AN EVALUATION STUDY

ON

EMERGENCY RESPONSE SERVICES

(EMRI MODEL) 108 IN KARNATAKA

September 2013

INSTITUTE OF HEALTH MANAGEMENT RESEARCH, BANGALORE

IHMR Bangalore

DRAFT REPORT

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9/3/2013

PREFACE

EMRI is a historic landmark in the provision of health care in the Nation. EMRI is created with bringing Emergency Medical Response on to the nation's agenda. A much discussed and successful PPP model for ERS is the 108 Emergency Response Service being managed and operationalized by EMRI (Emergency Management and Research Institute) in many states. GVK EMRI entered into an agreement with the Government of Karnataka on 14th August 2008. This Program is called the "Aarogya Kavacha". Following the MOU signing, a total of 517 ambulances have been deployed in phased manner till 2010.

Being keen on knowing the functioning of the EMRI model in the state of Karnataka a study was taken up for the evaluation of EMRI 108 model in Karnataka. With this study, an attempt to understand the functioning of the programme on field, its success and failures, gaps, ways to address them and to suggest replication and improvement of the programme and also help build systematic linkages so as to maximize health outcomes from this scheme was made.

Institute of Health Management Research, Bangalore was entrusted to carry out the evaluation of the EMRI 108 services under Public Private Partnership model. IHMR Team carried out the evaluation study for six months covering ten districts in the state of Karnataka. The Evaluation process involved Quantitative and Qualitative evaluation involving Analysis of Secondary Data provided by the EMRI, Field Visit, Surveying of the facilities incharges at the Health Center through Checklists, Interaction with the Beneficiaries through Focus Group Discussion and community survey, and interaction with other stakeholders.

The findings and recommendations or suggestions of this study would help to strengthen the quality and management of Emergency Response Services in the state and also the entire nation.

Project Director
RCH

ACKNOWLEDGEMENT

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ABBREVIATIONS

ALS	Advanced Life Support
AMBY	Ambulance
AP	Andhra Pradesh
ASHA	Accredited Social Health Activist
BLS	Basic Life Support
BPL	Below Poverty Line
CHC	Community Health Centre
DH	District Hospital
DHO	District Health Officer
EME	Emergency Management Executive
EMLC	Emergency Medicine Learning Center
EMRI	Emergency Management And Research Institute
EMS	Emergency Medical Services
EMT	Emergency Medical Technician
ERCP	Emergency Response Centre Physicians
ERO	Emergency Response Officer
ERS	Emergency Response Systems
FGD	Focus Group Discussion
FE	Fleet Executive
FM	Fleet Manager
FY	Financial Year
GPS	Geographical Positioning System
HH	Household
HHS	Household Survey
HR	Human Resource
IMR	Infant Mortality Rate
KII	Key Informant Interviews
MMR	Maternal Mortality Rate
MO	Medical Officer
NRHM	National Rural Health Mission
OBC	Other Backward Class
PCR	Patient Care Record
PHC	Primary Health Centre
PPP	Public Private Partnership
PPS	Probability Proportion To Size
RTA	Road Traffic Accident
RTO	Regional Transport Office
SC	Scheduled Caste
SLA	Service Level Agreement
ST	Scheduled Tribes
TH	Taluk Hospital
THO	Taluk Health Officer

EXECUTIVE SUMMARY

India is experiencing a tremendous growth in emergency medical services systems. The main purpose of Emergency Response Systems (ERS) is to provide 24X7 services to meet the emergency services demands of the population in the necessary quantity and quality. Timely and prompt delivery of the ambulance to the site, for the right reason, to the right person, giving the right medical care at the right time are some of the critical areas in emergency response system. It is often stated by GVK EMRI that EMRI strives to provide each citizen the "Right to Safety" with the unique model of integrated emergency response service.[1] The process of safe patient transfer is a complicated process and involves the interaction and coordination of various levels of healthcare providers and agencies. Building an effective emergency management system in our country with a vast population and varied geographical terrain, socio economic conditions and cultural beliefs is a challenging task and requires strengthening of various sectors. The ERS system needs to be constantly evaluated and modified to maximize quality, minimize cost and optimize overall efficiency. In a country like India, Emergency Management Systems can occasionally become overwhelmed and the demand may exceed the available resources. There should be policy and a strategic plan in place to assist at these times in order to efficiently allocate the resources. However, when the demand exceeds available resources on a frequent basis, this is a sign of poorly funded, designed or mismanaged system.

Community awareness on the emergency services offered is of prime importance in order to make the community well informed on how to utilize the service, when to utilize the service and also be self-reliant and capable of availing the services. Utilization of any services is again a complex phenomenon. Use of any health services is related to its availability, quality of services offered, cost of services, social structure, cultural beliefs and need of services.

This study brings out the various perspectives of EMRI model in terms of operations, finance, utilization patterns, community needs, challenges and issues in managing the emergency response system in the state of Karnataka. The study was conducted in ten districts in Karnataka and focused on the three cardinal pillars of EMRI ie. sense, reach and care. It involved the assessment of awareness and intervention in the community, evaluation of performance of service providers and identification of gaps, inadequacies and excess.

The average trips in past three years have been almost constant at around 3.5 trips per day per ambulance. It was noted that even though the average number of trips remained almost the same, the distance travelled per trip has increased from 41 km in FY 2010-11 to around 47 kms in FY 2012-13.The study findings on operational efficiency revealed that that out of 517 ambulances 511 ambulances are in functional state. The operating cost per trip has increased over the years from financial year 2010 to 2013. In FY 2010-11, with an average of 3.5 trips per day and average distance of 41 km travelled per trip, it costed Rs 898 per trip for an average of 515 ambulances. While in the years 2011-12 and 2012-13, with 517 ambulances and an average of 3.3 trips, it costed Rs 934 and Rs 110 respectively. Similar to cost per ambulance per trip, the cost per ambulance per year also increased from Rs. 11.32 lakhs in the year 2010-11 to Rs 12.89 lakhs in 2012-13 with almost the same number of ambulances and average trips.

The evaluation study brought out various dimensions of the EMRI services. Responses from the community revealed that 95 % of the respondents were aware of 108 ambulance services. The facility incharges also perceived that most of the beneficiaries were aware of the services. Around 81.3% of the respondents were fully satisfied with the various aspects of EMRI 108 services. Also, 56.7% of respondents who availed the 108 services were fully satisfied with the behavior and skills of the paramedical staff in the ambulance. Ninety nine percent of the respondents who availed 108 service preferred 108 ambulance service in case of any future emergencies.

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[1] Subodh Satyawadi (2011) Emergency Management - Synergizing research, technology and good governance towards a world-class healthcare delivery system .Indian Emergency Journal. Vol. VI/Issue-II/September. pp. 01-03

It was seen during the study that around 99% of services utilised out of all the emergency services availed through EMRI 108 model were mainly medical emergencies within which 51% cases were pregnancy related[2] .The study findings from the primary data revealed that pregnancy related cases constituted around 74.7% of the cases for which the respondents availed 108 ambulance services. The least availed services were suicide and poisoning at around 2-3%. Other emergency medical services for conditions like accidents and injuries, acute abdomen, chest pain, respiratory problems were some of the many emergency services from which the beneficiaries have clinically benefited.

In spite of the benefits of the 108 service to the community, there have been few problems faced by the community, facility incharges of the healthcare facilities as well as EMRI. The average time to reach the spot for 108 was found to be within 30 minutes (80.4% respondents) to most of the areas. However, few cases of delay were reported. Around 85 % of the respondents felt that that people in their village were availing the 108 services and the main reason perceived by the community due to which the remaining 15 % are not availing 108 ambulance services was found to be lack of awareness followed by delay in arrival at the spot of emergency. Around 44% of the community stated the reason to be lack of awareness. It was mentioned by the stakeholders that there are several cases of misuse happening, where there are illegitimate calls and also the calls where the case is minor and not critical. Also, even though the 108 ambulance service is free of cost, there were some cases reported where the beneficiary was charged. These problems could be solved by having proper validation and screening procedures for calls received, and also it is important to create awareness for the community regarding the judicious use and importance of the 108 service.

If the standard norm of 1 ambulance per 1 lakh population[3] is considered, it emerged that more ambulances need to be provided in order to meet the demand. Many respondents and facility incharges felt that the delay was due to insufficient ambulances provided to their district. However, a point to be noted from the study findings was that the delays were also reported even in districts where there is adequate number of ambulances. It is to be noted that the delay sometimes may be due to the distance, vehicle breakdown, route problems, uneven terrain, bad road conditions, traffic congestion and delay in dispatching of the vehicle because of non-availability. There were some concerns raised by the facility incharges on the overload of cases owing to lack of information on services offered at each level by the facility by the EMRI ambulance staff. Such issues need to be addressed by bringing together both the stakeholders to a common platform and streamlining the procedures to be followed for referral.

Manpower planning and training plays a crucial role in the efficient functioning of any emergency response service. The paramedical staff and drivers form the backbone of the entire ERS. Optimum staff to vehicle ratio forms the crux of a well managed system. There were around 2.5 EMTs and drivers on an average per ambulance between FY 2010-13.Along with this, training and development forms an essential part of the system. Some lag in the training was reported by the facility in-charge and also revealed during the interviews with the staff. Hence, necessary follow up training should be provided to the ambulance staff on case management regularly to avoid any complaints from the receiving facilities. Though the EMRI said that it trains the first respondents on a needs basis, it is recommended that such trainings are conducted on regular basis voluntarily.

This study brought out a holistic view of the entire EMS system in the state of Karnataka. It can be concluded from the study that the EMRI 108 service has brought a revolutionary change in the emergency transport system and pre-hospital care in the state. Efforts from both the Government and EMRI's side to eliminate the bottlenecks will enable the EMS system in the state to strive towards excellence in the field of emergency management and research.

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[2] According to secondary data collected from EMRI

[3] nrhm.gov.in (n.d.) EMRI/Patient Transport Service, Emergency Medical Transport System [WWW] nrhm.gov.in , Available from : http://nrhm.gov.in/nrhm-components/health-systems-strengthening/emri-patient-transport-service.html [Accessed on 6/5/2013]

INTRODUCTION

Emergency Medical Services (EMS) in the United States refers to the ambulance services that respond to the scene of medical and surgical emergency, stabalises the victim of sudden illness or injury by providing emergency medical treatment at the scene and transports the patient to a medical facility for definitive treatment. Emergency Medical Services system on the other hand refers to a mechanism for accessing the system and reporting an emergency; prehospital service delivery; transport mechanisms; definitive, specialty and rehabilitative care facilities; public education; participation and prevention processes; resource allocation and financing structures; and coordinating the role of collaborating organizations[4].

The main purpose of Emergency Response Systems (ERS) is to provide 24X7 services to meet the emergency services demands of the population in the necessary quantity and quality. Recent experience shows that emergency medical services for conditions like pregnancy related cases, severe trauma, congestive heart failure, obstructive airway diseases, poisoning are some of the many emergency services from which the beneficiaries can clinically benefit. However, based on the resources available and mission and goals of the emergency system, the scope of the emergency management systems can be extended further more than the aforementioned conditions to a wider range of services like interfacility transfers, police and fire emergencies.

