

Original Research Article

Comparing primary health care delivery through family health centres in tribal Kerala: a two-centre study

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ABSTRACT

Background: 'Aardram Mission', a Government of Kerala health initiative, aims to transform Primary Health Centres (PHCs) into Family Health Centres (FHCs) -one of its four key-components - focusing on people-friendly outpatient-services, comprehensive health service access for all including marginalized populations and standardizing healthcare from primary to tertiary settings. The research study compares healthcare service provision, innovations and challenges in delivering healthcare to tribal communities at two distinct Family Health Centres.

Methods: This qualitative study was conducted in FHC Noolpuzha in Wayanad and FHC Edamalakudy in Idukki districts, Kerala, India. It was carried out with provider stakeholders from two FHCs serving tribal populations in two different districts of Kerala, aiming to highlight contrasting examples of healthcare service delivery. These selections aim to showcase the diversity and mechanisms of service provision. Thematic analysis was done on the inputs obtained through the qualitative study.

Results: While one FHC demonstrated judicious use of resources and better functioning, attributed to strong team-building efforts among human resources and active engagement from local political leaders and the community, the other FHC faced significant barriers to healthcare access for tribal communities, including inadequate infrastructure, high direct and indirect costs to the beneficiaries and limited social support.

Conclusions: The findings offer practical insights for enhancing health services for tribal communities in Kerala by promoting stronger collaboration within and between departments, fostering political support and adopting more socially inclusive approaches to healthcare.

Keywords: Equity, Family health centre, Inclusivity, Kerala, Tribal

INTRODUCTION

The Kerala Model has long been recognized for its significant achievements in health and social development, however, scheduled tribes (STs) in Kerala have continued to remain among the state's most marginalized populations, with persistently poor health and social development indicators.¹ While the rest of the state continue to sustain these developmental gains, tribal communities lag significantly behind the majority of the

population.^{2,3} The health of indigenous populations continues to be a major concern globally, nationally and within Kerala, as tribal communities remain disproportionately affected by a wide range of illnesses; particularly chronic conditions, further intensified by enduring disparities in socioeconomic status, education and access to healthcare.⁴ To combat this, one of the main objectives of Aardram Mission launched by Kerala is to provide access to comprehensive health services for the marginalized/vulnerable including the tribal populace.⁵ Against this backdrop, this study was undertaken to

explore and compare the approaches, innovations and challenges involved in delivering primary healthcare services to tribal populations through two FHCs functioning under the Aardram Mission.

Objective

To explore the innovations and provider-level challenges in two FHC serving tribal communities across different contexts and to explore their implications for enhancing tribal health outcomes.

METHODS

Study design

A qualitative approach was employed to meet the objectives of a larger/broader research project on understanding tribal-inclusivity within healthcare systems in Kerala.

Study place

FHC Noolpuzha in Wayanad district and FHC Edamalakudy in Idukki district, of Kerala.

Study duration

The study duration was from January 2024 to May 2024

Inclusion criteria

Only persons aged 18 years and above were included in the study.

Exclusion criteria

Staff with minimal experience/newly joined at the FHCs and those who do not give consent were excluded.

Procedure

Distinctive features from data of two primary-care facilities-FHC Noolpuzha in Wayanad district and FHC Edamalakudy in Idukki district were chosen; with the aim of presenting contrasting examples that highlight the diversity and underlying mechanisms of healthcare delivery in these settings. FHC Noolpuzha was chosen as it is widely recognized across Kerala as one of the best FHCs, known for its innovative and inclusive service delivery to the tribal population. In contrast, FHC Edamalakudy, located deep within the Forest Division as Kerala's first tribal Grama Panchayat (GP), operates in a challenging terrain that presents unique obstacles to healthcare delivery. The factors underlying the differences between these two centres were explored to better understand how context shapes the responsiveness of health systems to tribal healthcare needs. Purposive sampling method was employed to identify the participants. Data was collected from the State/District

level, Local Self-Government (LSG) and FHC level provider stakeholders along with document review.

