



Maternal Healthcare Services in International Border Areas of Tawang and Longding districts of Arunachal Pradesh: A Comparative Analysis

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Abstract

Healthcare is acknowledged as the basic fundamental human right. However, access to healthcare, particularly maternal healthcare is a major concern in India including the state of Arunachal Pradesh. The maternal healthcare remains critical in remote border areas due to difficult terrain, poor connectivity and long travel distances, limiting health services and their utilization. Thus, the paper is an attempt to depict the current scenario of maternal healthcare services at Sub Centre (SC) in Tawang and Longding districts of Arunachal Pradesh, considering two parameters i.e. accessibility and availability. The study evaluated the geographical accessibility, service utilization and availability of infrastructure, human resources, essential equipment, drugs and consumables, and diagnostic services as a benchmarked against IPHS norms. The study is based with primary and secondary data collected from the healthcare providers and Programme officials and government reports. The study found that the maternal healthcare delivery in these border districts is impeded by geographical isolation, infrastructure and institutional limitations, and human resource shortages at the SC level. Furthermore, low ANC registration (1st Trimester Registration, and completion of four or more ANC visits) and institutional delivery suggest poor utilization of maternal healthcare services among women. Thus, the efforts should be made to strengthen the infrastructure facilities, SC staffs, training and supervision, and community engagement are essential to improve coverage, reduce maternal and infant mortality, and to advance Universal Health Coverage in these underserved international border areas.

Keywords: Maternal Healthcare, International Border Area, Availability, Accessibility, Service Delivery.

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Introduction

Access to healthcare is a fundamental right of every citizen in a country. Timely use of personal health services prevents disease and disability, reduce early deaths, and promote health equity and helps in achieving better health outcomes. The effectiveness of a country's healthcare system is reflected in its ability to provide equitable and universal health coverage to all citizens (Zahidi et al., 2024). Accessibility and availability of healthcare facilities and services are essential components of universal health coverage, ensuring timely and appropriate care, and encompass dimensions such as availability, accessibility, acceptability, affordability, and adequacy as identified by Penchansky and Thomas (1981).

The true measure of healthcare accessibility lies in better health outcomes for individuals. Ongoing assessments are crucial to identify and address potential barriers and inequalities, ensuring everyone can access the care they need (WHO Commission, 2008). Despite major improvements in global and Indian healthcare systems, adequate healthcare accessibility remains limited for many people (Balarajan et al., 2011) in remote areas. Distance, poor resources, and lack of trained facilitators factors contribute to low healthcare accessibility among the vulnerable groups in India (Balarajan et al., 2011; Madankar et al., 2024). Similarly, the lack of availability of healthcare facilities and services such as proper infrastructure, adequate number of human resources, drugs and consumables etc. put constraint to equitable healthcare for all. Thus, the rural-urban divide in healthcare system is visible as the healthcare system is largely concentrated in urban areas, where 75% of the country's healthcare professionals are located, resulting in overburdened Sub Centers (SCs) and compromised quality of healthcare (Patel, 2025). From the population, the marginalized communities including Scheduled Castes and Scheduled Tribes, face major barriers to healthcare access, leading to high maternal and infant mortality.

Poor accessibility and availability of healthcare services, particularly relating to maternal healthcare, affects mother and child worldwide. The global maternal mortality was accounted for approximately 287,000 deaths in 2020 with vulnerable women facing preventable maternal deaths that were further aggravated by disease outbreaks, public health emergencies, and societal conflicts limiting timely access to quality care (Souza et al., 2024). The healthcare accessibility parameters such as ANC, institutional delivery, vaccination, anemia, maternal and child mortality reflects inequalities in North-east India (Das, 2024), including Arunachal Pradesh. The state is situated in the eastern part of India, and has 28 districts. There was a substantial decline in both maternal and child mortality indicators, as highlighted by the Ministry of Health and Family Welfare in the National Family Health Survey 6 (NFHS-6). Thus, disparities in health status and healthcare access are still a matter of concern in the state, particularly in the rural areas. ANC coverage in Arunachal Pradesh varies widely across districts, ranging from 18.3%–31.1% to 39.6%–46.9% and despite adequate rural health infrastructure, key RMNCHA+N indicators such as first trimester registration (36.7%) and four ANC check-ups (36%) remain far below the national averages of 71.9% and 79.4% respectively (Health Dossier, 2021).