There are a multiple factors to consider when selecting an ERS service delivery model. Due to lack of coordination, it is sometimes found that the government can't solely dedicate the necessary resources to provide quality service. In such circumstances, a public private partnership model is often able to provide services more efficiently than the government, and thus overall costs may be less. The amalgamation of public and private entities can often be the most economical option without compromising quality service delivery. Considering the risks involved in delivering emergency services, the most important factor is that of ensuring continuous services even in situations of great danger. This can be made possible in an arrangement like a public private partnership. By not having the entire system controlled by one entity, it allows for a greater overall stability of the system. On the flipside however, management of a mixed system requires greater interorganisation cooperation.

Emergency Management and Research Institute is a historic landmark in the provision of health care in the Nation. A much discussed and successful PPP model for ERS is the 108 Emergency Response Service being managed and operationalized by EMRI (Emergency Management and Research Institute) in many states. The emergency transportation provided in a state-of-the-art ambulance coordinated by a state-of-art emergency call response centre, which is operational 24 hours a day and 7 days a week. In addition, the call to the number 108 is a Toll Free service accessible from landline or mobile, which helps to save the loved ones who would be willing to shower EMRI with praise and call for the strengthening of this system-whatever it takes to do so. EMRI's 108 is dialed for the purposes mentioned below:
1.   To save a life
2.   To report a crime
3.   To report a fire

An emergency care system needs a pattern that lends itself to prompt delivery for the right reason, to the right person and gives the right medical care at the right time. For Emergency management systems to be effective it is important that conditions which receive no or little benefits from the system should be excluded from the standard set of services that are delivered. The most effective way of controlling this is through an effective and efficient call screening at the level of call centers. At the same time, to ensure optimum utilization and accessibility of the services, the clients served by the system should be aware of how to access the system, when to access the system and what services to expect that it can deliver.

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[4] Holtermann, Keith (ed.) (2003).Emergency Medical Services Systems Development : Lessons learned from the United States of America for Developing Countries. Washington D.C : PAHO-WHO

The field level care in ERS is usually provided by the EMTs, paramedics, nurses and other allied health professionals. As EMS requires medical oversight, it is very crucial that the staff are appropriately qualified and well trained before being sent on field. Also, timely evaluation of the competence level of the staff is very essential.

The most challenging task in managing emergency services is the maintenance of emergency fleet and associated equipments. Without the brisk maintenance of records and performing preventive services, the system can incur unnecessary expenses. Qualified engineers should be available within the system to manage the operability of the fleet.

The domain of emergency management services is constantly growing and is at the crossroads between public health measures and emergency medicine. Part of the growth lies in the public's belief that pre hospital care is advantageous to save a life and improve treatment outcomes. To ensure this growth, it is of prime importance to educate the community. Community involvement can enrich, enliven and redefine the entire system. It is paramount to validate efficacy, efficiency and effectiveness of the system.

Key Stakeholders
The various stakeholders in this model are given below
- EMRI
- Government of Karnataka
- Medical System— Hospitals, PHCs
- Police Department
- Fire departments
- Media
- Community
- Technology partner
- Staff: Ambulance operators, emergency technicians ,call centre staff and Hospital/PHC staff.

BASIS FOR GOVERNMENT INTERVENTION

There was no effective Emergency Response System in India during the launch of National Rural Health Mission (NRHM) in 2005, and the Ambulances which were stationed in the District Hospital (DH) and Taluk Hospital (TH) were used only to provide inter-facility transfer services. The lack of an assured referral transport system for the people in the rural areas, and non-availability of a proper functional model emergency rescue system made the Government to search for a creative business model to provide public services.[5] The 108 model of ERS, managed and operationalized by Emergency Management and Research Institute (EMRI) was first introduced in the state of Andhra Pradesh as a Public private partnership (PPP). It was started in the year 2005 by a single philanthropist Mr. B. Ramalinga Raju. On 15th August 2007,it was taken over by Government of AP as PPP (Govt. 95% and EMRI 5 %). It has also been introduced in other states successively after the successful implementation in Andhra Pradesh. In all the implemented stated, EMRI acts as a nodal agency for ERS, including Police and Fire emergencies.[6] The main aim of the ERS managed by EMRI as a PPP is to reach the caller within 15 to 20 minutes and the patients are shifted to the nearest hospital within 20 minutes after the arrival of the vehicle.[7]

In Karnataka, road accidents have been increasing day by day; in road accidents 33% pertains to pedestrians and 22% are on two wheelers. In our state, the infrastructure facility available to deal with emergencies is very

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[5] NHSRC. (2012). Publicly Financed Emergency Response and Patient Transport Systems Under NRHM. Policy Support Report
[6] BR Chandrasekar, DR Shankar, AR Rao et al. (2011) Utilization of Emergency Management and Research Institute (108 EMRI): An Emergency Response Service in Khammam District, Andhra Pradesh, India. J Hum Ecol, 34(1): pp. 49-52
[7] NHSRC.(2009) .Study of Emergency Response Service – EMRI model

inadequate especially in rural areas it's entirely lacking. Further 40% of maternal deaths in the state are due to lack of timely transport facility. Hence timely response and care to save lives, limbs and property of citizens in emergencies is need of the hour and the role of the Government is crucial in providing relief through agencies such as police, fire, medical and other Government Departments.

The rationale behind undertaking this evaluation is to facilitate the Department of Health & FW, Government of Karnataka to understand the functioning of the programme on field, its successes and failures, gaps, ways to address them to suggest replication and improvement of programme, and also helps build systematic linkages so as to maximize health outcomes from this scheme.

It was realized that, with the growing significance of EMRI model as a preferred option for providing ERS and increasing support provided by the state, it is important to review the functioning of the EMRI after 5 years of its operation across the state of Karnataka. The review will address many of the issues with major focus on the case load and number of vehicles deployed. As a part of operational efficiency, it is important to study the cost per trip and cost per ambulance per year. This evaluation study was born in this particular context.

PROGRESS REVIEW

There have been lots of changes and innovations happening in publicly financed ERS systems due to increased political will and greater flexibility under NRHM, by realizing the importance of providing emergency obstetric care and to ensure universal access to institutional deliveries.[8] The monitoring mechanism and the effective stewardship role played by the government have brought improvements in accountability, efficiency and have helped in expanding in programmes to all the districts of the state. Greater utilization of the 108 service by the people in rural and remote areas across the state shows the success of this partnership as both the parties play an indispensible role in constantly creating awareness among the public, reaching the spot timely and providing quality services which is comparable to the best in ERS service.

After the successful implementation of the Public Private Partnership (PPP) model in Andhra Pradesh between GoAP and EMRI which started in August 2005, it has been introduced in other states also including Karnataka. GVK EMRI is the largest professional Emergency Service Provider in India today.

GVK EMRI handles medical, police and fire emergencies through the "1-0-8 Emergency service". This is a free service delivered through state- of -art emergency call response centers and has over 4785 ambulances across Andhra Pradesh, Gujarat, Uttarakhand, Goa, Tamil Nadu, Karnataka, Assam, Meghalaya, Madhya Pradesh, Himachal Pradesh, Chhattisgarh, Uttar Pradesh and 2 Union Territories Dadra & Nagar Haveli and Daman & Diu. With a vision is to respond to 30 million emergencies and save 1 million lives annually, GVK EMRI is set to expand fleet and services set to spread across more states.

GVK EMRI entered into an agreement with the Government of Karnataka on 14th August 2008. This Program is called the "Aarogya Kavacha". Following the MOU signing, a total of 517 ambulances have been deployed in phased manner till 2010. The 108 Emergency Response Service in Karnataka was launched on 1st November 2008 with a fleet of 113 ambulances spanning across the state. Currently GVK-EMRI Karnataka covers all districts of the state with 517 ambulances deployed at various strategic locations throughout the state. Presently, the entire cost is borne by Government of Karnataka. 108 Emergency Response Services has also signed MOU with over 6800 hospitals in Karnataka which provides initial stabilization and transportation of the patient free of cost for the first 24 hours.

There has been a constant increase in the utilization of the EMRI service in the state from the initiation of the free service. There is one ambulance for a population of one lakh and twenty five thousand in the state. There are about 1700 trips made by all the Ambulances in the state, on an average, each day and about 225 referrals, on an average, each day. There is greater utilization of the 108 service for pregnancy/labour and Road Traffic

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[8] NHSRC. (2012).Publicly Financed Emergency Response and Patient Transport Systems Under NRHM. Policy Support Report

accident (RTA) or trauma case. After the introduction of 108 services, there is a greater increase in the number of institutional deliveries.

PROBLEM STATEMENT

After the introduction of NRHM, there is a new dawn for pre hospital emergency care and a robust and efficient EMS bridges the last connectivity gap between the healthcare facility and the community. There is a need to find out the utilization pattern, demographic profile of beneficiaries of 108-EMRI services, and the types of emergency and factors facilitating the utilization of services and provided by EMRI 108. Having completed, almost five years of the operations in the state, there has been a greater recognition of the need to carry out independent monitoring in the state on various aspects of functioning of the EMRI like costing, contractual agreements, operation efficiency, and effectiveness.

Due to the cost of scaling up an assured quality emergency services for all remains prohibitively high, it is important to constantly evaluate, learn, implement and improvise the system. It is to be noted that there are very few studies and research done on the effectiveness of the EMRI system in the state, creating an empty space in the literature regarding the evidence on the functioning and efficiency of the 108 service. This necessitated a large scale evaluation study across the state covering all the districts to find out the awareness and utilization of the service by the people combined with the efficiency and operational challenges faced in functioning of the ERS system managed by EMRI.

Having evolved in to a leading ERS system in the state with 517 ambulances operating across the state with the average density of one vehicle per one lakh and twenty thousand people and catering to rural and urban areas, it is important to monitor the services offered under PPP, and find out the gaps in operations, in order to rectify them and improve upon the available system to meet the demand and achieve the aims health for all. Since EMRI service is completely funded through public spending, and financially supported from the exchequer, cost effectiveness and efficiency becomes a prerequisite to successfully scale up the operations and sustain it by addressing the increasing need and demand for the service.

This evaluation is backed by the above premise and the increased need to know the inputs from all the stakeholders involved in the largest ERS system in the state. Even with the increase level of awareness among the people about the 108 service and better accessibility and facilities of the EMRI vehicle compared to other means of emergency transportation available in the villages, there are instances of non-availing of vehicles and non-availability in certain areas. There has been a greater concern over the delay in 108 reaching the spot and the stabilization of the cases before it reaches the suitable facility. This could be due to several reasons like delay of the 108 vehicle reaching the spot, increased demand, less number of vehicles, the non-judicious or misuse of the vehicle and lack of effective monitoring and surveillance at the village level, and inefficient call-regulation and dispatch. These speculations need to be justified through a robust evaluation of the service, and bringing out recommendations. This should be based on available data, findings from the interviews of key informants and the community. This will aid in the further improvement of the services by taking in to account the lessons learned in the past.

OBJECTIVES AND ISSUES FOR EVALUATION

For effective and efficient intervention of Emergency Response Services (EMRI Model) 108, evaluation of the performance of this initiative was carried out. The Specific objectives of the study were:

1) To examine and comment on patterns of utilization of services in 30 districts of Karnataka to understand present and potential demand for these services and the effectiveness of EMRI to respond to this

2) To review the operational aspects of EMRI scheme. This would include operational efficiency of EMRI, financial management, and management of contractual obligations.

3) To examine the design aspect and the framework of the EMRI model, in the context of larger health systems issues and ERS requirements, including equity issues and institutional frameworks including governance and accountability issues.

