintaining hygiene during food consumption.

Regional and socio-cultural influences play a significant role in meal acceptance and utilization. Wayanad district's diverse tribal communities, including Paniya, Kurichiya, and Mullukkuruma groups, bring different food preferences and taboos to the school setting. Some communities have traditional restrictions on certain vegetables or non-vegetarian foods, which occasionally affect consumption patterns. The school authorities have made efforts to accommodate these preferences by offering alternative items on specific days. Language and cultural familiarity also influence how comfortably girls adapt to the new meal routines.

Socio-economic background of the families further shapes dietary habits. Girls coming from poorer households show greater reliance on school meals for their nutritional needs, often carrying leftover food back to share with siblings. In contrast, girls from relatively better-off families may supplement school meals with additional items brought from home. Seasonal availability of forest produce also affects overall dietary patterns, with girls consuming more wild fruits and tubers during certain months of the year.

The transition from home-based to school-based eating has led to noticeable behavioural changes in dietary habits. Many girls have learned to appreciate a more balanced plate composition, with adequate portions of cereals, pulses, and vegetables. The peer group influence in residential schools has encouraged greater acceptance of new foods that were initially resisted. Regular nutrition education sessions conducted in schools have further reinforced positive dietary practices.

However, challenges in full utilization persist in some cases. Some girls report feeling full quickly due to the bulk of rice-based meals, leading to partial consumption of accompanying items. Others mention occasional monotony in menu cycles, which affects long-term acceptance. The quality and taste of prepared meals also influence consumption levels, with better-cooked meals receiving higher appreciation.

Overall, school meal programs have brought about positive shifts in dietary habits and food diversity among tribal adolescent girls in Wayanad. The structured provision of meals has helped bridge nutritional gaps that exist in traditional home diets. Continued efforts to incorporate local food preferences, improve menu variety, and strengthen nutrition education can further enhance the effectiveness of these programs in improving dietary patterns and nutritional well-being of the students.

III. NUTRITIONAL STATUS INDICATORS

Nutritional status of tribal adolescent girls in the Government Model Residential Schools of Wayanad district is assessed through multiple indicators that provide a comprehensive picture of their health and development. Anthropometric measurements form the primary basis for evaluating physical growth and nutritional adequacy. Height-for-age, weight-for-age, and body mass index (BMI) are the key parameters used to identify different forms of malnutrition. Many girls show improvement in height and weight after joining the residential schools, indicating the positive effect of regular and balanced school meals. However, a considerable proportion still falls in the category of mild to moderate stunting, reflecting the long-term impact of chronic undernutrition experienced during early childhood.

The prevalence of undernutrition remains a concern despite the school meal interventions. Stunting affects a significant number of girls, pointing to prolonged inadequate nutrient intake before they entered the residential school system. Wasting, though less common, is observed in some cases, particularly among newly admitted students coming from food-insecure households. Thinness, indicated by low BMI, is more prevalent among older adolescent girls, possibly due to increased nutritional demands during puberty and growth spurts. Overnutrition or overweight is relatively rare but is beginning to emerge in a small percentage of girls, highlighting the need for balanced meal composition to prevent the double burden of malnutrition.



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Micronutrient status reveals important deficiencies that persist even with school meal programs. Iron deficiency anaemia is one of the most common problems, affecting a substantial number of girls. This is particularly significant given the higher iron requirements during adolescence due to menstruation. Regular consumption of iron-rich foods through school meals has helped in reducing the severity of anaemia, but complete elimination remains a challenge due to limited absorption and other dietary factors. Vitamin A deficiency is another area of concern, though the inclusion of vegetables and occasional fruits in meals has shown some improvement. Calcium and vitamin D status also require attention, as many girls come from communities with limited dairy consumption.

Iodine deficiency, though less severe than in previous decades, still affects some students, particularly those from remote tribal hamlets. The use of iodised salt in school kitchens has helped in addressing this issue to a large extent. Other micronutrients such as zinc and folic acid also show varying levels of deficiency, influencing overall growth and immune function. The school meal programs have contributed to better micronutrient intake through fortified foods and diverse menu items, but gaps remain in achieving optimal levels for all girls.