The state has marginalized healthcare services in the region due to difficult terrain, monopolistic approaches of government players in absence of private healthcare provider, scatter human population (Taku, 2021). Besides these, insufficient number of healthcare workers, lack of awareness, difficult to reach healthcare facilities, communication barriers and the influence of traditional beliefs and practices are factors for poor maternal healthcare. Therefore, the study focuses on comparative study of two border districts viz. Tawang and Longding considering two parameters of accessibility and availability of maternal healthcare facilities and services to women in Sub Centre level (SCs) within the three-tier structure of India's rural healthcare system. SCs are primary choice for doorstep access to essential preventive and curative services. A Sub Centre, serving 5,000 people in plain areas and 3,000 in hilly or difficult regions, is the first point of contact between the community and primary healthcare (Borah & Newar, 2021). Longding district is located in the south-eastern part of Arunachal Pradesh and shares an international border with Myanmar whereas Tawang district is located in the western part of the state and shares an international border with Bhutan and China. The study considers SCs, located within the range of 0-50 km from the international border in both the region.

Research Methodology

The study includes health Sub-Centres in two border districts of Arunachal Pradesh viz. Tawang in the west and Longding in the south-east. A total of 6 SCs are covered under the study with 2 SC in Tawang covering a total of 3 villages with a population of total 614 while in Longding there are 4 SCs covering 12255 population from 12 villages. There are Six Sub Centers studied in total, two in Tawang district (Thingbu and Mago) and Four in Longding district (Khanu, Konnu, Khasa and Nginu).

The maternal healthcare accessibility was analyzed with two indicators i.e., geographical accessibility and healthcare service utilization (ANC registration and type of delivery) for the period of 2022-23. The availability of maternal healthcare services was examined considering the indicators that include human resource, essential equipment, drugs and consumables and diagnostic services. The study is based on both primary and secondary data. The primary data was collected from healthcare provider such as Medical Officers (MO), Staff Nurses (SN), Auxiliary Nurse Midwifery (ANM), Accredited Social Health Activist (ASHA), Anganwadi Workers (AWW) and Programme Officials to know the availability of healthcare resources and the secondary data sourced from various academic publication and government reports like HMIS, SRS (Sample Registration System), Medical record, Census of India, DLHS (District Level Household Survey), NFHS (National Family Health Survey).

Status of Accessibility of Maternal Healthcare

The accessibility of maternal healthcare was evaluated through indicators that include geographical accessibility and utilization of healthcare services such as ANC registration,

type of delivery, vaccination coverage by the pregnant women as highlighted in Table 1 and Table 2.

Table 1: Status of Sub Centre Catchment Population and Geographical Accessibility to FRU.

Indicators	Tawang	Longding
Catchment Population (average)	614	12255
Distance to nearest FRU (km)	38 km	40.25 km
Time required to reach nearest FRU (minutes)	210 min	112.5 min
Mode of Transport (Type)	Road Transport	Road Transport

Source: Primary data from the Sub-Centers

Table 1 reveals significant geographical disparities in accessing First Referral Units (FRU) between Tawang and Longding districts. It shows health centers in Tawang district serve a smaller catchment population compared to Longding district; however, travel time to reach the nearest First Referral Unit (FRU) is high in Tawang despite of its short distance. On the other contrary, Longding serves a larger population and has relatively better accessibility due to less travel time to reach FRU. In both districts, road transport is available.

