

Assessment of an innovative referral transport -Motor bike ambulance/Sangi Express in tribal areas of district Kabirdham, Chhattisgarh, India: A mixed method study

Awanish Sharan¹(IAS),Ankita Tiwari²

¹(Indian Administrative Services, India)

²(National Health Mission, Chhattisgarh, School of Management/Manipal Academy of Higher Education Karnataka, India)

Abstract:

Background: Maternal mortality remains a priority under goal 3 of Sustainable Development Goals (SDGs). Providing antenatal care services is very essential to reduce maternal deaths. Timely access to basic as well as emergency obstetric services depends highly on availability of effective referral transport. It acts as a link between the home of pregnant women and a health facility. An innovative motor bike ambulance initiative named SangiExpress was implemented in tribal clusters of district Kabirdham, situated in Chhattisgarh, the central state of India in order to overcome the accessibility issues, as well as to strengthen obstetric care services. This initiative intended to provide practical transport solution in difficult to reach areas, where the state-run referral transports faced several challenges. It was implemented with the objective of providing referral transport services in these tribal areas with special emphasis to particularly vulnerable tribal groups (PVTGs).

Materials and Methods: A mixed method study was carried out to evaluate the performance of referral transport motor bike ambulance/SangiExpress, in terms of utilization and its user's perspective. The qualitative part of study used interviews of users to obtain provider narrative. The quantitative part utilized usage records maintained by health facilities and pilots of motor bike ambulance/SangiExpress for analysis of performance. Analysis was carried out using STATA13 and utilization was reported as mean standard deviation, frequency and proportion.

Results: Motor bike ambulance/Sangi Express was utilized for several purposes. Nearly three fourth (72%) of the users accessed it for seeking obstetric care, followed by utilization for child health checkup (16%) and during emergency or for referral to higher center (13%). The qualitative findings revealed that the motor bike ambulance / Sangi Express support was prompt, accessible and highly acceptable. Moreover, the users considered it a way of reducing out of pocket expenditure, and also helped women to build confidence in seeking health services

Conclusion: Motor bike ambulance/Sangi Express served successfully to a diverse group of beneficiaries, providing prompt and assured services to the tribal community. The purview of this referral transport extended beyond obstetric referrals to provide several other referral services including child health, trauma and accidental referrals. This innovative referral transport in form of specially designed motorbike is very well suited for difficult to reach areas and reduces barriers for receiving health care.

Key Word: Referral transport; Ambulance; Obstetric emergency; Pregnant women, Patient transport.

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I. INTRODUCTION

The global estimates of maternal deaths declined by 35% between the years 2000 to 2017. However, these estimates remain high in Low and Middle Income Countries (LMICs). The countries like Nigeria and India had the highest estimates, accounting for approximately one third (35%) of global figures¹. Maternal mortality remains a priority under goal 3 of Sustainable Development Goals (SDGs). Providing basic as well as emergency obstetric services is very essential to reduce maternal deaths². Timely access to these services depends highly on availability of effective referral transport. It acts as a link between the home of pregnant women and a health facility². It is estimated that more than 75% of maternal deaths could be prevented through timely access to essential child birth related care^{2,3}. Evidently 27% of the maternal deaths happened enroute the health facility². According to previous studies, 55% of women delivering at home cited lack of timely

transportation as a primary reason for home delivery³. Maternal deaths are often a consequence of a long and chain of delays and only in few cases death can be attributed to a specific event. Nearly two third of the India's maternal deaths occurred at home or in transit³. Referral plays a key role in the survival of women and their newborn as the complications during birth may become life threatening.⁴ Referral transport services affect access to both preventive and childcare services. It is a coordinated movement of health care seekers, through the health system to reach a higher level of facility in a small and often fatal window of time⁴. It is widely recognized that improved maternal and neonatal health outcomes require a continuum of care, from the household and community through the referral process to an effectively functioning health system⁵. It is widely accepted that substantial reduction in maternal mortality and severe morbidity is impossible without effective referral system for complicated cases¹. Goal of referral transport is to address the second delay of "The Three Delay Model" and also to provide pre hospital care while transporting patient to appropriate hospitals(public/private)^{6,7}. The concept of "The Three Delay Model" (Fig.1), elaborates how different factors that affect the interval between onset of illness (specifically, an obstetric complication) and its outcome^{6,8}.