Ethical approval

The study received approval from the Institutional Ethics Committee of SHSRC-K with certification no.22/2023/SHSRC-K.

Statistical analysis

Qualitative data analysis was conducted using thematic analysis employing inductive and deductive approaches. 'Systems Approach', 'Log Frame Model' and 'Stakeholder Analysis' have been utilized to elucidate how tribal health outcomes could be improved, highlighting the nuances involved in delivering effective healthcare to tribal communities as envisioned by Aardram Mission.

RESULTS

Upgraded to an FHC in 2017, Noolpuzha serves a uniquely positioned Gram Panchayat located at the tri-junction of Kerala, Tamil Nadu and Karnataka. The Panchayat is spread across 17 wards and 215 hamlets, nearly two-thirds of which are forested. It has one of the highest tribal population concentrations in Kerala with population predominantly from the Paniya community, along with Kuruman, Kattunayakan and Oorali tribal groups.

Elevated to an FHC in 2023, Edamalakkudy serves Kerala's only tribal Gram Panchayat in the Munnar Forest Division of Idukki. The population, entirely from the Muthuvan community, is spread across 28 inhabited hamlets (out of a total of 30). Located in Shedkudi-a cluster of six hamlets-the FHC is primarily accessed by nearby residents, with limited utilization from more remote settlements.

The analysis highlights how FHCs are structured to cater to the specific healthcare needs of tribal populations, with Figure.1 intricately illustrating the 'Systems Approach' employed to map and model the factors influencing tribal health outcomes through judicious health care delivery; thereby reflecting the vision for comprehensive healthcare delivery for tribal communities as set forth by the 'Aardram Mission'.

'Stakeholder Analysis' outlines how to prioritize and strategize stakeholder engagement to effectively tackle the challenges of delivering health care services to tribal communities through 'Aardram' (Figure 2). Table1 displays the 'Log Frame Matrix', which captures goals, objectives, activities, indicators, means of verification and assumptions, highlighting pathways for data-driven, need-based and inclusive healthcare delivery. Deeper comparative analysis of FHC Noolpuzha and FHC Edamalakudy highlighted significant disparities in

healthcare delivery, resource availability and responsiveness to tribal health needs. A comprehensive strength, weaknesses, opportunities, threats (SWOT) analysis consolidates these findings and pinpoints the key aspects for focus, as depicted in Figures 3 and 4. Emergent themes from the primary data analysis are as follows.

Infrastructural amenities

FHC Noolpuzha offered a range of institution-based services complemented by well-established outreach initiatives, including 41 Anganwadis and seven Sub-Centres. It provides spacious primary and secondary waiting areas with ample seating with furniture made of culturally-accepted and locally-sourced raw materials (like bamboo wood), with convenient and accessible basic amenities at multiple points and health-education broadcasted through televisions. The waiting areas, outpatient rooms, pharmacy and laboratory were properly organized in line with prescribed directives and all buildings were designed to be accessible to elderly and individuals with disabilities. However, further infrastructural expansion within the existing structure had significant spatial limitations.

In sharp contrast, narratives from FHC Edamalakudy staff highlighted their reliance on improvised solutions and mutual support to navigate systemic deficiencies. FHC Edamalakudy is located deep within the forest, requiring several kilometres of walking. Service delivery was severely constrained by frequent power outages, inadequate road infrastructure and a lack of essential facilities including transportation. Regular shortages of essential medications and kits were also reported. Due to the absence of an on-site laboratory, residents were required to travel approximately 60 kilometers to the nearest health facility for diagnostic services resulting in high direct and indirect costs. Continuous internet access was not guaranteed and staff noted that resolving

electricity-related disruptions could take several days to weeks. These power interruptions hindered timely updates to critical systems such as the Integrated Disease Surveillance Programme (IDSP) and P-form (presumptive cases) reporting. Additionally, eHealth and eSanjeevani services remained non-functional at the facility. Considering the constraints and the difficult geography, the FHC was found to be well-maintained by the available staff.