SCOPE OF THE STUDY

It covers:

- Access to medical, health care, police and fire services.
- Proportion of services in each area like pregnancy related cases, neonates, infants, children etc.
- Impact on health indicators like IMR, MMR, institutional deliveries etc.
- Coverage of emergency by EMRI.
- Process and implementation of the scheme.
- Maintenance of the records.

EVALUATION DESIGN

Effective program evaluation is a systematic way to improve and account for public health actions by involving procedures that are useful, feasible, ethical, and accurate or appropriate.

Figure 1: Framework for Evaluation

| Effective Implementation of EMRI 108 | ← | FEEDBACK AND MONITORING |

Input
- Infrastructure & Service delivery
- Staffing
- Mobility & ambulance
- Emergency drugs
- Machines & equipments
- Technology Infrastructure
- Networks
- Funding
- Customer Requirements

Process
(System Analysis)
- Training and Development
- Movement & Dispatch of ambulances
- Communication and screening
- Process Assessment
- Quality Assessment
- Record keeping
- Financial Management
- Customer feedback

Output
- Availability & accessibility of the Emergency services (medical, healthcare, police, fire)
- Improved Utilization of emergency services
- Cost benefit
- Benefits to community
- Improved indicators IMR, MMR, Institutional deliveries
- Accountability of services through records
- Customer Satisfaction

PURPOSE OF EVALUATION

The purpose of this evaluation is to facilitate the Department of Health and FW, Government of Karnataka to understand the functioning of the programme on field, its success and failures, gaps, ways to address them and to suggest replication and improvement of the programme and also help build systematic linkages so as to maximize health outcomes from this scheme. For effective and efficient intervention of Emergency Response Services (EMRI Model) 108, there is a need for evaluation of the performance of this initiative.

The evaluation will include three pronged approach:

Figure 2: Approach to Evaluation
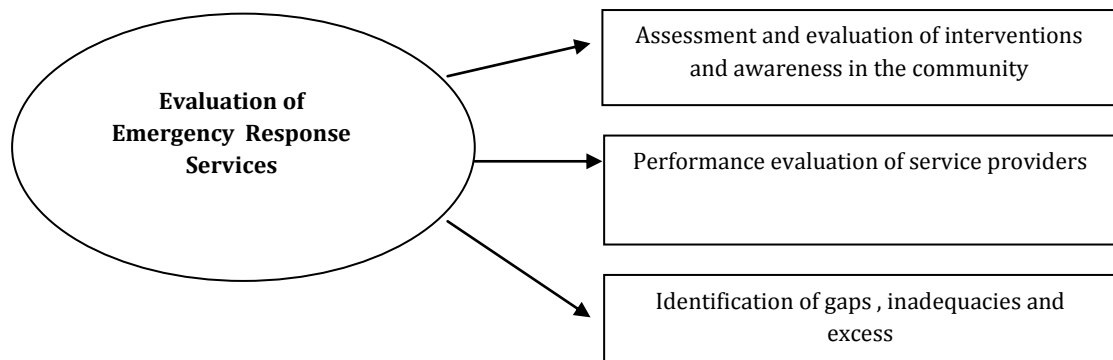
SAMPLING METHODOLOGY

According to the performance of health indicators, the state was divided into 3 categories, 'Category A', 'Category B', 'Category C'. 'Category A' contains four districts, 'Category B' contains nineteen districts and 'Category C' contains seven districts.

The study was conducted in one third districts (10 districts) of the state. Probability proportion to size (PPS) sampling technique was applied to get the required study districts from each of the 3 categories. Thus, one district (out of 4), six districts (out of 19) and three districts (out of 7) was be selected from category A, B and C respectively.

Selection of districts in each category was done by simple random sampling. From each of the selected districts, the District Hospital and one third of the Taluk Hospitals, by PPS, was selected.

Figure 3: Sampling Design for the Study

Karnataka State

⇩

30 Districts

| Category 'A' Districts (4 Districts) | Category 'B' Districts (19 Districts) | Category 'C' Districts (7 Districts) |

1/3rd districts were selected for the study (PPS Sampling)

Total Districts selected for the study = 10

'A'	'B'	'C'
PPS Sampling	PPS Sampling	PPS Sampling
1 District	6 Districts	3 Districts
PPS Sampling	PPS Sampling	PPS Sampling
1DH + 2 THs	6 DHs + 12 THs	3 DHs + 6 THs
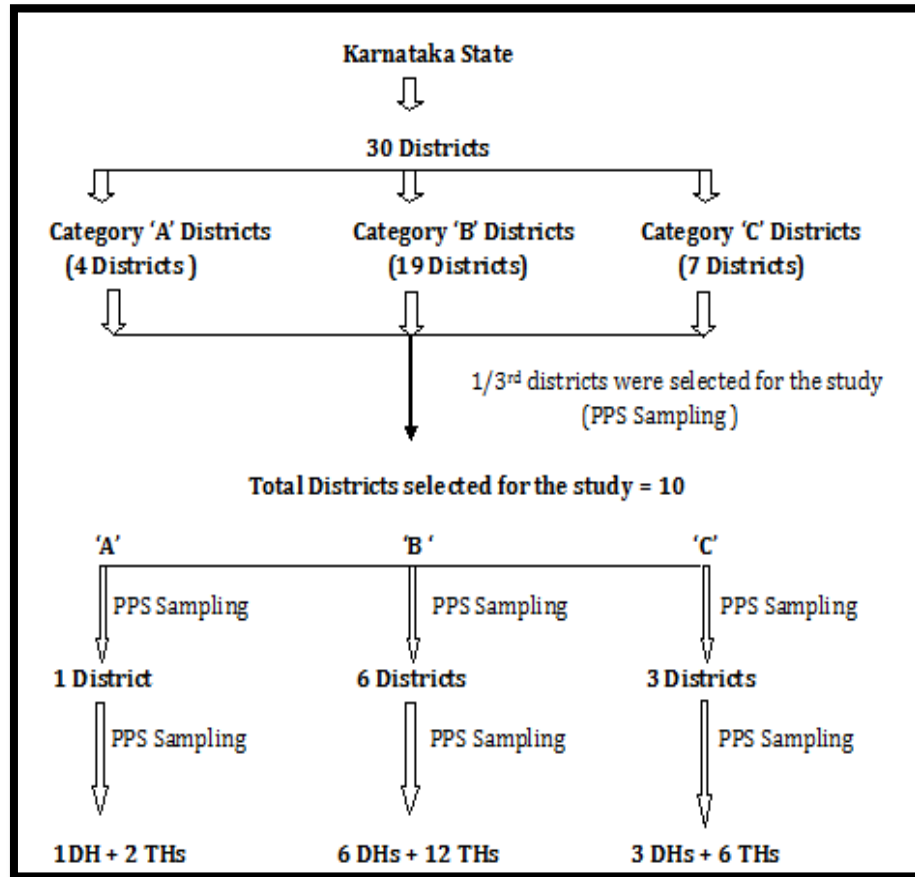
Forty PHCs associated with these Taluk Hospitals were selected by Systematic Random Sampling.

COMMUNITY SURVEY

Household survey was conducted in all the ten districts for 30 PHCs. The Serving area of the PHC was divided into three parts (inner 1/3rd , middle 1/3rd and outer 1/3rd) based on individual PHC coverage area (see figure 4 below). From every part fifteen households were interviewed which were selected by adopting simple random sampling.

Figure 4: Selection of the Survey Households

1/3rd   15 HH

1/3rd   15 HH

1/3rd   15 HH

PHC

Total HH / PHC = 45
Total PHCs = 30
Total HH to be surveyed = 1350

Household survey being conducted in Bedaguli village
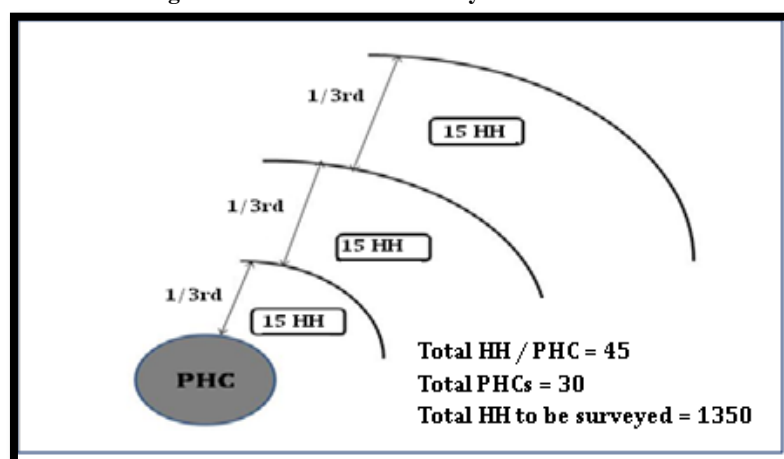
FOCUS GROUP DISCUSSION

Focus Group Discussion (FGD) was conducted with the community for remaining 10 PHCs (villages) in each of the 10 districts. In each FGD a minimum of 8 participants and maximum of 12 participants were randomly selected.

FGD being conducted in Sampaje village

EVALUATION METHODOLOGY

The evaluation methodology mainly focused on the three cardinal pillars of EMRI services namely
1. Sense
2. Reach
3. Care

The care was further analyzed in three stages
- Before the arrival of ambulance
- After arrival of ambulance
- Treatment at the facility

The various stakeholders covered in the study to evaluate the above mentioned aspects are shown in figure 5 below.

Figure 5: Different Stakeholders of EMRI/108 covered in the evaluation study
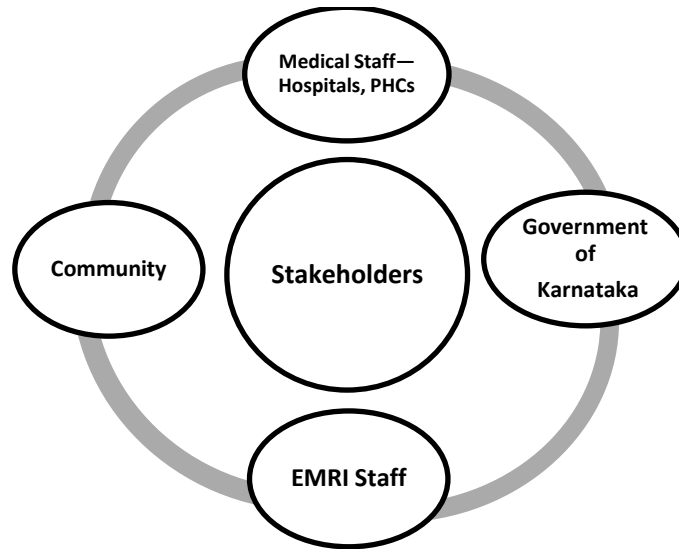
Both quantitative and qualitative assessment was carried out.

Quantitative Assessment:

The quantitative assessment for the evaluation of EMRI broadly included service record analysis, desk surveys and household survey in the area of PHCs. Available records and MIS data at District Hospitals, Taluk Hospitals, PHCs and EMRI office for financial years 2010-11, 2011-12, 2012-13 was collected and assessed.

Qualitative Assessment:

The qualitative tools for the assessment of performances of EMRI 108 Programme were based on interviews with community people, stakeholders and service-providers in the 10 districts (arrived by PPS sampling). All concerned staff at EMRI, District Hospitals, Taluk Hospitals and PHCs were interviewed. Interactions with beneficiaries by community survey were carried out. In each of the 10 selected districts, Focus Group discussions were carried out with the community. For collection of data by interviews, semi-structured interview schedules were used. For FGD, a checklist tool was used.