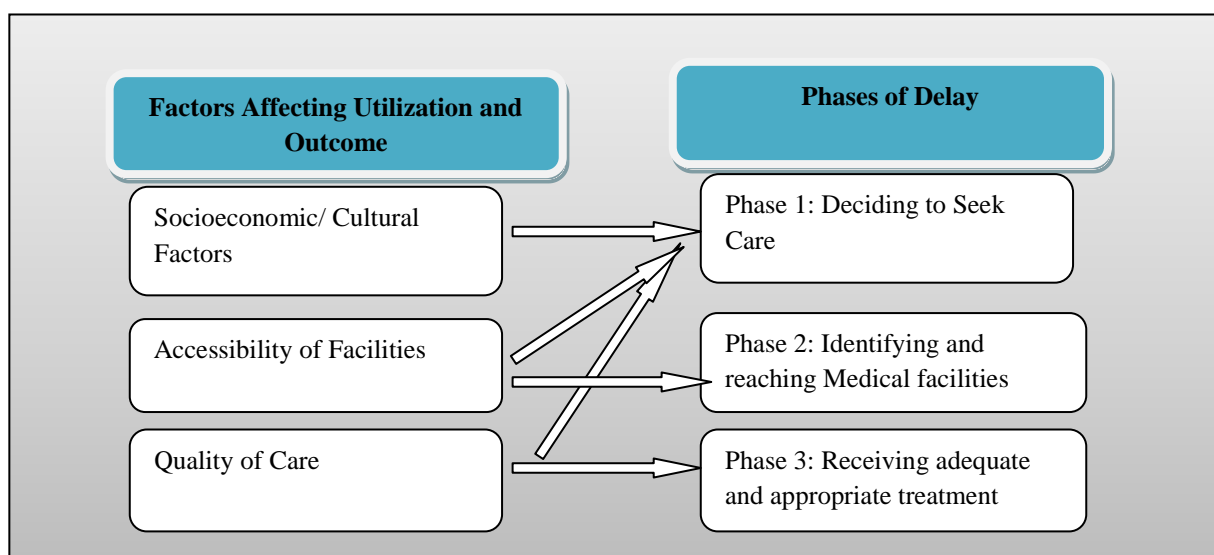


Fig 1: The Three Delay Model

Over three-fifth (61%) of maternal deaths occur among women from tribal communities^{9,10}. In India, more than two third of the scheduled tribe population is concentrated only in the seven states of the country, viz. Madhya Pradesh, Maharashtra, Orissa, Gujarat, Rajasthan, Jharkhand, and Chhattisgarh¹⁰. Tribal communities in general and PVTGs in particular are highly disease prone¹¹. The chief causes of high maternal mortality rate were found to be poor nutritional status, anemia, unhygienic and primitive practices for parturition¹¹. With reference to PVTGs, several factors such as remote villages, long distances, lack of transport network, and dense forest pose serious challenges to delivery of health services near their village clusters¹¹. In the past in LMICs, the motor bike ambulance have proven effective to reduce the delay in referring women with obstetric complications from remote rural health centers, particularly under the circumstances where health centers have no access to other transport or means of communication to call for an ambulance. It is relatively cheap and effective option for referral of the patient in developing countries particularly in rural areas with little or no public transport. It potentially helps to reduce coststo access emergency obstetric care for women and their families⁸.