Human resources

FHC Noolpuzha demonstrated exemplary performance across multiple domains of service delivery. With a comprehensive staff-team of over 60 personnel, including those recruited through Public Service Commission (PSC), National Health Mission (NHM), Hospital Management Committee (HMC) and Local Self Government Institutions (LSGI) appointees, the facility consistently maintained above 90% in the National quality assurance standards assessment. There were no vacancies in the public health team, which included mid-level service providers (MLSPs); with the general Accredited Social Health Activists (ASHAs) supported by tribal community insiders serving as ‘Hamlet ASHAs’ under ‘Oorumithram’- conceptualized as a community friend.

In contrast, FHC Edamalakudy operated under resource-constrained and logistically challenging conditions. Only two doctors were available for consultation on a monthly rotation and there was an absence of PSC staff. The facility’s staffing was primarily limited to two NHM staff nurses, with no designated Pharmacists or Lab Technicians. Consequently, pre-checks mandated by ‘Aardram’ were not conducted. The team was entirely male, with both Junior Public Health Nurse (JPHN) positions vacant. The Junior Health Inspector (JHI) from another FHC held additional charge of FHC Edamalakudy, resulting in only partial service provision.

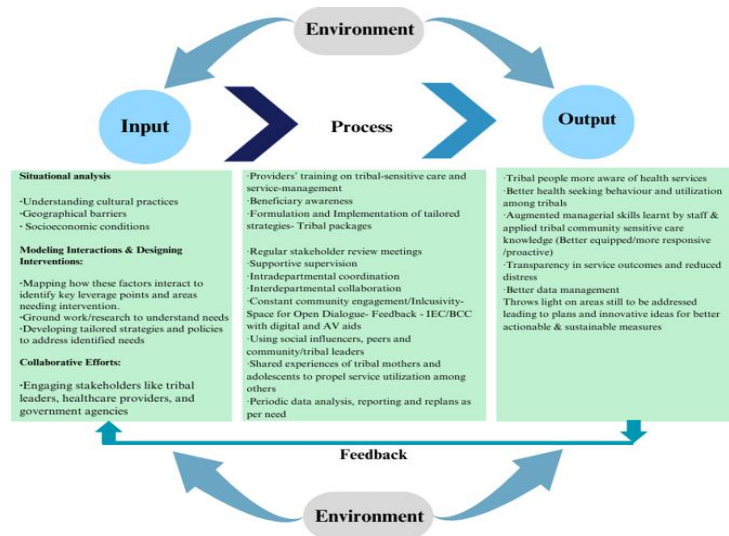


Figure 1: Systems approach.



Figure 2: Stakeholder analysis.

INTERNAL	STRENGTHS <ul style="list-style-type: none"> Fully staffed- PSC, NHM and LSGI appointments Greater GP involvement Good FHC-GP team spirit Community investment and ownership Presence of Hamlet ASHAs Staff trained in Team-building mechanisms by Aardram Mission Pre-checking procedures for basic clinical parameters by SN, trained general & hamlet ASHAs Tribal Help Desk Tribal Mobile Medical Unit GP proactive in medicine purchase Health functional with GP's support IP services despite being FHC Elderly, children-friendly spaces SHE toilet services Mental health + COPD programmes Palliative care unit Food kits for sickle cell patients Add-ons: Physiotherapy and dental department, speech therapy unit, autism care unit, and a fully-equipped gymnasium- through Corporate Social Responsibility (CSR) funds 	WEAKNESS <ul style="list-style-type: none"> Awareness campaigns to combat high alcoholism and tobacco consumption not effective FHC staff clueless regarding rehabilitation of substance-addicted individuals Furthering infrastructure development-a challenge due to spatial constraints in the FHC
	EXTERNAL	OPPORTUNITIES <ul style="list-style-type: none"> MLSPs may be better utilized for eSanjeevani services Monkey intrusions- One Health team involvement More IEC can be displayed using existing televisions and AV aids Actionable steps and support systems in place to help substance-addicted individuals recover. Further collaborations

Figure 3: SWOT analysis- FHC Noolpuzha.