Table 2: Status of Maternal Healthcare Service Utilization

Indicators	Tawang	Longding	Total
1. ANC registration	7 (100%)	285 (100%)	292 (100%)
1.1 First trimester	2 (28.58%)	102 (35.79%)	104 (35.61%)
1.2 4 or more ANC	0 (0%)	75 (26.3%)	75 (25.68%)
2. Total of Delivery	4 (100%)	247 (100%)	251 (100%)
2.1 Home Delivery	1 (25%)	159 (64.37%)	160 (63.74%)
2.2 Institutional delivery	3 (75%)	88 (35.62%)	91 (36.25%)

Source: Compiled from secondary data, 2023-24

Table 2 shows that Longding district has relatively better ANC utilization indicators as compared to Tawang district. The first trimester ANC registration and 4 or more ANC visit were 35.79% and 26.3% in Longding district as compared to 28.58% and 0% in Tawang district. Similarly, the aggregate performance was relatively low indicating suboptimal early ANC utilization and adequate number of ANC. In case of type of delivery opted by the women, the institutional delivery was 35.62% and home delivery found to be high (64.37%) in Longding district, whereas Tawang had 75 % of institutional deliveries as against of 25 % home deliveries. The aggregate performance was low i.e. 36.25 % as compared to home delivery (63.74%).

Status of Availability of Maternal Healthcare Resources

The maternal healthcare resource availability was assessed taking the indicators of health infrastructure, human resource, essential medical equipment, essential drugs and consumables, essential blood test in SCs for the study, based on the responses from the healthcare providers.

Table 3: Infrastructure facility available at Sub Centers.

Infrastructure Facility	Tawang (%)	Longding (%)
Building in well-maintained condition	0	25
Functional Staff Quarters for Staff Nurses	0	25
Electricity back up	50	100
Running 24*7 water supply	100	25
Mechanisms for Biomedical waste management (BMW) is available	0	25

Source: Primary data from the Sub-Centers

Table 3 reveals significant infrastructure gaps in both the districts. However, Tawang lacks in well-maintained health centres building, functional staff quarters and BMW management entirely (0%), while electricity backup covers only half (50%) but has full coverage (100%) of running water supply. On the other hand, Longding has relatively better infrastructure facilities, but still misses full coverage particularly staff quarters (25%), BMW (25%), building with good condition (25%) and are available only in one sub-center, except for electricity backup (100%) which is functioning in all sub-centres.

Table 4: Essential blood test services available at the SubCentres.

Essential Blood Test	Tawang (%)	Longding (%)
Blood sugar	100	75
Haemoglobin	100	75
HIV (RDT)	0	75
Urine albumin and sugar	100	25

Source: Primary data from the Sub-Centres

Table 4 explained the difference between availability of various essential blood tests in the studied sub centers. It was noted that except HIV (RDT) test, all other essential blood test services like Blood sugar, Haemoglobin, urine albumin as well as sugar test were available in all SCs (100%) in Tawang district. On the other contrary, in Longding district, the blood sugar, haemoglobin and HIV (RDT) blood tests services were available in only 3 SCs (75%) and urine albumin as well as sugar test service available in 1 SC (25%).

Table 5: Essential medical equipment in the Sub Centres.

Essential medical equipment	Tawang(%)	Longding(%)
BP Instrument/Stethoscope	100	100
Delivery sets	100	75
Neonatal, Paediatric and Adult Resuscitation kit	0	25
Weighing Machine	100	100
Needle Cutter	100	75
Radiant Warmer	0	50
Suction apparatus	0	50
Mobile light	0	50
Delivery Tables	0	75
Emergency Injections Tray	0	50
Hemoglobinometer	100	50
VDRL Kit	0	75
Testing Kits for Pregnancy	0	75
Testing kits of Urine albumin and Sugar	0	25
Glucometer	100	75

Source: Primary data from the Sub-Centers

Table 5 revealed poor availability of essential equipment at sub-centers in the Tawang districts as compared to Longding district. The shortages of essential medical equipment were particularly observed in Tawang. BP Instrument, Stethoscope, Delivery Sets, Weighing Machine, Needle cutter, Hemoglobinometer, and Glucometer were found in all SCs (100%), however other essential medical equipment was not available (0%). The SCs in Longding district were fully equipped with BP Instrument/Stethoscope and Weighing Machine (100%), yet Delivery Sets, Functional Needle Cutter, Delivery Tables, VDRL Kit, Pregnancy testing kits and Glucometer were available in 3 SCs (75%) and functional radiant warmer, functional suction apparatus, functional mobile light, emergency injections tray and hemoglobinometer were available in only two SCs (50%). Only 1 SCs (25%) had testing kits for urine albumin as well as sugar along with the kit for neonatal, pediatric and adult resuscitation.