The motor bike ambulance has also improved the ability of healthcare system to deal with patients, particularly emergency cases⁷. Motor bike ambulance/SangiExpress functional in Kabirdham district, of state Chhattisgarh, India, is an innovative idea to provide essential transport facility. It focuses on referrals obstetric and gynecological services, child health services and provides essential linkage during emergency as well as accidental situations. Keeping in mind to ensure services to PVTGs this initiative funded by District Mineral Fund (DMF) is implemented in tribal clusters. Five motor bike ambulancesweredesigned and engineered specifically for providing essential obstetric care and act a continuum of care. Two-tiered motor bike was modified into ambulance alike structure to accommodate minimum of five people at a time. Pilot of the motor bike ambulance /SangiExpresswere recruited by the local Non-Governmental Organizations (NGOs). These pilots of SangiExpresswere recruited from amongst the local area to build confidence at community level. The contact numbers of the pilot were communicated widelyat community level with the help of Mitanni/ ASHA

(Accredited Social Health Activist). Initially, in July 2018 the motor bike ambulance/SangiExpress was implemented in two tribal cluster villages where it provided services to total 205 users. Given its positive response, within three months of the beginning of the initiative, it was replicated in two more tribal village cluster on 1st November 2018. In diversified, low middle-income countries like India, there is lack of literature assessing such initiative. This study thus aims to assess the motor bike ambulance/ SangiExpress in terms of its utilization and to dwell further to understand the client / user perspective

II. Material and Methods Study Design: Mixed Method Study (quantitative, qualitative)

Study Location: The study was conducted in five difficult to reach tribal village cluster situated in two community development block/administrative blocks of the district Kabirdham, Chhattisgarh, the central state of India. These clusters namely; Daldali, Bokkarkhar, Jhalmala, Cheerpani, Kukdoor were situated at location far-fetched from the PHC/CHC and had difficult terrains which imposed many challenges to the state run referral transport to reach these villages.

Study Duration: January 2020 to April 2020.

Sample size: 5339 user records maintained since the inception of initiative were used for the quantitative part of study. 30 users of motor bike ambulance/ Sangi Express were interviewed for qualitative component

Sample size calculation: A census method was used and all the available users' records were utilized for analysis. The study used purposive sampling to recruit participants for qualitative interviews.

Quantitative Method:

The health facilities and all the pilots of motor bike ambulance service/ Sangi Express recorded the usage services on monthly basis. These records include the reason for the usage of motorbike ambulance/ Sangi Express, all records of one year and five months i.e. from August 2019 to January 2020. were analyzed.

Qualitative method:

In order to assess the perception of users, semi structured interview of five users from each tribal village cluster in two community development /administrative blocks were conducted. The questionnaire included socio demographic characteristics such as age, occupation and open-ended questions.

Ethical Consideration

The research was discussed, planned and was permitted by District Magistrate, Kabirdham. Written informed consent was obtained from all participants prior to interview.

Statistical analysis

Analysis similar to that done by Bhopal et al was carried out using STATA13 and utilization was reported as mean standard deviation, frequency and proportion. To know client's perspective semi structured interview were recorded. Qualitative extractions from the findings of interviews were analyzed by using thematic analysis. Themes including awareness, perceived value, responsiveness, cost effectiveness, assurance were identified.

III. RESULT

Quantitative findings

A total of 5339 user records were obtained during the implementation period. The major reasons for utilizing motor bike ambulance/SangiExpress services included antenatal checkups, labor pain, and drop back from hospital after institutional deliveries, to seek child care, emergency situation and referral to higher health facility. Almost half of the users (45%) utilized motor bike ambulance/Sangi Express to ply for antenatal checkups. Other reasons to reach out for healthcare facility constituted patients amounting to 45% of the total number of beneficiaries. 12% of user utilized motor bike ambulance/Sangi Express for reaching out to the public health facility during labour pain counts and 14% users for going back home after institutional deliveries been conducted. Apart from obstetric care services 16% users used motor bike ambulance /SangiExpress for seeking child health care. The users also utilized this referral transport during accident or emergency situation (12%) and while getting referred to higher level of public health facility for any other reasons (1%) Over all the findings of study indicated wider utilization of motor bike ambulance /SangiExpress for seeking services related to maternal health and child health services.