Health outcomes linked to nutritional improvements are visible in several areas. Better nutritional status has led to improved school attendance, concentration in studies, and participation in physical activities. Reduction in common infections and better immune response have been observed among girls with improved nutritional indicators. Physical development, including onset of menarche and overall growth velocity, shows positive correlation with better nutritional intake through school meals.

Developmental outcomes extend beyond physical health. Improved nutrition has been associated with better cognitive performance and emotional well-being among the students. Girls with adequate nutritional status demonstrate higher energy levels, better classroom participation, and improved social interactions. The residential school environment, combined with nutritious meals, provides a supportive setting for overall development during the critical adolescent phase.

Long-term health implications of current nutritional status are significant. Girls who achieve better nutritional levels during adolescence are likely to have improved reproductive health outcomes in future. Reduced prevalence of anaemia and better calcium status can help in preventing complications during pregnancy and lactation in adulthood. The school years thus represent a critical window for nutritional intervention with lifelong benefits.

The nutritional status indicators clearly demonstrate both the achievements and the remaining challenges of school meal programs in Wayanad. While there has been noticeable improvement in several parameters, the persistence of undernutrition and micronutrient deficiencies indicates the need for continued efforts and program strengthening. Regular monitoring of these indicators can help in timely identification of at-risk students and appropriate interventions. The data also highlights the importance of addressing not only school-based nutrition but also improving household food security and dietary practices for sustained impact on the nutritional well-being of tribal adolescent girls.

IV. INTERLINKAGES BETWEEN SCHOOL MEALS, DIET, AND NUTRITION

School meal programs in the Government Model Residential Schools of Wayanad district have created important interlinkages with the daily dietary habits of tribal adolescent girls. The provision of regular, balanced meals has influenced not only the quantity but also the quality and timing of food consumption throughout the day. Many girls have developed more structured eating patterns, with fixed meal times replacing irregular snacking or skipped meals that were common in their home environments. The school meals serve as a central anchor in their daily diet, often constituting the largest and most nutritious meal of the day.

The influence on dietary habits extends beyond the school hours. Girls who regularly consume school meals tend to carry some positive changes back to their families. They become more aware of the importance of including vegetables, pulses, and variety in meals. Some girls have started requesting similar food preparations at home, gradually influencing household dietary practices. The exposure to different food items through school meals has expanded their food preferences and willingness to try new preparations. This behavioural change is particularly significant in tribal communities where traditional diets may be limited in diversity.



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The contribution of school meal programs to overall energy and nutrient intake is substantial. For many girls, especially those from food-insecure households, the school meals provide a major portion of their daily calorie requirements. The inclusion of rice, dal, vegetables, and occasional non-vegetarian items helps in meeting energy needs while supplying essential proteins and micronutrients. Fortified foods and milk provided in the program contribute significantly to calcium and other nutrient requirements during the critical growth phase of adolescence. Studies have shown measurable improvements in energy intake and nutrient consumption among regular participants compared to their pre-school meal dietary patterns.

The programs have helped in addressing specific nutrient gaps commonly observed in tribal adolescent girls. Improved intake of iron-rich foods and vitamin C sources has supported better haemoglobin levels in many cases. The regular provision of pulses and vegetables has enhanced protein quality and dietary fibre intake. However, the contribution to overall nutrient intake varies depending on meal acceptance, portion consumption, and complementary foods consumed at home. Girls who fully participate in all meal times show better nutritional outcomes compared to those with lower engagement.

Spatial and social variations significantly influence program effectiveness. Girls from different tribal communities in Wayanad show varying levels of acceptance based on cultural food preferences and familiarity with the menu items. Some communities adapt more easily to the school diet, while others take longer to adjust due to traditional food taboos or taste preferences. The geographical location of schools also plays a role, with schools closer to market centres having better access to diverse food supplies compared to more remote ones.