INTERNAL	STRENGTHS <ul style="list-style-type: none"> 24-hour functionality (owing to extreme geography) Recognizing and supporting traditional birth attendants (TBA) Coordinated activities among ASHAs Additional incentives 	WEAKNESS <ul style="list-style-type: none"> Only two doctors-15 days/month Notable absence of PSC staff Absence of female staff Staff transfers Minimal GP level support and team efforts Aardram mandates not followed Shortages of essential medications Improper reporting and documentation. Frequent power outages- IDSP reports affected Non-functional palliative care unit Inadequate medical camps Lack of vehicles Constant referrals Staff Cultural insensitivity- Support withdrawal from tribals
	EXTERNAL	OPPORTUNITIES <ul style="list-style-type: none"> Traditional birth attendants- trained and integrated for better service delivery & support Existing SNs can be honoured, trained and motivated for better outcomes ASHAs can make tribal women aware about menstrual hygiene Awareness generation/medical camps at worksites of tribal people

Figure 4: SWOT analysis- FHC Edamalakudy.

Operationalization of services

All proposed services under an FHC's ambit were provided by FHC Noolpuzha, including special clinics like 'Aswasam' programme for depression, other initiatives for mental health and post-partum depression; as well as 'Swaas' for airway diseases. Despite being in a remote area, eHealth (digitalized health care initiative in Kerala) has been operational since 2018 in FHC Noolpuzha. Provider-provider mode of eSanjeevani services were made available through MLSPs by ensuring strong internet connectivity. Any shortages or delays in the regular supply from the Kerala Medical Services Corporation (KMSCL) are supplemented at Noolpuzha FHC through local purchases, with active support from the GP.

Additionally, the FHC performs a greater number of tests than those prescribed by the Aardram Mission, including several key tests like sputum microscopy and haemoglobin electrophoresis. FHC Noolpuzha offers limited IP care, despite it not being covered by the Aardram Mission at the primary care level.

FHC Edamalakudy reportedly functioned 24/7 because the challenging terrain made adhering to operational timings impossible, with no formal queue or token system. Due to remoteness and accessibility issues, tribal residents often used traditional medicines rather than visiting the FHC. Outreach activities and medical camps required closing the hospital temporarily, affecting emergency care. No special clinics were operational, though the FHC did monitor NCDs among the tribal population. Specialist doctors like Psychiatrists, Dentists and Gynaecologists could not visit the FHC and the palliative unit was non-functional at the time of data collection (early 2024). Medical camps were mostly limited to a few accessible hamlets due to transportation difficulties. Staff also highlighted the need for PSC staff to manage reporting and documentation work.

Enablers/innovations for inclusive care

Noolpuzha staff perspectives highlighted an organizational culture grounded in compassion and inclusivity, underpinned by robust infrastructure and logistical support. Staff training under the Aardram Mission and the integration of government-initiated eHealth, eSanjeevani and the GP initiated telemedicine support were noted as significant enablers of efficient care delivery. Tangible involvement of the GP as part of decentralized system of care in Kerala enabled greater Human Resource filling and innovative service initiation and sustainability.

'Elderly corners' were established in the premises, complete with televisions for relaxation and social gathering. Inclusion of ST promoters to run a 'Tribal Help Desk' at the centre, 'free electric-vehicle transportation' facility for the elderly, differently-abled

and pregnant; tribal AN home, physiotherapy units, gymnasium, anaemia-assessment programmes with a nurse specifically appointed by the GP, rehabilitation care, cost-effective elderly dental care, menstrual hygiene resources and Child Health Assessment and Monitoring Programmes are services provided by this FHC. These efforts were supported by substantial Corporate Social Responsibility (CSR) contributions and local governance backing.

Due to FHC Edamalakudy's challenging terrain and accessibility issues, home births have persisted. Additionally, cultural beliefs among the women discourage them from early reporting of pregnancies. To address this, the facility implemented special initiatives, including recognizing, acknowledging and supporting traditional birth attendants to improve maternal care services. Moreover, staff working in these difficult conditions received additional departmental incentives, amounting to 20% of their salary, to fostering greater commitment. The existing staff demonstrated strong resilience and commitment, consistently upholding good work ethic.