Interview being conducted at PHC

DATA COLLECTION AND ANALYSIS

DATA COLLECTION: Primary data for the study was collected from the various stakeholders of EMRI scheme as mentioned in figure 5. Data was collected from the beneficiaries (Community survey), DHO, THO, PHC, MOs and EMRI Officials. Secondary data and reports produced by internal monitoring system of EMRI, for financial years 2010-11, 2011-12, 2012-13 was collected. Records at ambulance and various facilities were verified.

TOOLS USED: Primary and Secondary data was collected to address all the evaluation questions with the help of the following data collection instruments. The Primary tool in this study was:

a) A predesigned structured interview schedule for beneficiaries evaluation (Community survey).
b) Predesigned structured Interview schedules for concerned staff at PHCs, District Hospital and Taluk Hospital.
c) Predesigned structured Interview schedules for EMRI and other related officials
d) Focus Group Discussion checklist for conducting FGDs.

Secondary data was collected with the help of a checklist designed for Record analysis

DATA ANALYSIS

Both primary data from the Household Survey Questionnaire was analyzed using SPSS v.16 software. Appropriate tables/graphs were generated and statistical tests (SQC) were applied to draw inferences.

The primary data collected through interview of the Key Respondents like PHC Medical Officer, Chief Medical officer of Taluk Hospital and District Surgeons were analyzed using MS Office Excel Software, and the qualitative responses were looked for Key Themes and Subthemes and frequency analysis was done.

The secondary data collected from the EMRI for financial years 2010-11, 2011-12, 2012-13 was collected and analyzed using the MS Office Excel Software and appropriate charts and tables were generated.

SURVEY HOUSEHOLD CHARACTERISTICS

The Primary Survey was conducted in 10 districts which were selected on the basis of the methodology mentioned above. Totally 1357 households were surveyed with the help of the questionnaire which was developed. It was ensured that the methodology of surveying households was based on distance from the PHC. The households surveyed per district ranged from 47 to 315.

Table 1: Detail of Districts Surveyed for the Study

S.No.	District	Surveyed Houses	
		Frequency	Percent
1	Belgaum	179	13.2
2	Bellary	90	6.6
3	Bidar	47	3.5
4	Bijapur	135	9.9
5	Chamarajnagar	141	10.4
6	Chitradurga	135	10
7	Dakshina Kannada	135	10
8	Kolar	90	6.6
9	Mysore	315	23.2
10	Raichur	90	6.6
	TOTAL	1357	100

Table 2: Distribution of Survey Households

Distance from PHC	Frequency	Percent
Inner one-third	462	34.0
Middle one-third	464	34.2
Outer one-third	431	31.8
Total	1357	100.0

Thirty four percent of the households surveyed fell within inner one-third radius, 34.2% fell between inner one-third and middle one-third radius of and 31.8% fell between the radius middle one-third and outer one-third.

Demographic Characteristics

The highest number of respondents (50.6%) belonged to the age group of 30 to 49 years followed by 0 to 29 groups (41.4%). The least number of respondents belonged to the age group of 70 to 100 (0.8%).The average age of the respondents was 33 yrs with a standard deviation of 10. The maximum age of the respondent was 89 years and the minimum was 17 years.

Table 3: Demographic Profile of Respondents

Variable	Frequency	Percent
Age in Years		
0-29	562	41.4
30-49	686	50.6
50-69	98	7.2
70-100	11	0.8
Gender		
Male	605	44.6
Female	752	55.4
Religion		
Hindu	1218	89.8
Muslim	119	8.8
Others	20	1.5
Caste		
SC/ST	691	50.9
OBC	329	24.2
Others/General	337	24.8
Marital Status		
Married	1214	89.5
Unmarried	143	10.5
Type of Family		
Nuclear	1016	74.9
Joint	341	25.1
Total	1357	100

Table 4: Age distribution

Age Statistics	
Number	**1357**
Mean	33.2078
Std. Deviation	10.28601
Range	79.00
Minimum	10.00
Maximum	89.00

Females comprised of 55.4% of the survey respondents and male comprised of 44.6% of the survey respondents. About 89.8% of the respondents belonged to Hindu religion, followed by Muslim (8.8%) and other religion comprised of 1.5% of the respondents. People who belonged to Scheduled Caste (SC) or Scheduled Tribes (ST) comprised of almost half (50.9%) of the respondents of the survey population. The remaining half comprised of OBC (24.2%) and General or Others (24.8%).Most of the respondents were married comprising of 89.5% and unmarried comprised of 10.5% of the survey respondents. Around 74.9% of the respondents belonged to nuclear family and 25.1% belonged to joint family system.

Socio-Economic Status

Table 7 below depicts the socio-economic status of the respondents of the survey comprising of Education, Occupation, Colour of Ration Card and Economic Status. The highest proportion of people were Illiterates (23.7%) followed by Primary school educated (20.7%) and Just Literate (19.2%). Those who were Graduate and above were least (2.4%), followed by Higher Secondary (7.2%), Secondary (13.7%) and Middle School (13%).

Table 5: Socio-economic status of Respondents

Variable	Frequency	Percent
Educational Status		
Illiterate	322	23.7
Just Literate	261	19.2
Primary	281	20.7
Middle School	176	13
Secondary	186	13.7
Higher Secondary	98	7.2
Graduation and Above	33	2.4
Occupation		
Agriculture and Animal Husbandry	343	25.3
Service (Govt. or Pvt.)	35	2.6
Business	49	3.6
House wife	447	32.9
Skilled Labour	124	9.1
Unskilled Labour	310	22.8
Unemployed/Student	49	3.6
Color of Ration Card		
White	36	2.7
Yellow	25	1.8
Red	61	4.5
Green	1140	84
No Ration Card	95	7
Economic Status		
World Bank Classification		
APL	1265	93.2
BPL	92	6.8
B.G Prasad Classification		
Upper Class	1	0.1
Upper Middle Class	22	1.6
Middle Class	166	12.2
Lower Middle	506	37.3
Lower	662	48.8
Total	1357	100

The highest number of respondents were housewives (32.9%), followed by Agriculture or Animal Husbandry (25.3%) and unskilled labourers (22.8%). Among the survey respondents, least number of respondents belonged to the service sector (Govt. or Pvt.) comprising of only 2.6% of the people, followed by Business and unemployed/student category comprising of 3.6% each and skilled laborers (9.1%).

Most of the surveyed respondents had green colour ration card, followed by red (4.5%) and the least number of people had yellow card (1.8%). It is to be noted that 7% of the surveyed population did not have any type of ration card.

The economic status of the surveyed population was classified according to World Bank and also B.G. Prasad classification. As Per World Bank categorization, which is 1.25 $ a day, 93.2% were above the poverty line (APL) and only 6.8% were below the poverty line (BPL). As per B.G. Prasad's classification, almost half (48.8%) of the respondents belonged to lower class, followed by 37.3% who belonged to lower middle class and 12.2% belonging to middle class. The least one was upper class (0.1%) followed by upper middle class (1.6%).

FINDINGS AND DISCUSSION

I.   EQUITY ISSUES AND UTILISATION PATTERNS

1. Overview of distribution of 108 Ambulances Services in the State

The distribution of ambulance is based on the population[9] of each district. It is expected that there need to be one ambulance per lakh population[10] in each district in order to meet the demand for emergencies and respond timely and have quick referral to the healthcare facility. There are totally 517 ambulances operating in the state of Karnataka. Table 1 below shows the distribution of ambulances in all the 10 study districts of Karnataka. Among the study districts, Belgaum and Mysore districts have the highest number of ambulances of 41 and 27 respectively. Chamarajanagar and Kolar districts have least number of ambulances of 10 and 14 respectively. It was noted that most of the study districts have less than expected number of ambulances.

Table 6 : Overview of distribution of 108 Ambulances Services in the sample districts

S. No.	Districts	Percentage distribution of Population[11]	Present number of Ambulances	No. of ambulances per one lakh population	No. of Ambulances to be alloted[12]	Deficiency in ambulances
1	Belgaum	7.8	41	0.9	47.8	6.8
2	Bellary	4.1	20	0.8	25.3	5.3
3	Bidar	2.8	15	0.9	17.0	2.0
4	Bijapur	3.6	18	0.8	21.8	3.8
5	Chamarajanagar	1.7	10	1	10.2	0.2
6	Chitradurga	2.7	16	1	16.6	0.6
7	Dakshina Kannada	3.4	17	0.8	20.8	3.8
8	Kolar	2.5	14	0.9	15.4	1.4
9	Mysore	4.9	27	0.9	29.9	2.9
10	Raichur	3.1	17	0.9	19.2	2.2
	TOTAL	**36.6**	**195**	**0.87**	**224.1**	**29.1**

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[9] **Source:** Census of India (2011) "Provisional Population Totals Paper 1 of 2011: Karnataka", Office of the Register General, New Delhi, India.

[10] nrhm.gov.in (n.d.) EMRI/Patient Transport Service, Emergency Medical Transport System [WWW] nrhm.gov.in , Available from : http://nrhm.gov.in/nrhm-components/health-systems-strengthening/emri-patient-transport-service.html [Accessed on 6/5/2013]

[11] Percentage calculated with respect to the state polpulation

[12] Taking the standard as 1 ambulance per 1 lakh population

Among the study districts, Chamarajanagar and Chitradurga are the only districts which have adequate number of vehicles. Bellary, Bijapur and Dakshina Kannada districts have the least number of vehicles standing at 0.8 ambulances per lakh population. Belgaum, Bidar, Kolar, Mysore and Raichur districts have 0.9 ambulances per lakh population. Hence it was seen that amongst the sampled districts which constituted 36.6% of the total state population, there were totally 195 ambulances deployed. This gave an average of 0.87 ambulances per 1 lakh population which is less than the standard norm of 1 ambulance per 1 lakh population. Considering the same standard norm, it was seen that in the study districts there was a deficiency of around 29 ambulances with maximum deficiency recorded in Belgaum district which constitutes 7.8% of the total state population.

Similarly, the average number of ambulances per lakh population in the state is 0.85, and the state needs approximately another 94 ambulances to meet the demand and achieve the expected number.

2. Utilisation of Emergency Services

2.1 Based on type of emergency (Medical , Police, Fire)

The 108 ambulance service caters to medical, police and fire emergencies occurring in the districts. The total emergencies stand at an average of 2.5 lakh[13] each year in the study districts. It can be seen from Graph 1 that medical emergencies were the major cause out of all the emergencies attended by 108 service among the study districts. The percentage of medical emergencies stands at an average of about 99%. In 2010-11, 2011-12 and 2012-13, the percentage of medical emergencies out of all the emergencies was 99.39 %, 99.39% and 99.44% respectively. It was seen that police emergencies were the next major cause out of all the emergencies attended by 108 service among the study districts. The percentage of police emergencies stands at an average of about 0.55%. In 2010-11, 2011-12 and 2012-13, the percentage of police emergencies out of all the emergencies was 0.52 %, 0.60% and 0.53% respectively.