Social factors such as family background, economic status, and peer influence further shape the effectiveness of school meal programs. Girls from extremely poor households tend to rely more heavily on school meals and show greater nutritional improvements. Peer groups in residential settings encourage better consumption patterns through social learning. However, social dynamics can also create challenges, such as food sharing practices or preferences for certain items that affect equitable distribution within the group.

The interlinkages between school meals, diet, and nutrition demonstrate both opportunities and challenges. While the programs have successfully improved dietary habits and nutrient intake for many girls, sustaining these benefits requires addressing cultural acceptability, menu diversity, and complementary household nutrition. The residential school environment provides a unique platform for shaping long-term dietary behaviours that can extend beyond the school years. Understanding these interlinkages is crucial for designing more effective and culturally sensitive school meal interventions that can meaningfully contribute to the nutritional well-being of tribal adolescent girls in Wayanad district.

V. CHALLENGES AND OPPORTUNITIES IN PROGRAM IMPLEMENTATION

School meal programs in the Government Model Residential Schools of Wayanad district face several barriers to achieving optimal utilization and nutritional impact. One of the primary challenges is related to cultural acceptability of the menu. Many tribal girls come from communities with distinct food preferences and traditional dietary practices. Some items provided in the school meals may not align with their taste or cultural beliefs, leading to partial consumption or wastage. This cultural gap reduces the overall nutritional benefit despite regular provision of meals. Language barriers and limited involvement of local community members in menu planning further compound this issue in certain schools.

Infrastructure limitations present another significant barrier. Many schools, particularly those in remote locations, face challenges in proper storage, cooking facilities, and hygiene maintenance. Inadequate kitchen infrastructure and irregular supply of cooking fuel affect the quality and timeliness of meal preparation. Water scarcity in some schools during summer months impacts both cooking and hygiene practices. These infrastructural constraints directly influence the acceptance and nutritional value of the meals served.

Supply chain issues also affect program implementation. Irregular delivery of food grains, pulses, and vegetables sometimes leads to monotonous menus or reduced portion sizes. The quality of supplied ingredients varies, with occasional reports of substandard items reaching schools. Transportation challenges in the hilly terrain of Wayanad add to these logistical difficulties, particularly during monsoon seasons when road connectivity becomes poor.



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Social and economic factors influence utilization levels. Girls from extremely poor households may feel hesitant to fully participate due to social stigma or fear of being labelled as dependent on free meals. Some students skip meals when they visit homes during weekends or holidays, leading to inconsistent nutritional intake. Peer pressure and group dynamics in hostels can sometimes lead to selective eating behaviours, where certain popular items are consumed more while nutritious but less preferred items are left uneaten.

Despite these challenges, several success factors have been observed in different school settings. Schools with active Parent-Teacher Associations and community involvement show better program implementation. The involvement of local tribal leaders in menu planning and monitoring has improved cultural acceptability in some schools. Dedicated and trained kitchen staff who understand local tastes have contributed to better meal quality and higher consumption rates. Schools that incorporate nutrition education as part of the curriculum have shown better awareness and improved dietary habits among students.

Emerging trends indicate gradual positive changes in program effectiveness. There is increasing acceptance of diverse food items among the younger generation of tribal girls. Many schools have started incorporating locally available millets and traditional vegetables, which has improved both nutritional value and cultural relevance. The use of fortified foods and micronutrient supplements has shown promising results in addressing specific deficiencies. Some schools have successfully introduced kitchen gardens, providing fresh vegetables and creating educational opportunities for students.

Areas needing attention include strengthening monitoring mechanisms for regular assessment of program implementation and nutritional outcomes. Capacity building of kitchen staff and school authorities on hygiene, nutrition, and menu diversification is essential. Greater involvement of parents and community members in program planning can improve relevance and ownership. Addressing seasonal variations in food supply through better storage and local procurement systems can ensure consistency in meal quality.

The opportunities for program improvement are substantial. Integration of school meal programs with broader nutrition initiatives, such as anaemia control and deworming campaigns, can create synergistic effects. Use of technology for better supply chain management and real-time monitoring can address logistical challenges. Collaboration with local self-help groups for food procurement can support both program quality and local economy.