Table no 1:Shows metabolic parameters of patients of the three groups before treatment.

Category	Reason for use	N= 5339	
		n	%
Obstetric	Labour pain	660	12
	Drop back to home after institutional deliveries	804	14
	Antenatal Checkup	2491	45
Child health	Child Health Checkup	897	16
Medical	Emergency Care	676	12
Accidental	Referral linkage to higher level of Public Health facility	31	1

Figureno 2: Broad reasons for the use of motor bike ambulance / Sangi Express

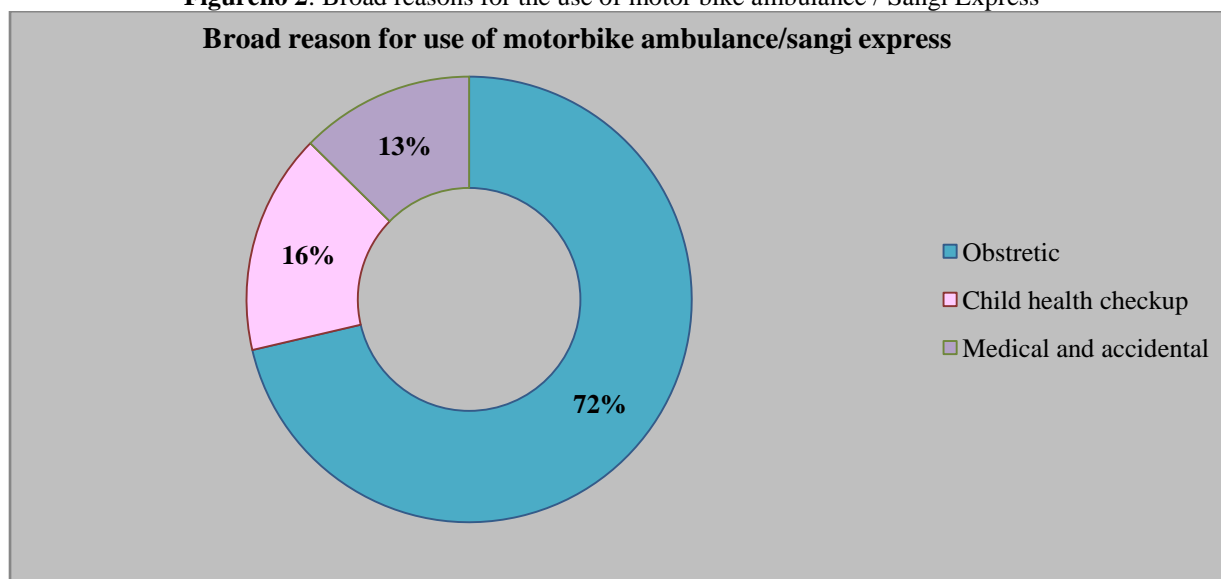


Figure no2 illustrates that the majority (72%) of users has utilized motor bike ambulance services/ SangiExpress forservices related to obstretic care (including antenatal care checkup, institutional deliveries services and drop back to home facilities after institutional deliveries). followed by child health (16%) care and medical and accidental care (13%)

Table no 2 shows the mean monthly user scattered by motor bike ambulance/SangiExpress services for different services. The mean monthly coverage was highest for Antenatal checkup (Mean: 133; SD 64.17). On an average per month, the motor bike ambulance/Sangi Express carried 37 pregnant women during labour pain to the health facilities and brought back 45 of them home after the institutional delivery. Apart from the pregnant women, this referral transport carried 49 children on an average per month for health checkups to the facilities. It also aided in carrying a mean of 38 beneficiaries per month for emergency care.