Challenges

Despite efforts through awareness campaigns by FHC Noolpuzha to address rising rates of alcoholism and tobacco use, the impact has been limited. The FHC staff acknowledged a gap in their ability to support addicted individuals, noting that awareness alone was not enough without actionable steps and comprehensive support systems to enable recovery. Situated close to the forest, the FHC faces a persistent menace of monkeys entering the premises, leading to property damage, particularly to CCTV cameras and televisions.

Staff at FHC Edamalakudy reported substantial barriers to patient follow-up and emergency care, including reliance on 108 ambulance services from distant hubs and the frequent need to use personal transportation. Poor phone connectivity further compounded the issue. So, the tribals mostly visited the FHC when they had nearby rural employment scheme work, using only such opportunities to also seek consultations. The FHC lacked dedicated clinics for maternal, mental health or NCD care, though bi-monthly outreach camps provided temporary relief. Limited governance support and infrastructure funding posed additional challenges, though small allocations were provided for local medicine purchases. Staff also described difficulties in managing personal emergencies due to the inability to take sick leave, as finding substitutes was challenging. Accessibility challenges significantly affected patient revisits and continuity of care; in the doctor's absence, staff nurses were often tasked with diagnosing and treating patients. Staff highlighted that bi-monthly medical camps with gynaecologist participation would benefit the population in the absence of antenatal care services. Although staff received an additional 20% salary incentive for working

in such challenging terrains, these payments were infrequent. Moreover, they faced constraints with regard to safety in their shelter and easy food material procurement amidst the harsh climate and tough geography. While FHC Noolpuzha exemplifies a best-practice model with comprehensive staffing, innovation

and strong community links, FHC Edamalakudy highlights the persistent challenges of remote tribal healthcare. Study insights underscore how geography, governance and resources shape the responsiveness and inclusivity of primary care for tribal populations.

Table 1: Logical framework for services to be provided to beneficiaries including tribal sects through FHCs.

	Project description	Indicators	Means of verification	Assumptions/risks
Goal	Equitable, affordable, comprehensive and quality care to all including vulnerable sects like tribals	Sustainable development goals 2030 targets	National level data-national family health survey, health management information system	Continued political will (with changing parties). Continuum of collaborative efforts from GP: funding, sustained intersectoral collaboration, major natural disasters hindering organisational development efforts
Purpose	Greater tribal health care inclusivity by health systems and better health outcomes	% increase in positive health outcomes among tribal sects	State and district level Aardram data on tribal health, State level LSG reports	Competent Human Resources who stay with the FHC for longer periods. Difficult terrains and transfers could affect adversely. Culturally sensitive & need based care augmenting community support
Output	More culturally-sensitive and need-based healthcare provision. Better service utilization	% increase in services delivery coverage+% increase in service utilization	Facility level statistics, GP level report. Project progress reports	Continued community engagement would foster sustained care
Activities	Non-communicable diseases (NCD) screening, diagnosis, management, drug supply, referral follow up, defaulter tracking	% of population screened for NCDs % under control	Aardram facility (e Health), district and state level statistics and reports (IDSP, Reproductive and Child Health portal Training reports	Reorientation training for staff on culturally-sensitive services essential. Feedback and review mechanisms with FHC level, GP level, tribal beneficiaries & collaborative sector stakeholders: necessary to ensure improved and sustainable care, staff turnover needs to be kept in check
	Mental Health (MH)- Screening, management, referral, MH clinic, drugs,DMHP camps	No. & % of new cases, % of cases under treatment and defaulters tracked		
	Chronic obstructive pulmonary disease (COPD)	% of patients screened under COPD programme % put on inhaler medications		
	Geriatric care	% of patients attended geriatric clinic		
	Palliative care	% of patients received palliative care services		
	Communicable Diseases (CDs)-Detection, reporting, sample collection/testing and management	% of cases, % of cases under treatment		
	Vector borne-Dengue, Malaria, Japanese Encephalitis, Filariasis and Kala Azar + Water borne diseases	% of malaria & indigenous malaria cases, annual blood examination rate, % of suspected & confirmed dengue cases, % of patients received morbidity management services. % of drinking water-sources chlorinated		
	Pre-pregnancy, child birth and post-natal care	% of pregnant mothers who received minimum four antenatal check		

Continued.