Graph 1: Year wise distribution of Emergencies in Study Districts
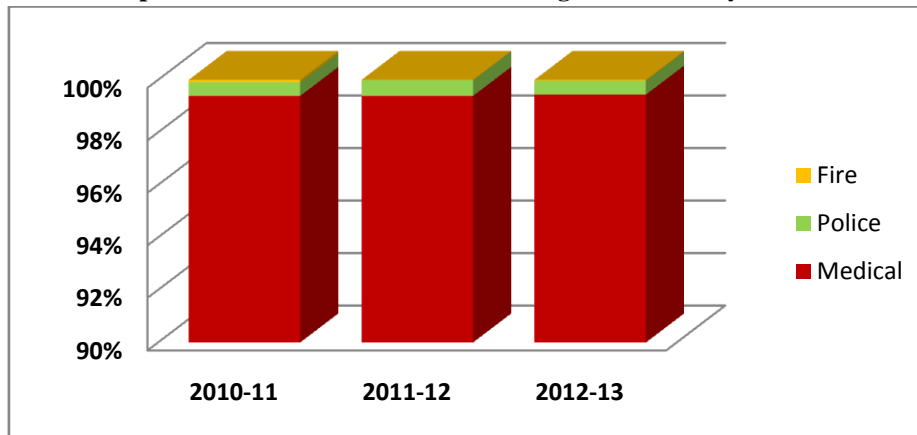
It is also seen that the percentage of fire emergencies out of all the emergencies attended by 108 service in the study districts were the lowest. The percentage of fire emergencies stands at an average of about 0.05%. In 2010-11, 2011 -12 and 2012-13, the percentage of fire emergencies out of all the emergencies was 0.09 %, 0.01% and 0.03% respectively.

2.2 District Wise comparison

Graph 2 depicts the percentage of medical emergencies in each study district out of all the medical emergencies among the study districts during the period of 2010-11, 2011-12, and 2012-13. It can be noted from the figures that among the study districts most of the medical emergencies were reported in Belgaum district followed by Mysore and Bellary districts. In 2010-11, 2011-12 and 2012-13, the percentage of medical emergencies out of

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[13] Secondary data provided by EMRI

total medical emergencies in Belgaum district was 21.8%, 21.1% and 20.6 % respectively, the percentage for Mysore district during 2010-11, 2011-12 and 2012-13 was 15.4%, 16.1% and 16.9% and the percentage for Bellary district during 2010-11, 2011-12 and 2012-13 was 12%, 11.7% and 11.3%.

Graph 2: Percentage of Medical Emergencies in Study Districts (FY 2010-13)
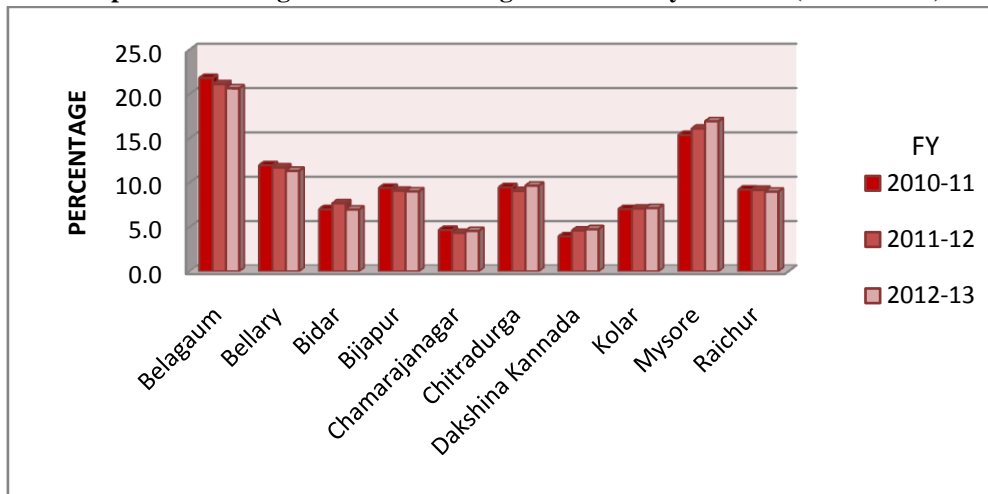
Among the study districts, the lowest number of medical emergencies during the period of 2010-11, 2011-12, and 2012-13 can be seen at Chamarajanagar district followed by Dakshina Kannada district. In 2010-11, 2011-12 and 2012-13, the percentage of medical emergencies out of total medical emergencies in Chamarajanagar district was 4.7%, 4.3% and 4.6% respectively and the percentage for Dakshina Kannada district during 2010-11, 2011-12 and 2012-13 was same at 4%, 4.6% and 4.8% respectively.

Graph 3 depicts the percentage of police emergencies in each of the study district out of all the police emergencies among the study districts during the period of 2010-11, 2011-12, and 2012-13 in the state. It can be noted from the figures that most of the police emergencies were reported in Mysore district followed by Chitradurga district. In 2010-11, 2011-12 and 2012-13, the percentage of police emergencies out of total police emergencies in Mysore district was 23.4%, 20.3% and 24.3% respectively, the percentage for Chitradurga district during 2010-11, 2011-12 and 2012-13 was 13.2%, 14.6% and 15.9% respectively.

Graph 3: Percentage of Police Emergencies in Study Districts (FY 2010-13)

Among the study districts, the lowest number of police emergencies during the period of 2010-11, 2011-12, and 2012-13 can be seen at Chamarajanagar district followed by Bidar district. In 2010-11, 2011-12 and 2012-13, the percentage of police emergencies out of total police emergencies in Chamarajnagar district was 5.5%, 4.3% and 4.6% respectively, the percentage for Bidar district during 2010-11, 2011-12 and 2012-13 at 5.6%., 5.2% and 4.8%.

Graph 4 depicts the percentage of fire emergencies in each district out of all the fire emergencies among the study districts during the period of 2010-11, 2011-12, and 2012-13 in the state. It can be noted from the figures

that most of the fire emergencies were reported in Belgaum and Bellary districts. In 2010-11, 2011-12 and 2012-13, the percentage of fire emergencies out of total fire emergencies in Mysore district was 6.6%, 10.6% and 5.8% respectively, the percentage for Belgaum district during 2010-11, 2011-12 and 2012-13 was 8.3%, 9.4% and 6.4%, the percentage for Bellary district during 2010-11, 2011-12 and 2012-13 was 6.8%, 3.5% and 9.3% respectively.
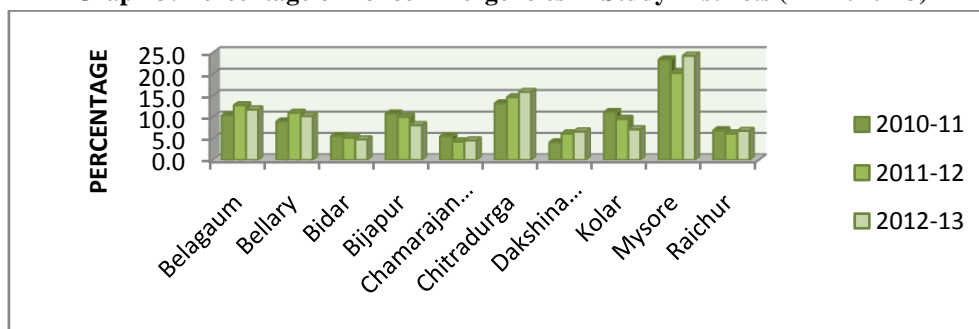
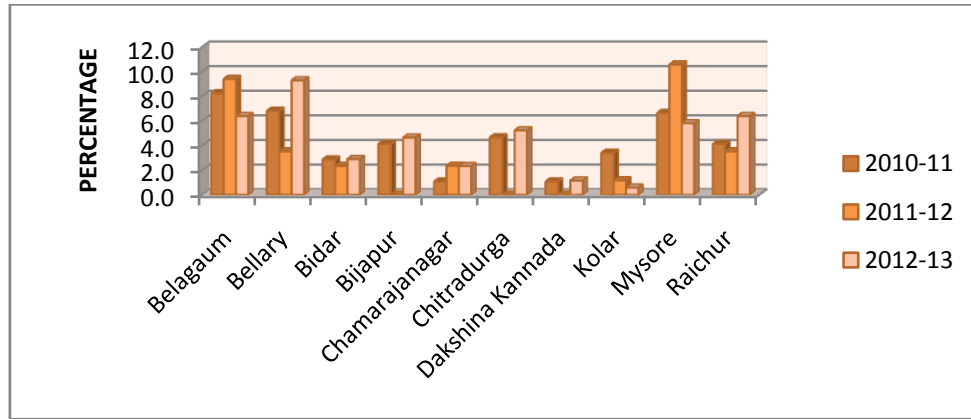**Graph 4: Percentage of Fire Emergencies in Study Districts (FY 2010-13)**

Among the study districts, the lowest number of fire emergencies during the period of 2010-11, 2011-12, and 2012-13 were reported in Dakshina Kannada followed by Chamarajanagar and Kolar districts. In 2010-11, 2011-12 and 2012-13, the percentage of fire emergencies in Dakshina Kannada district out of total fire emergencies among the study districts was 1.1%, 0% and 1.2% respectively, the percentage for Chamarajanagar district during 2010-11, 2011-12 and 2012-13 at 1.1%., 2.4% and 2.3% respectively.

It is to be noted that unlike the medical and fire emergencies, the percentage of police emergencies is high in Mysore compared to Belgaum district. Belgaum and Bellary have higher percentages of police emergencies as compared to Bijapur and Kolar. Dakshina Kannada has lower percentage of police emergencies compared to Raichur.

2.3 Utilisation of Emergency Services by Community

Availed cases are defined as the cases where the 108 service has reached the spot and carried the patient to the hospital.

From the 1357 respondents interviewed, 49.3% of respondents reported to have required emergency services for one of their family members recently (within 6 months). Out of the respondents, 76.8% respondents reported that emergency ambulance service was required for their neighbors. Majority of respondents (87%) felt that people in their village are availing 108 ambulance services for any emergency cases.

Table 7 : Emergency service (health, fire) required in recent (6 months) time

EMERGENCY SERVICE (Health, Fire) REQUIRED IN RECENT (6 months) TIME				
	Family Member		**Neighbour**	
Response	**Frequency**	**Percent**	**Frequency**	**Percent**
Yes	669	49.3	1042	76.8
No	688	50.7	242	17.8
Don't Know	NA		73	5.4
Total Respondants	1357	100	1357	100

Graph 5 : Emergency service availed in recent time by respondent's family member
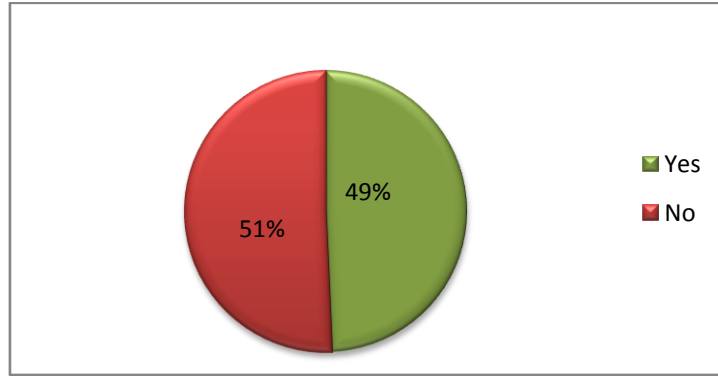
Out of the 669 respondents who required the emergency transportation services ,86.2 % (577) of respondents reported to have availed 108 ambulance service ,12.7% of respondents used private or personal vehicle and 1% of respondents were unaware of the type of transport which was used. From the 1042 respondents whose neighbours required emergency transportation service recently, 96.4% (1004) respondents said that the EMS transportation used by their neighbours during the time of emergency was Government ambulance from PHC or 108 ambulance service.

Also from the ten FGDs conducted, majority of the participants responded that they used the 108 ambulance service. Very few participants informed that they sometimes use private bus, auto or own vehicle like jeep.