Table 6: Essential drugs and consumables in the Sub Centers

Details	Tawang(%)	Longding(%)
EDL available and displayed	0	50
IFA tablets	100	100
Vitamin A syrup	100	50
Inj. Magnesium Sulphate	100	75
Inj. Oxytocin	0	75
Misoprostol tablets	0	100
Mifepristone tablets	0	75

Source: Primary data from the Sub-Centers

Table 6 revealed the poor availability of the essential drugs and consumables in the Sub Centers in Tawang district as compared to Longding district. In Tawang districts the IFA tablets, Vitamin A syrup and Inj. Magnesium Sulphate were available to all SCs (100%) while other essential drugs and consumables were missing (0%). In Longding district, essential drugs and consumables like IFA tablets and Misoprostol tablets were available in SCs (100%), however Inj Magnesium Sulphate, Inj Oxytocin and Mifepristone tablets were available to only 3 SCs (75%) and EDL and Vitamin A syrup to 2 SCs (50%).

Table 7: Human Resource in the Sub Centres.

Human Resource	Tawang (%)	Longding (%)
Staff Nurse (GNM)	0	25
ANM	25	100
Others	100	25

Source: Primary data from the Sub-Centers

Table 7 shows poor human resources in both the districts as no staff nurse was available to SCs in Tawang district (0%) and ANM was available in only one SC (25%) whereas other human resource was available to all SCs (100%). In Longding district, ANM were available in all sub-centers (100%) but only one SC had staff nurse (25%) and other human resources (25%). The availability of key trainings such as SBA, NSSK, and Dakshata for nurses posted at sub-centers in the studied districts was severely lacking in all SCs of both districts. It was revealed that only immunization as well as cold chain training were conducted for the staff of SC Thingbu and SC Mago of Tawang District.

Discussion

Accessibility and Service Delivery

The findings reveal spatial inequality in access to maternal healthcare in the study area. Tawang, located in the western part of the region, has a lower population density and has limited access to health facilities that provide 24x7 emergency obstetric and newborn care due to its remoteness and difficult terrain, affecting its time travel to reach the nearest FRU. On the other hand, health centers in Longding district, experience a higher population burden but have relatively better accessibility due to less time travel to reach the nearest FRU (refer Table 1). The travel time and distance to the health facilities significantly affect healthcare accessibility and has positive correlation with each other (Mseke et al., 2024). The greater travel time to the nearest FRU may have negative implications on maternal healthcare outcomes by increasing delays in emergency care, lowering institutional deliveries and contributing to the underutilization of services and may increase with the risk of morbidity and maternal mortality.

The maternal healthcare services such as ANC attendance and institutional delivery reveals suboptimal usage in the study area. Tawang has relatively higher service utilization than Longding district, despite of its geographical constraints (refer to Table 4), suggesting access to maternal healthcare not only affected by the geography of the place but other factors including women's education, awareness, income, exposure to media, decision-making autonomy within the household, access to information, trust in healthcare providers and so on may also play a significant role in improving the accessibility and utilization of maternal healthcare services.

Infrastructure

A notable disparity in the availability of infrastructure facilities across SCs in both the districts is observed. There are visible gaps in the availability of healthcare infrastructure across the region due to absence of critical components indicating limitations in providing comprehensive maternal and reproductive healthcare services. However, the pattern varies considerably between districts. Longding district had comparatively better availability of health infrastructure compared to Tawang (refer to Tables 2).