Project description	Indicators	Means of verification	Assumptions/risks
	ups, % of high risk antenatal cases		
Neonatal and Infant, Childhood and Adolescent health care services including immunization	% of infant deaths, % of low birth weight new born, % of fully immunized infants/children, % of adolescents attended adolescent clinics		
Training all Health & Wellness Centres (HWCs) in tribal sensitive and affirmative care	% of staff categories underwent induction & reorientation training: Skill based, team-training and tribal affirmative care		
Chalking out evidence and need based Tribal care packages	No. of stakeholder consultative workshops held. % of tribal sects and individuals received care through each package component		

DISCUSSION

While stark disparities were revealed between the two FHCs, underlying socio-political and geographical dynamics significantly shaped how healthcare services were delivered. While better resources and enhanced functioning was seen in one FHC which was reflective of team building efforts and greater GP as well as community engagement, significant barriers to healthcare access among tribal communities was seen in the other FHC including high direct and indirect costs, inadequate infrastructure and social support challenges. Visible team-building efforts and community support were woven into the tapestry of the functional success of FHC Noolpuzha with adequate literature showing how such outputs could be attributed to effective team-training.⁶⁻⁹ These tangible results can be attributed to a key component of the ‘Aardram Mission’ at the state level-the implementation of specialized team-building training programmes. The training sessions centre around the theme of delivering compassionate care, which broadly embodies the term ‘Aardram’, with teamwork as a core component. These sessions brought together representatives from the Gram Panchayat and FHC staff, facilitated by resource-persons with extensive experience within the health system and direct involvement in the formulation of the Mission’s framework.^{5,7}

Several Indian and Kerala specific studies show financial burden of purchasing medications and transportation expenses, often deterred individuals from seeking timely care as seen in this study.¹⁰⁻¹⁴ It is also seen from Moosan et al and other studies that cultural beliefs, social dynamics and inadequate interdepartmental coordination, with the LSG, further complicated health care resources, service delivery and utilization.¹⁵⁻¹⁷ Addressing these barriers requires a comprehensive approach that includes

improving resource allocation, enhancing infrastructure, providing social protection and fostering community engagement through greater leadership and managerial strategies at all levels.^{17,18}

Though there is good support from the forest department, further inter-departmental innovations could significantly enhance primary health care in tribal settlements deep in the forest areas. Joint inter-departmental team capacity and skill building training workshops for health workers and forest department staff can improve cultural sensitivity and emergency preparedness, especially for challenges unique to forest environments. This could reduce the current reactive approach, where action is taken only after major emergencies arise and instead establish a proactive, ongoing system to address the healthcare needs of vulnerable communities.

Strengthening and updating rapid-response protocols for medical emergencies in remote areas and ensuring culturally sensitive engagement with tribal communities, will further ensure that health care delivery is more accessible. Animal intrusions as reported in Noolpuzha can be controlled by the forest department’s coordinated intervention. Shared monitoring work and active participation in review-meetings along with establishment of robust data-sharing systems between the Health and Forest Departments would ensure better tracking of health vulnerabilities linked to the forest ecosystem.

Despite the overall satisfactory performance of FHC Noolpuzha, addressing substance abuse remains a persistent challenge. A segment of beneficiaries continues to engage in habitual consumption of cheap alcohol and other psychoactive substances, which in turn compounds mental health challenges and suicidal tendencies.^{19,20} This entrenched pattern necessitates sustained, multisectoral

intervention. Strengthening linkages with Vimukthi centres (deaddiction centres run collaboratively by the Department of Health Services and the State Excise Department in Kerala) and expanding targeted outreach initiatives may enhance de-addiction efforts and promote long-term behavioural change.²¹⁻²³ Limited human resources and possible inadequate supportive supervision may have rendered the absence of the key clinical component of Aardram- pre-checks for blood pressure, blood sugar and body mass index assessment; non-functional at FHC Edamalakudy. Rotation-based specialist visits (Psychiatrists, Gynaecologists, Dentists) at least quarterly, may leverage better outreach. Investment in solar power solutions and backup generators could provide continuous electricity supply in the FHC. Establishment of mobile laboratory and diagnostic units in collaboration with district health authorities may minimize the need for long-distance travel.