The main reason perceived by the community for not availing 108 ambulance services was found to be lack of awareness (44%) followed by delay in arrival (21%) at the spot of emergency. Out of all the reasons stated by the respondents for not availing 108 services in the village, about 15% of respondents perceived that their village did not have the 108 ambulance facility and hence the people were not availing these services. In the villages where the FGDs were conducted, all the participants reported that their village has 108 ambulance services. Graph 6 below represents the various causes reported by the respondents as reasons for not availing 108 EMRI services.

Graph 6: Reason for not availing EMRI 108 Services
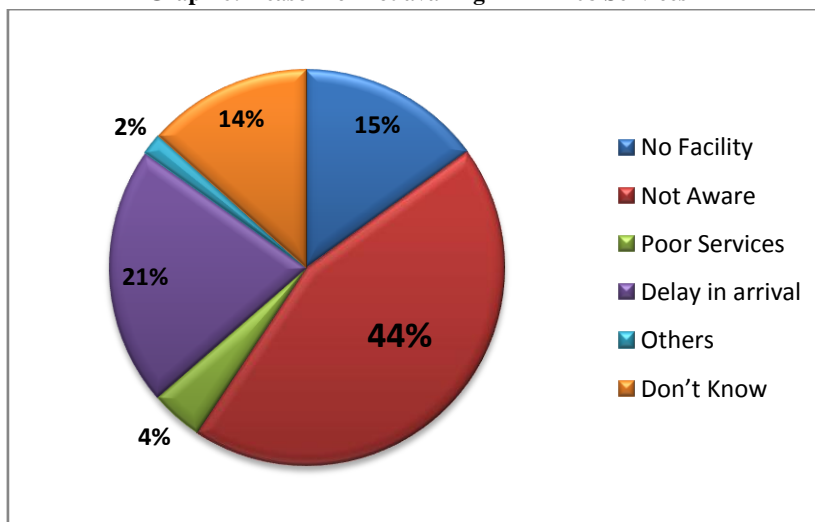
Similarly, in the FGDs also, the main cause of concern was the ambulance arriving late on few occasions due to which the people had to arrange their own vehicle to a certain distance.

2.4 Distribution of Medical Cases Reported

The availed cases were mainly divided into accidents (RTA/Injury), delivery (Pregnancy related cases), Suicide and Poisoning, Abdominal pain (acute abdomen), sick newborn (neonatal cases) and other cases.

From the primary data collected from the respondents, it was found that out of the respondents whose family members availed the service, delivery cases constituted 74.7% of emergency cases for which the family member availed 108 service amongst all the reported cases for which emergency transport was required. This was followed by accident cases and abdominal pain cases at 7-8% of the total number of cases for which emergency transport was availed by the family member. The least reported emergency case for which emergency transport was availed was for poisoning cases at 2.1% of the total cases for which emergency transport was required.

TABLE 8 : Cause of Referral For Availed Services In Study Districts

CAUSE OF REFERRAL FOR AVAILED SERVICES IN STUDY DISTRICTS				
	AVAILED BY FAMILY		**AVAILED BY NEIGHBOUR**	
Type of Medical Emergency	**Frequency**	**Percent**	**Frequency**	**Percent**
Delivery	499	74.7	562	53.9
Accident	55	8.2	322	30.9
Abdominal pain	49	7.3	38	3.6
Sick New born	19	2.8	17	1.6
Poisoning	14	2.1	37	3.6
Others	27	4	32	3.1
Don't Know	6	0.9	34	3.3
Total (No. of Respondents)*	669	100	1042	100

* This question was asked only to respondents who availed the service recently

For EMS availed for neighbour, again 53.9% cases were delivery cases followed by accident cases (30.9%). However, there was variation seen in the responses on case distribution for emergency services availed by the respondents neighbours. This may be due to recall bias and lack of information on the reason for which the neighbor availed the service. Graph 7 below depicts the distribution of various emergency cases for which EMS was availed as reported by the respondents.

Graph 7: Cause of referral for availed services in sample districts reported by respondents
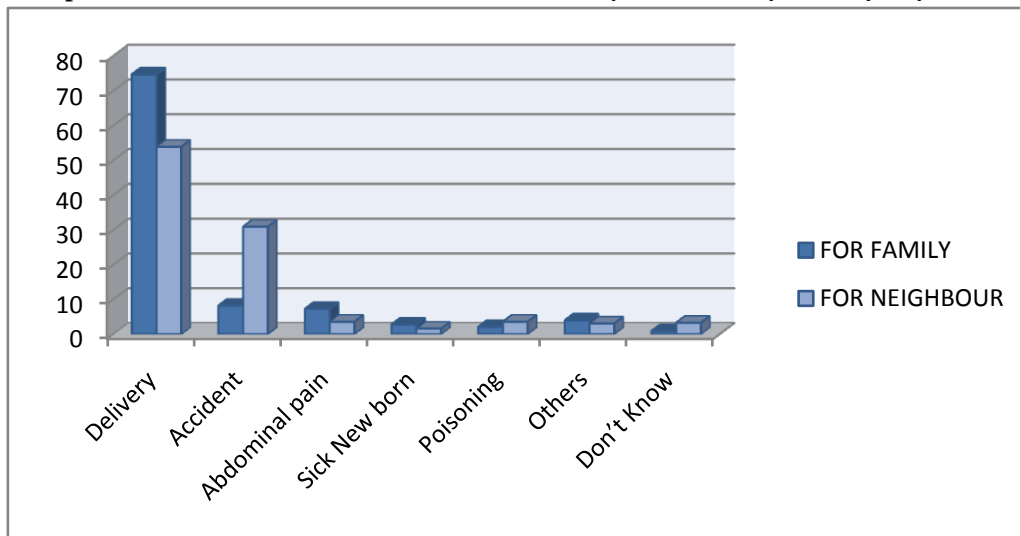
Out of all the ten focus group discussions conducted, in eight FGDs, it was reported by the participants that 108 facility availed by them was for delivery cases. The next common cause for availing the service as reported by the participants was for accidents and injuries due to fall or assault. Other reasons were snake bite, poisoning,fire,chest pain and stomach pain.

This data was supported by the secondary data collected from EMRI for the three financial years 2010-11, 2011-12 and 2012-13 which showed that pregnancy related cases recorded the majority of cases for which the emergency ambulance service was availed at around 51 % followed by injury (including accidents) and acute abdomen cases at around 11-12% of the total medical emergency cases for which services were availed. Given below is the case break of the types of emergencies for which the 108 ambulance service was availed as recorded by EMRI.

Graph 8 : Year wise trend of all cases among Study Districts (Apr' 2010-Mar' 2013)
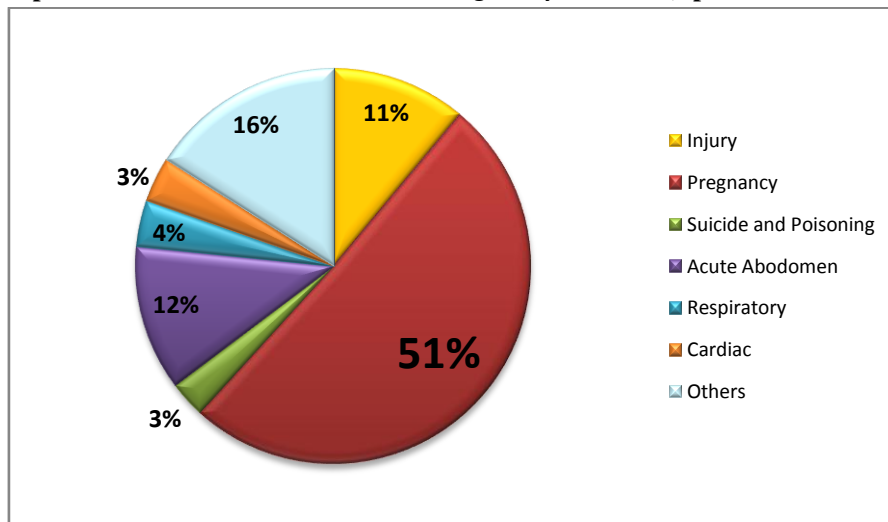
2.5   AREA WISE DISTRIBUTION OF EMERGENCY CASES

INJURY CASES

Belgaum had the highest percentage of injury cases in all three years followed by Mysore and Bijapur. The lowest percentage of injury cases who availed 108 service among the study districts was from Chamarajnagar district in all three years.

Graph 9 : District wise distribution of injury cases (FY 2010-13)
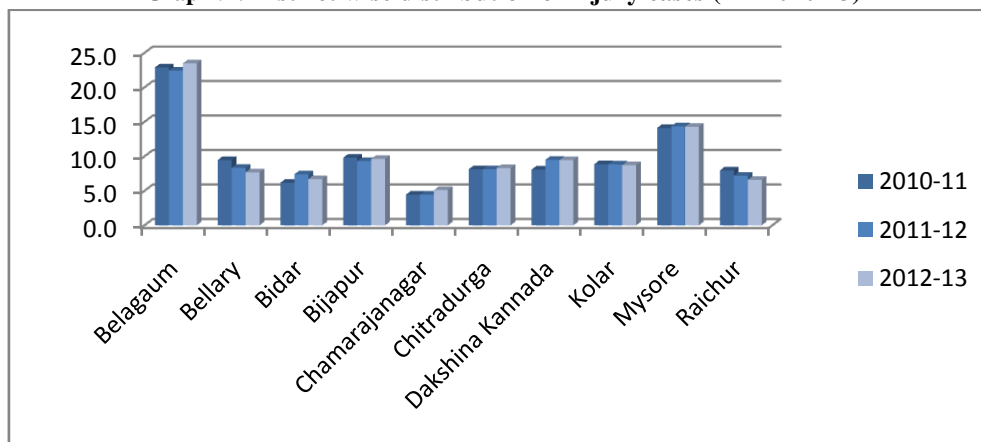
PREGNANCY CASES

Belgaum had the highest percentage of pregnancy cases in all three years followed by Mysore. The lowest percentage of pregnancy cases who availed 108 service among the study districts was from Dakshina Kannada district in all three years. Graph 10 below depicts the percentage of pregnancy cases out of all the pregnancy cases in the study districts during FY 2010-13.

Graph 10: District wise Distribution of Pregnancy Cases (FY 2010-13)
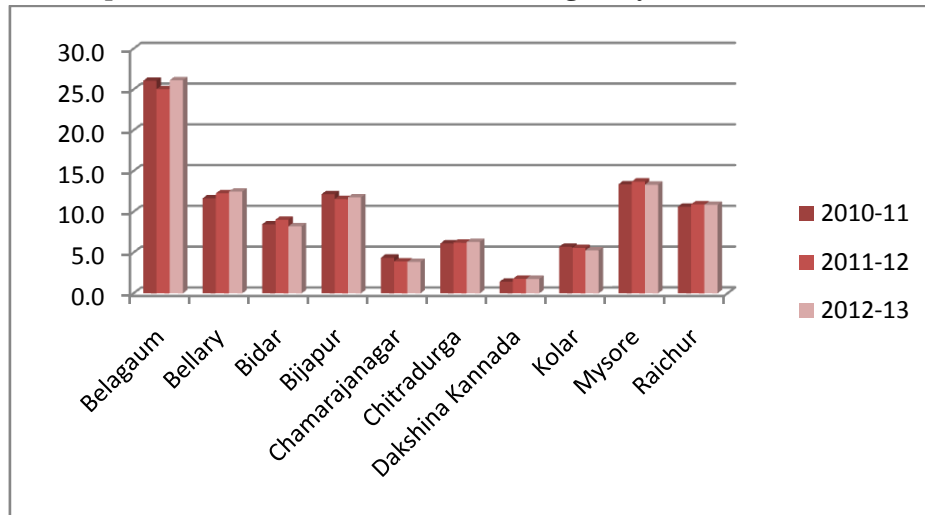
ACUTE ABDOMEN CASES

Mysore had the highest percentage of Acute Abdomen cases in all three years followed by Chitradurga and Belgaum. The lowest percentage of Acute Abdomen cases who availed 108 service among the study districts was from Dakshina Kannada in all three years. The graph below depicts the percentage of Acute Abdomen cases out of all the Acute Abdomen cases among the study districts during 2010-11.