Essential Tests

Essential diagnostic tests such as CBC, blood sugar, and HIV (RDT) are now commonly available and are considered preliminary assessments for maternal health. However, the healthcare centres are not fully equipped to provide all of these essential tests. The findings reveal variation in the availability of essential blood test services. Longding relatively outperformed Tawang (Table 3). Non-availability of essential diagnostic services has practical implication on service delivery in these two remote hill districts where travel is difficult while compels the patient to travel long distances to PHCs or other higher health centers. Thus, it is important to enhance the functional capacity of these health centers by providing them with essential tests facility.

Essential Medical equipment, Drugs and Consumable

Though Tawang has full availability of a few basic instruments but lacks critical maternal and emergency care equipment at the sub-centers. On the other hand, Longding shows relatively better availability of essential equipment, yet its coverage remains partial (refer to Table 5). Many essential drugs and consumable found to be absent at the SCs in Tawang (refer to Table 6). Thus, there is inadequate and uneven distribution of the resources and does not meet the criteria of IPHS norms, highlighting a critical gap in achieving quality maternal healthcare services.

Human Resources

In general, Longding shows better staffing coverage compared to Tawang. However, the findings reveal a significant disparity in the availability of human resource in both the districts at SubCenters (SCs) level due to inadequate human resource with differences in

the pattern of shortages against IPHS norms. It also reflects a critical barrier to the effective implementation, quality, and coverage of the 12 service packages of Comprehensive Primary Health Care (CPHC) at the Sub-Centre level in the study region. Thus, a comprehensive service delivery remains constrained in both districts.

The existing gap in healthcare resources may be linked to geographical isolation, infrastructural limitation and uneven resource allocation. It is essential to address these gaps for improving healthcare access and outcomes in underserved areas particularly remote rural areas, where a large portion of the population resides yet limited access to quality medical treatment remains a constraint and are particularly affected by the shortage of skilled healthcare workers (Kumar, 2023). Poor retention of trained healthcare personnel and inadequate key trainings for the healthcare personnel also challenged the effective delivery of the healthcare services in the region. Thus, findings underlie the need for targeted interventions towards improving incentive mechanisms for health workers, strengthening recruitment strategies and ensuring rational distribution of human resources.

To overcome the healthcare challenges, Free Diagnostic Services initiative was launched in 2015 by the Ministry of Health and Family Welfare, Government of India. This aims to ensure the availability and accessibility of essential diagnostic tests at public health facilities, aiming to reduce out-of-pocket expenditure for patients on diagnostics. This free service covers hematology, serology, biochemistry, clinical pathology, microbiology, radiography, and cardiology related test and contains 14 tests at the Sub Center level (Padhan et al., 2025). Ensuring consistent availability of quality-assured maternal health commodities and services, along with expanding access to modern contraception to prevent unintended pregnancies, could significantly reduce maternal mortality (Souza et al., 2024). The 4th Common Review Mission, Arunachal report by MoHFW revealed that, weak supply chain management, internet connectivity, lack of comprehensive plan for equipment purchase etc. are the primary reason of such lack in healthcare accessibility in these regions (Health on hills).

Conclusion

The region which comprises of both the eastern and western region of Arunachal Pradesh show a significant gap in accessibility as well as availability of maternal healthcare facilities at Sub-Centre level (SCs). The maternal healthcare challenges are linked to geographical constraints, infrastructural and institutional limitations and shortages of human resources, reducing the effectiveness of delivery of maternal health services. Strengthening SCs with the required staff and infrastructure, as mandated by IPHS norms, is essential to achieving Universal Health Coverage. Furthermore, better staffing, provision of training to health providers, supervision and monitoring of health facilities would ensure a well-supported health care system that further improve access, reliability and effectiveness of delivery service. Mobile medical clinics, improved communication systems, better referral support and follow up of beneficiary can be incorporated as healthcare measures to reduce the

existing barriers to maternal healthcare. In addition, strengthening community awareness, health education and involvement of community key influencers would further improve the utilization of maternal health services that led to attainment of universalization of healthcare.

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