Table no 2 Monthly coverage of motor bike ambulance/ Sangi Express

Reasons for using Motorbike Ambulance	Mean	Standard Deviation
Labour Pain	37	9
Drop Back to Home After Institutional Deliveries	45	17
Antenatal Checkup	138	64
Child Health Checkup	50	43
Emergency Care	38	33

Referral Linkage to higher level of Public Health care facility	2	2
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Qualitative findings

The narratives of user interviews were categorized under five categories

Awareness

User indicated that all the members of their house were aware of the motor bike ambulance/SangiExpress as they have heard about it from ASHA (Accredited Social Health Activist), locally popularly known as Mitaninor from the nearest public hospital. Not just the past user, the family members are also well aware about the motor bike ambulance services. All the interviewees were also well aware about the purpose of motor bike ambulance/ SangiExpress.

[I heard about it] from ASHA (Accredited Social Health Activist), Mitanin, also I saw motorbike ambulance / SangiExpress in my village taking pregnant women for antenatal checkups. [Past user 1, Daldali catchment]

[I heard about it] when I went to meeting at Jhalmala village, all the villagers know about motor bike ambulance / SangiExpress. [Past user 2, Jhalmala village]

ASHA (Accredited Social Health Activist) Mitanin informed me about motor bike ambulance/SangiExpress, and my family members are well aware of the services, we use motor bike ambulance for reaching out our public hospital. [Past user 3, Cheerpani village].

Perceived Value

User expressed their opinions that with the presence of motor bike ambulance/SangiExpress, there is improvement in the quality of maternal health referrals. The healthcare system was now able to serve the promised quality of maternal referral services at the community. Users showed preference towards motor bike ambulance/SangiExpress over conventional transport methods which emphasizes its successful implementation.

The main benefit is that we are able to reach health facility for institutional deliveries and seek essential, maternal and newborn care [Past user 1, Jhalmala]

Before motor bike ambulance / Sangi Express services, it took more than half an hour by walking to reach hospital for utilizing antenatal care checkup services, now there is so much ease it doesn't take even half an hour to reach out public hospital [Past User 2, Bokkarkhar]

The motor bike ambulance service/ SangiExpress is excellent, I have been using during my antenatal checkups, institutional deliveries and for my baby's health checkup. [Past user 2, Daldali]

Responsiveness

All the past users were quick to point out that the motor bike ambulance /SangiExpress's being prompt at services and saving lives. Ensuring timely reach of the pregnant women during labour pain, motor bike ambulance has been a blessing for the community providing safe institutional deliveries.

It just took ten minutes to reach my home, when my husband called the pilot, when I got labour pain started and I sat comfortably in motor bike ambulance / SangiExpress to reach to the public hospital [Past user 3, Cheerpani]

I had to go for antenatal checkup as I was getting fever, it was raining heavily, called Pilot of motor bike ambulance/SangiExpress, it came to my door step within fifteen minutes, the pilot got drenched but I reached hospital within time [Past user 3, Kukdoor]

I met with an accident and my shoulder was paining so much that I couldn't move my hand at all, I called motor bike ambulance/SangiExpress's Pilot and immediately he rescued me to primary health centre and got initial treatment there. [Past user 1, Daldali]

Cost effectiveness

Another key benefit mentioned by the beneficiaries of motor bike ambulance/SangiExpress is that its cost-effective method of reaching out to the hospital. Availability of motor bike ambulance services, has reduced out of pocket expenditure of the users as the service is available at free of cost. It saved money spent on fuel of the vehicle to reach public hospitals.

My out of pocket expenditure has reduced, if we will hire private vehicle to reach hospital it would cost us minimum of two hundred rupees, money but motor bike ambulance/SangiExpress provides us free of cost services [Past user 3, Cheerpani]

It has brought in reduction of fuel (petrol) expenses as we have to take routine checkup to hospital and now my family members are also happy with the services [Past user 4, Kukdoor]

Assurance

The motor bike ambulance/Sangi Express service has delivered trust, and confidence amongst user. It has also brought in the feeling of empowerment amongst female users. They feel that the availability of this referral transport has made them independent to reach the health facility whenever needed. Now they don't have to wait for the bread earner of the house to take them for essential checkups.