Greater integration of tribal hamlet heads (formerly called as 'Ooru Moopans') would enhance greater community mobility and sustainability.^{24,25} Additionally, training forest staff as community health volunteers could expand outreach and trust-building efforts. Newer community health initiatives like nutrition programmes using forest produce that also promote forest conservation would create sustainable, culturally respectful synergies. Expanding traditional healer collaboration by recognizing and integrating traditional birth attendants (TBAs) as part of the maternal health ecosystem, as well as co-creating health education campaigns in local tribal dialects that respect cultural beliefs while encouraging timely care-seeking, could be effective not only for childbirth-related care but also for supporting maternal mental health.²⁶ Implementing realistic measures to lower the financial and logistical burdens associated with institutional deliveries may enhance access and utilization.^{27,28}

Lack of female staff may significantly impair the functioning of centres which are particularly located in a tribal setting where gender-sensitive care is crucial. Among tribal women in Edamalakudy, where there are strong cultural norms that lead many to conceal their pregnancy, compounded by a longstanding mistrust of formal healthcare systems with low utilization of antenatal care services as in Moosan et al's study done in Kerala, the absence of female health workers not only reduces the likelihood of early antenatal registration and follow-up but also reinforces existing barriers to accessing maternal and reproductive health services. The presence of female staff is not just desirable but essential for creating a culturally safe and responsive healthcare environment in such communities.^{29,30}

This, in turn, also highlights the reluctance of personnel, particularly women, to take up postings in remote tribal areas which is often rooted in concerns about poor housing, lack of sanitation facilities, limited communication networks and overall insecurity. Without

addressing the critical need for adequate infrastructure to ensure safe and dignified living and working conditions for all genders of health staff, it becomes difficult to attract and retain committed health workers to such hard-to-reach areas where healthcare is often a luxury for the beneficiaries.³¹ Modified replication of best practices from FHC Noolpuzha within the geographical constraints of Edamalakudy could be considered through advocating for district-level convergence platforms by bringing together tribal welfare, local self-governance and health departments to ensure coordinated support. It is to be noted that each of these recommended solutions shall be possible only if backed with adequate leadership and involvement of all key stakeholders on a timely basis, leading to a 'felt-needs' based, yet logical, feasible and sustainable approach with continuous monitoring, supportive supervision and periodic evaluation mechanisms.^{32,34}

Both emic and etic aspects need to be covered while working on improved strategies to care for this vulnerable sect of the population and deeper studies need to be initiated in this regard.³⁵

Limitations

As the study examined the implementation of the components of Aardram Mission within tribal contexts, the findings are closely linked to Kerala's decentralized health governance structure which may not be directly transferable to settings with different administrative and health system arrangements. The study captured service delivery conditions during the specific period of data collection. Human resource availability, infrastructure, outreach activities and operational challenges in tribal settings are dynamic and are liable to change over time, depending on administrative decisions, seasonal accessibility and policy implementation.

CONCLUSION

Integrating managerial tools such as systems approach, stakeholder analysis, log frame matrix and SWOT analysis at institutional, district and state levels on a continuous basis can offer a comprehensive strategy to assess and strengthen healthcare provision at FHCs serving tribal communities. Tailored and integrated solutions that address unique challenges can significantly enhance health outcomes. By tackling identified barriers through optimized resource allocation, improved infrastructure, social protection measures and strengthened community engagement, a holistic approach can be achieved. Understanding and acting on these interconnected factors can make healthcare systems more responsive, equitable and effective for tribal populations.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee by the Institutional Ethics Committee of SHSRC-K

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