Graph 11 : Districtwise Distribution of Acute Abdomen Cases (FY 2010-13)
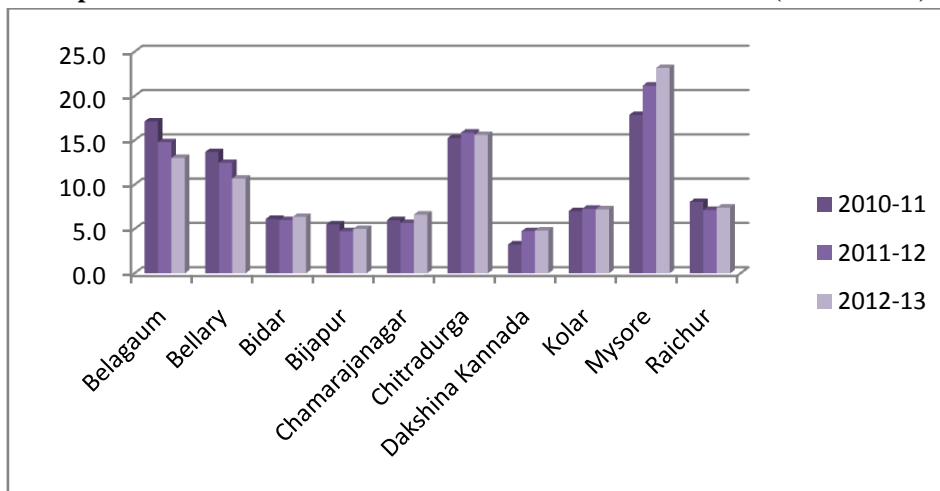
Respiratory cases

Again, Mysore had the highest percentage of Respiratory cases reported which availed 108 ambulance services. The lowest number of Respiratory cases who availed 108 service among the study districts was from Bidar. The graph below depicts the percentage of Respiratory cases out of all the Respiratory cases among the study districts during FY 2010-13.

Graph 12 : District wise Distribution Of Respiratory Cases (FY 2010-13)
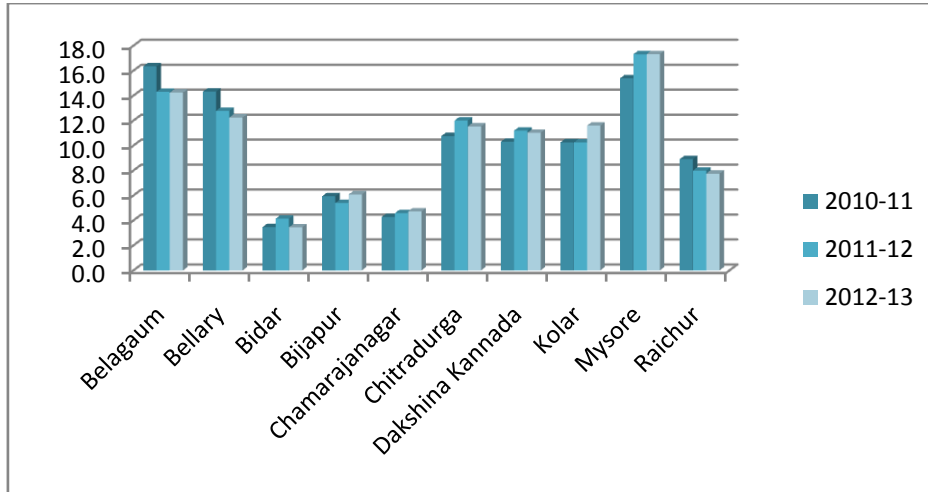
CARDIAC CASES

Mysore district had the highest number of Cardiac cases reported which availed 108 ambulance services..The lowest number of Cardiac cases who availed 108 service among the study districts was from Bijapur.

Graph 13 : District wise Distribution of Cardiac Cases (FY 2010-13)
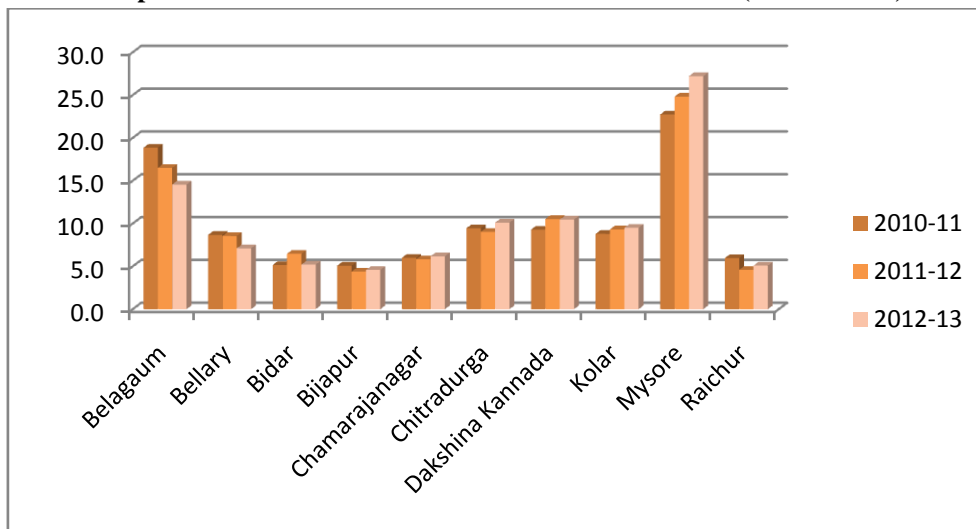
Suicide and Poisoning Cases

Mysore had the highest percentage of Suicide and Poisoning cases reported which availed 108 ambulance services.The lowest percentage of Suicide and Poisoning cases who availed 108 service among the study districts was from Dakshina Kannada. Graph 14 below depicts the percentage of Suicide and Poisoning cases out of all the Suicide and Poisoning cases among the study districts during 2010-13.

Graph 14 : District wise Distribution of Suicide and poisoning Cases (FY 2010-13)
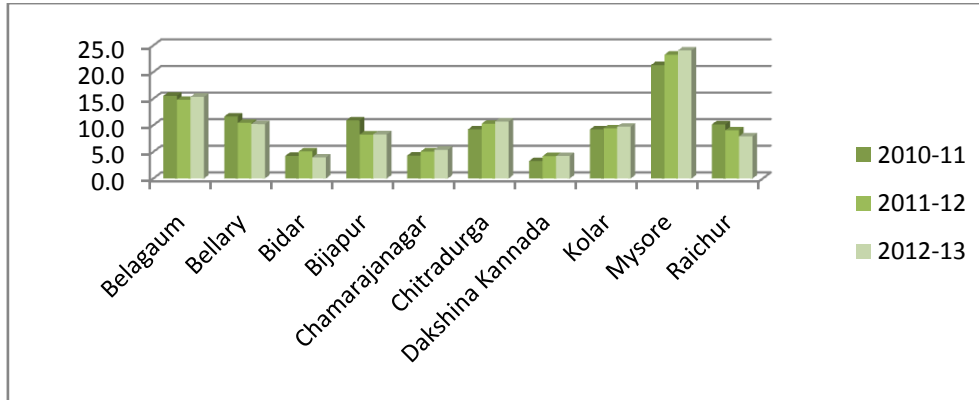
3. Cost paid by the clients availing 108

One of the key features of EMRI 108 service is its cashless nature. The service is free of cost irrespective of who avails it, distance, type of emergency service, and facility where the patient is handed over. It was observed that from all the respondents, 88% of the clients who availed 108 service have not paid any amount after availing the service. However 12% of the respondents claimed to have paid money to the health staff or driver after availing the service. Also, in two of the villages where FGD was conducted, ie. Ashoknagar and Goolgeri the participants reported incidents where they were charged by the ambulance staff for transporting the patient.

II.   OPERATIONAL ASPECTS

1. Process and implementation of the scheme

a.   Infrastructure and Facility

Ambulance vehicle: There are two types of 108 vehicles which are the Basic Life Support (BLS) and Advanced life Support (ALS). The 108 vehicle has one staff nurse, one driver and is equipped with the essential drugs and equipments like oxygen cylinder, delivery kits, wash basin. The ALS vehicle is fitted with a cardiac monitor and defibrillator for advanced cases. The ambulance is installed with Geographical Positioning System (GPS) systems which aids in navigation and tracking. In most of the emergency referral from the village to Taluk level, the BLS vehicles are used, and only in case of complicated inter-facility referrals, the ALS vehicles are used. Currently, out of the 517 ambulances 511 ambulances are in functional state. The 6 ambulances are awaiting replacement which will take 3-4 months time.

The ambulance receives the fitness certificate from the RTO before it starts functioning. The ambulance committee evaluates the ambulance on a regular basis. The ambulance is also audited quarterly once. The fleet department ensures the maintenance of the ambulances.

Networking: The EMRI 108 ambulance service is coordinated by a call centre, which is functional 24 X 7. The calls from the beneficiaries are answered from a centralized call center where the EMRI executive (call handlers) takes the details of the emergency and deploys the nearest available vehicle. This is done with the help of the vehicle location mapping and the mobile telephony technology. In case of police or fire incidents, the call is received at the call centre and transferred to a police dispatch officer at EMRI who informs the nearest police station or fire official.

For incidents of disaster or mass casualty, there may be two scenarios. The first one being informed to the EMRI by the District health official or district disaster management cell. In such a case, the EMRI contacts the district manager who contacts the call centre, DC, DHO or SP and ambulances are dispatched accordingly. If however the call is received by a civilian, it is escalated by the call handler to the team leader. The team leader in turn informs the district manager who contacts the respective stakeholder and accordingly the ambulances are mobilized.

Drugs, Equipments and Supplies: The procurement of the equipments, supplies and drugs is through the process of e tendering annually. The annual tendering schedule is send to the suppliers. The entire process is completed under supervision of a Government supervisor. Oxygen cylinders are procured from district level vendors by the same process.

All the indents are communicated by the EMT at the ambulances via telephone to the district executives who in turn communicate to the stores. The item is then supplied to the respective ambulances by the ambulance assistants. It is ensured that the "Go Live" quantity is maintained.