Now I don't have to wait for my husband to take me to the public hospital for my routine checkup done, I just call ASHA (Accredited Social Health Activist)/ Mitanin and within few minutes, motor bike ambulance/sang Express reaches my house [Past User 1, Kukdoor]

I feel confident, that now in case of any emergency we don't have to walk down to seek care to the hospital, and my family members are also satisfied and also men in our family allow me to go to hospital using motor bike ambulance / SangiExpress service.[Past User 2, Cheerpani]

IV. DISCUSSION

This study sought to evaluate the performance of Motor Bike Ambulance/SangiExpress by dwelling further into the reasons for which the referral transport was used. Users of this transport were also interviewed to understand its acceptability in Indian context. Our analysis of 5339 data in this study confirms the findings that motor bike ambulance/ SangiExpress is successfully utilized by the beneficiaries. With the provision of motor bike ambulance / SangiExpress, in all the tribal cluster villages' women (especially pregnant women) got the benefits of essential ante natal checkup services / The referral services were provided at their door step which enable them to reach out to the hospital during traumatic labour pain. The finding also indicates that majority of the beneficiaries has utilized motor bike ambulance / SangiExpress, for seeking obstetric care (71.87%) from the nearest public hospital.

Our findings confirm the results of earlier studies about contribution of motor bike ambulance in delivering essential health services^{7,8}It is well documented in the literature that the unavailability sufficient medical facilities has led to increase in maternal mortality rate^{4,12}. Our study finding highlights that availability of motor bike ambulance/ SangiExpress is most beneficial for seeking antenatal care, institutional deliveries and child care which serves the purpose of making tribal communities to avail health services which is consistent with the findings of similar study done by Bhopal et al in Sierra Leone⁷.

Study provided deeper perspective about the utilization of motor bike ambulance / SangiExpress in terms of quality in services. Our findings tend to demonstrate that this referral transport was popular in the community. The perceived value of the vehicle was high among the residents as they considered it, responsiveness and cost effectiveness. Motor bike ambulance/ SangiExpress provided them assurance, of the services which was perceived crucial to quality services. This initiative was perceived beyond just a maternal referral transport and was utilized not only to access essential obstetric, child and emergency/ referral services but any health service requirements. Mitanin plays a key role in creating awareness and understanding within the community about maternal and child health and brings about changes in related attitude and practices¹³. In this study as well the word of mouth, through ASHA (Accredited Social Health Activist)/ Mitanin has played a major role in creating awareness about the services, and people at community level are very well aware about the motor bike ambulance / SangiExpress services. Findings also revealed that the motor bike ambulance/SangiExpress has not only gained positive perception amongst community members but has been accountable with its timely availability to the users, Additionally, it has successfully reduced out of pocket expenditure in this tribal village cluster.

The strength of our study is that it applied mixed method approach to assess the utilization of referral service carried out by motor bike ambulance/SangiExpress. The limitation of this study is that it doesn't compare the performance of motor bike ambulance / SangiExpress, with respect to other available referral service like 102, 108 ambulances.

V. Conclusion

The motor bike ambulance/SangiExpress emerged as a popular and convenient referral transport solution for difficult to reach tribal village cluster. The user acceptability of this transport vehicle calls as reported in this study calls for policy initiative to replicate it in similar settings. Even though the causes of maternal mortality

are well known, several contextual factors pose challenges to improvement. However, it appears that initiatives like motorbike ambulance/ SangiExpress are tailored made innovations and suit local context. They should be encouraged by system as well as the local communities. It provides communities with a low-cost solution to reduce a key barrier to receiving care. However, further research is required to quantify how availability of motor bike ambulance / SangiExpress, has led to increase in maternal health indicators.

Five Motor bike ambulances specially engineered, pictured in Fig 2, specifically engineered for to act as a means of commutation in difficult to reach areas. The designing of motor bike ambulance / SangiExpress, includes comfortable sitting arrangement for minimum of five to six people to accommodate along with essential first aid tools and equipment. Similar motor bike ambulance services have been initiated in Sierra Leone and have shown positive response on its acceptability and accessibility in rural setup.



Fig.2 Motor bike Ambulance /SangiExpress

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