The challenges and opportunities in program implementation highlight the dynamic nature of school meal initiatives in tribal contexts. Continuous adaptation based on feedback from students, teachers, and communities is necessary for maximising nutritional impact. The residential school setting provides a unique platform for testing and refining nutrition interventions that can serve as models for similar programmes across other tribal regions.

VI. FINDINGS AND DISCUSSION

The analysis of school meal programs in the Government Model Residential Schools of Wayanad district reveals several key patterns and outcomes regarding their impact on tribal adolescent girls. One of the most consistent findings is the improvement in dietary diversity and regularity of meals. Girls who regularly participate in the school meal program show greater inclusion of pulses, vegetables, and dairy products in their daily diet compared to their pre-admission dietary patterns. This increased diversity has contributed to better overall nutrient intake, particularly in terms of protein, iron, and certain vitamins. The structured meal timings in residential schools have helped in reducing irregular eating habits and hunger gaps that were common in home environments.

Nutritional status indicators show moderate to significant improvements among regular participants. Anthropometric measurements indicate positive trends in weight gain and BMI for many girls, especially during the initial years of school stay. The prevalence of moderate undernutrition has decreased, though stunting remains a concern reflecting the long-term effects of early childhood malnutrition. Micronutrient deficiencies, particularly iron deficiency anaemia, have shown reduction in severity, though complete elimination remains challenging. These improvements are more pronounced in girls who have stayed in the residential system for longer periods, suggesting a cumulative effect of consistent nutritional support.



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The role of school meal programs in tribal contexts emerges as both supportive and limited in scope. The programs have successfully acted as a safety net for girls from food-insecure households, providing reliable access to balanced meals. They have also served as an important platform for introducing new food habits and nutrition awareness. However, the impact is moderated by several factors including cultural food preferences, home dietary practices, and the overall socio-economic conditions of tribal families. The residential school environment provides a controlled setting that amplifies the positive effects of the meal program, but the sustainability of these gains after girls return to their villages remains a critical question.

Critical insights from the study highlight the importance of cultural sensitivity in program design. Meals that incorporate locally familiar ingredients and respect traditional food practices tend to have higher acceptance and better nutritional outcomes. The involvement of tribal communities in menu planning and implementation enhances ownership and effectiveness. The study also reveals that school meal programs work best when complemented by efforts to improve household food security and nutrition education for families.

Another important insight is the role of peer influence and the residential school environment in shaping dietary behaviours. Group eating patterns and nutrition education sessions have helped in gradual acceptance of diverse foods. However, the transition from school to home environment often leads to partial reversal of gained dietary habits, indicating the need for continued support systems beyond the school setting.

The findings also point to the limitations of relying solely on school meal programs for addressing nutritional needs. While they contribute significantly to daily nutrient intake, they cannot fully compensate for deficiencies rooted in early childhood or poor household diets. This underscores the importance of a life-cycle approach to nutrition that addresses the needs of adolescent girls within the broader family and community context.

The discussion highlights that school meal programs serve as a valuable intervention for improving nutritional status and dietary habits of tribal adolescent girls. Their effectiveness is enhanced when implemented with cultural sensitivity, community participation, and integration with other nutrition initiatives. The geographical and social context of Wayanad district presents both challenges and opportunities for strengthening these programs. Future efforts should focus on making school meals more diverse, culturally appropriate, and nutritionally complete while extending their positive influence beyond the school boundaries through family and community engagement.

So, the study demonstrates that well-designed and contextually relevant school meal programs can play a meaningful role in addressing nutritional vulnerabilities among tribal adolescent girls. However, their potential can be fully realised only through comprehensive approaches that address the multiple dimensions of nutrition in tribal contexts.

VII. POLICY SUGGESTIONS AND WAY FORWARD

Strengthening school meal programs requires targeted policy interventions that address both immediate nutritional needs and long-term sustainability. The Government of Kerala and central agencies should prioritise increasing the budgetary allocation for school meals in tribal residential schools to ensure higher quality and diversity of food items. This includes regular inclusion of locally available nutritious foods such as millets, traditional vegetables, fruits, and small quantities of eggs or fish based on cultural acceptability. Establishing a dedicated nutrition cell within the Department of Tribal Welfare can help in better planning, implementation, and monitoring of these programs.

Menu diversification and cultural adaptation should be made mandatory components of program guidelines. School authorities, in consultation with tribal community representatives, should develop region-specific menus that respect local food preferences while meeting nutritional standards. Regular training of cooks and kitchen staff on hygiene, balanced cooking, and use of local ingredients can significantly improve meal quality and acceptance. Introduction of kitchen gardens in all residential schools can provide fresh produce and serve as an educational tool for students.

Strategies for improving nutritional outcomes among tribal adolescent girls should adopt a holistic life-cycle approach. Regular health and nutrition screening, including haemoglobin testing and growth monitoring, should be institutionalised in all schools. Micronutrient supplementation programmes, particularly for iron, folic acid, and vitamin A, need to be strengthened and monitored for compliance. Nutrition education should be integrated into the school curriculum with



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practical sessions on balanced diet, hygiene, and healthy cooking practices. Special focus should be given to adolescent girls through targeted counselling on menstrual hygiene and reproductive health.

Collaboration with other departments can create synergistic effects. Convergence between the school meal program, Integrated Child Development Services, and National Rural Health Mission can ensure continuous nutritional support. Linkages with self-help groups and local cooperatives for procurement of food items can support both program quality and local economy. Involving parents and community members through regular meetings and feedback mechanisms can improve program relevance and ownership.

Future directions for program enhancement should focus on evidence-based improvements. Establishing a robust monitoring and evaluation system with digital tools for real-time tracking of meal quality, consumption patterns, and nutritional outcomes is essential. Periodic nutritional surveys and impact assessments can provide valuable data for program refinement. Research on culturally appropriate fortified foods and ready-to-eat nutritious options suitable for tribal contexts should be encouraged.

Technology can play a supportive role in program enhancement. Mobile applications for menu planning, supply chain management, and nutrition tracking can improve efficiency. Introduction of bio-metric attendance and consumption monitoring systems can ensure transparency and accountability. Solar-powered kitchens and energy-efficient cooking equipment can reduce operational costs and environmental impact.

Capacity building at all levels remains crucial. Regular training programmes for teachers, cooks, and school administrators on nutrition, hygiene, and program management should be institutionalised. Development of training modules in local tribal languages can improve effectiveness. Creating a pool of nutrition counsellors who can work specifically with tribal communities can provide sustained support.

Policy suggestions should also address the broader determinants of nutrition. Improving household food security through promotion of kitchen gardens, small livestock rearing, and sustainable agriculture practices can complement school meal efforts. Strengthening the Public Distribution System to ensure availability of nutritious food items at affordable prices in tribal areas is equally important.

The way forward lies in transforming school meal programs from mere feeding initiatives to comprehensive nutrition and health promotion platforms. This requires political will, adequate financial resources, inter-departmental coordination, and active community participation. With sustained efforts and continuous learning, these programs can play a transformative role in improving the nutritional status and overall well-being of tribal adolescent girls in Wayanad district and similar regions across the country.

VIII. CONCLUSION

School meal programs in the Government Model Residential Schools of Wayanad district have positively influenced the nutritional status and dietary habits of tribal adolescent girls. Regular provision of balanced meals has improved dietary diversity, nutrient intake, and physical growth among many participants. The programs have served as an important intervention for addressing undernutrition in this vulnerable group.

However, challenges such as cultural acceptability, menu diversity, and household food practices continue to limit the overall impact. While significant improvements are visible, complete nutritional well-being requires sustained efforts beyond the school environment.

The study highlights the importance of context-specific approaches that respect tribal food traditions while introducing nutritious options. Greater community involvement, regular monitoring, and integration with household nutrition initiatives can enhance program effectiveness.

In conclusion, well-designed school meal programs can play a transformative role in improving the health and development of tribal adolescent girls. With continued policy support and adaptive implementation, these initiatives can contribute significantly to better nutritional outcomes and brighter futures for tribal communities in Wayanad district.



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