The maintenance of equipments is supervised by the fleet department. The District Manager and district executive maintain the calendar for preventive maintenance. Quarterly audit of equipments is carried out.

b.   <u>**Human Resource, Training and development**</u>

The hierarchy followed at EMRI is given below :

Figure 6 : State Organogram
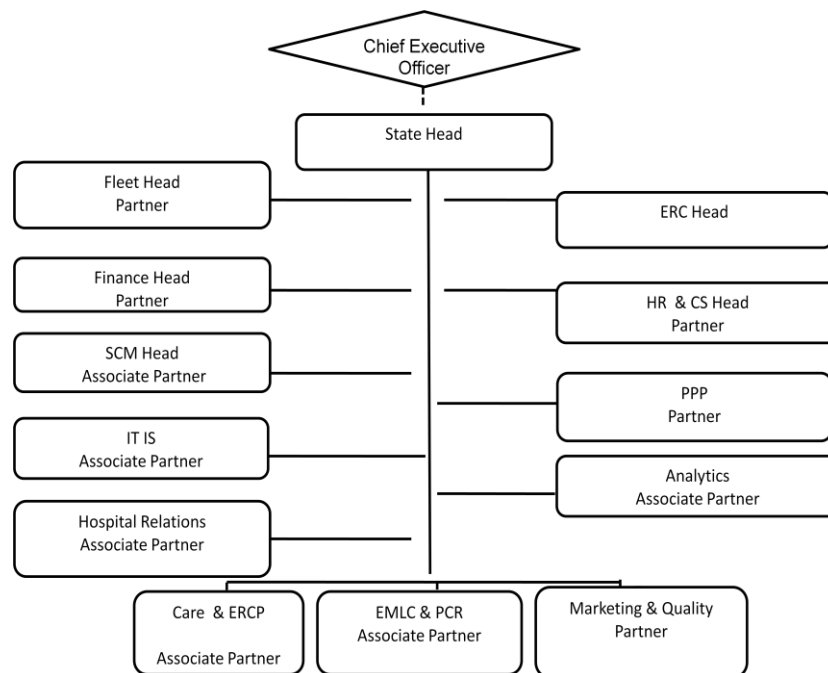
Figure 7: Operations System Hierarchy
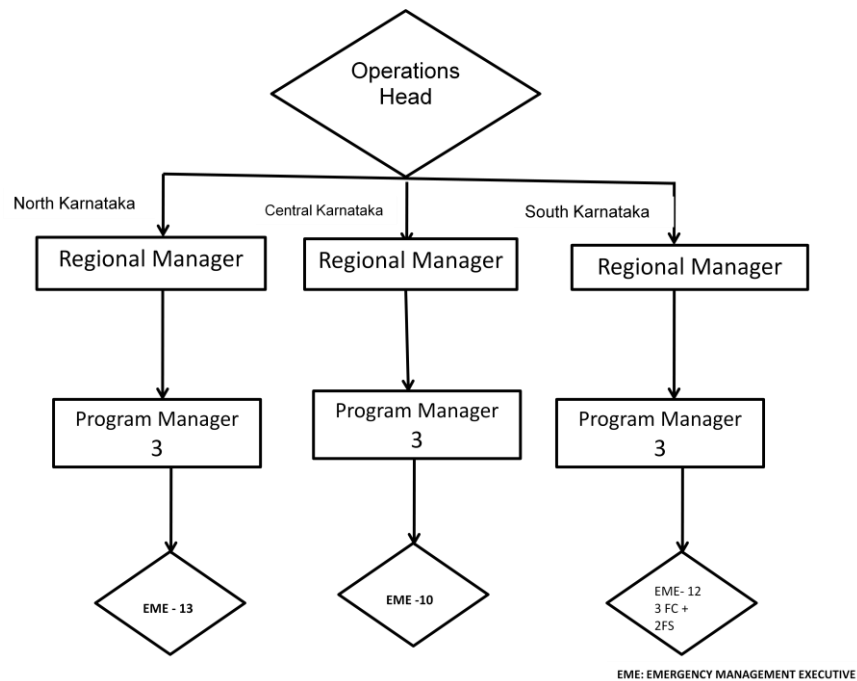
The Associates are classified into Emergency Response Officer (EROs at Call Centre), EMTs, PILOTs, Operation Staff and support staff. As on March 2013, EMRI reported to have 103 Emergency Response Officer (EROs at Call Centre), 1,207 EMTs, 1,283 PILOTs, 54 Operation Staff and 68 Support staff. The ratio of staff to ambulance has been on an average of 2.5 EMT per ambulance and 2.5 PILOTs per ambulance for the financial years 2010-13.

Table 9 :   Ratio of staff to ambulance

Financial Year	EMT/Ambulance	PILOT/ Ambulance
2010-11	2.61	2.64
2011-12	2.53	2.40
2012-13	2.32	2.43

Each staff recruited at the EMRI undergoes a foundation training before going on field. The drivers (PILOT) are trained on first aid, safe driving, mass casualty and mob management. The EMTs undergo a 52 days course on emergency care, obstetrics, anatomy and other related topics. Each staff undergoes a "Go Live" test after the training before they go on field. All the paramedics are evaluated by a group of doctors. The call centre employees also undergo 15 days training and an on the job training for 1 and a half months. Along with foundation training, skills training are also offered. There is a refresher training conducted every six months and evaluated.

The organization has certain welfare and safety measures for the staff. All vehicles and staff are insured. Enough stock of PPP is provided like gloves, mouth masks, gowns etc. Vaccination against infectious diseases is provided at the time of joining. However booster doses are given on field at district hospitals. In terms of safety, the employees maintain a closed network coordinating activities between the field, ambulance and district executives. Mock drills are conducted from time to time to sensitise the employees. Other employee benefits like Provident fund, gratuity, annual leaves etc are provided to all employees. However, there is no accommodation facility provided to the employees other than a rest room in the district hospitals. An employee satisfaction survey is conducted every two years to ensure employee satisfaction.

The monthly attrition rate of the employees has ranged from around 0.7 - 3 % for the years 2011 and 2012 as reported by the EMRI officials. According to them, the attrition rate has decreased over the years. Exit interviews of the employees are conducted at the time of their leaving the organization. Some of the reasons stated by them as reason for leaving the job are better opportunities, better salary and issues related to relocating to remote districts. They also reported that many employees left due to relocation.

2. Distance travelled per trip

The average distance travelled by one ambulance per day is reported to be 144.7 kms (2010-11), 133 kms (2011-12) and 151.5 kms (2012-13). The Average kms travelled per Ambulance for 1 trip per day was reported to be 41.3 km in 2010-11, 40.6 kms in 2011-12 and 46.6 kms in 2012-13. The average trips from 2010-13 have been around 3.5 trips per day per ambulance. It was noted that even though the average number of trips remained almost the same, the distance travelled per trip has increased in the year 2012-13.

3. Financial Management

The Karnataka State Government contributes 100% (capital cost and operational cost) for the EMRI 108 services. The GVK provides financial assistance only for the software and training aspects. The EMRI submits yearly budget within the guidelines of the MOU which was signed in 2008 projecting cost for next 5 years. The funds are released on quarterly basis in advance as per the submitted budget for the Financial Year.

The emergency transportation provided is free of cost to the beneficiary. The total capital cost for the years 2010-13 has decreased substantially from 2011-12 to 2012-13 and the total operating cost has increased during the same years. The operating cost per trip has increased over the years from 2010 to 2013.In 2010-11, with an average of 3.5 trips per day and average distance of 41 km travelled per trip, it costed Rs 898 per trip for an average of 515 ambulances. While in the years 2011-12 and 2012-13, with 517 ambulances and an average of 3.3 trips, it costed Rs 934 and Rs. 110 respectively.

Similar to cost per ambulance per trip, the cost per ambulance per year also increased in the year 2013.It was found to be Rs. 11.32 lakhs in the year 2010-11 with an average trips of 3.5 per day and Rs 11.03 lakhs in 2011-12 with an average number of 3.3 trips per day. The cost per ambulance per year rose to Rs 12.89 lakhs in 2012-13 with the same number of ambulances and average trips as in the year 2011-12.

The break up costs showed varying patterns over the years. Table 10 below shows the break up the costs incurred in the financial year 2010 to 2013.

Table 10: Break up of costs of EMRI/108 Service (FY 2010-13)

S. No	Particulars	F Y 2010-11	FY 2011-12	FY 2012-13
1	Salaries as percentage of total operating cost	53.64%	57.53%	53.18%
2	Administrative overheads as percentage of Total operating cost	4.53%	3.55%	3.61%
3	Vehicle Repair & Maintenance Cost as percentage of Total operating cost	2.41%	3.89%	3.59%

It was seen that the salaries constituted the majority of operating cost. Also, it was seen that the salaries, administrative overheads and vehicle maintenance costs constituted around 60-65% of the total operating costs.

The total per capita cost when taken in to account the cost per person per year for the state averages around Rs. 27 per person per year whereas when the cost per beneficiary is taken in to consideration , it was 2255, 2388 and 2616 per person per year in 2010-11, 2011-12 and 2012-13 respectively.

4. Response Time

It was reported that most of the cases have got the transport within half an hour of calling (80.4%). Almost one-fifth of the clients (19.6%) got the transport within 15 minutes. It is to be noted that 15.7% of the clients got the transport after half an hour and 3.3% clients got the transport only after one hour of calling for the vehicle. Table 11 below depicts the time response to get the 108 service for the case which availed the transport as reported by the respondents.

Table 11: Time response to get the transport as reported by respondents

Time Period	Frequency	Percent
< 15 minutes	131	19.6
15 – 30 min	406	60.8
30 min – 60 min	105	15.7
> 60 min	22	3.3
Don't Know	4	0.6
Total Respondents (n)	668	100

Most of the FGDs reported that the ambulance arrived within the stipulated time frame. Only participants from two villages where the FGD was conducted reported incidents when the ambulance arrived late.

This data when verified with the records maintained by EMRI office from the financial year 2010-13, it was noted that the average response time was around 29 minutes in rural areas and 17 min in urban areas. The average time reported was around 27 minutes. This complies with the service level agreement (SLA) -Response time of 20 min for urban areas and 30 min for rural areas.

It was also seen that in Kolar, all the respondents who availed the 108 ambulance service reported that the ambulance arrived in less than 30 min of calling. However, in Chitradurga district, out of all the respondents who availed 108 ambulance sevice,49.3% respondents reported that the ambulance arrived after 30 minutes of calling. It is to be noted here that districts like Chitradurga and Chamrajnagar do not have inadequacy of ambulance given the standard norm of 1 ambulance per one lakh population. Also, the percentage of medical emergencies in these districts is comparatively lesser as compared to districts like Belgaum, Bellary and Mysore which have scarcity of ambulances given the standard norm of 1 ambulance per one lakh population. Table 12 below shows a district wise comparison of the percentage of medical emergencies, deficiency in ambulances and response time reported by respondents.

Table 12 : Comparison of response time with ambulance allocation and population

S. No.	Name of the District	Percentage of total Emergencies (FY 2010-13)	Deficiency of ambulance calculated	DISTRICTWISE RESPONSE TIME REPORTED BY RESPONDENTS	
				Less than 30 min	More than 30 min
1	Kolar	7.1%	1.4	100.0%	0.0%
2	Bellary	11.7%	5.3	98.2%	1.8%
3	Mysore	16.2%	2.9	92.9%	7.1%
4	Bidar	7.2%	2.0	92.0%	8.0%
5	Raichur	9.1%	2.2	85.2%	14.8%
6	Belgum	21.1%	6.8	80.5%	19.5%
7	Bijapura	9.2%	3.8	78.0%	22.0%
8	Dakshina Kannada	4.4%	3.8	73.5%	26.5%
9	Chamarajanagar	4.5%	0.2	67.2%	32.8%
10	Chitradurga	9.4%	0.6	50.7%	49.3%

5. Hospital Linkages

The data from household survey of people who availed emergency transport from EMRI's 108 services revealed that the place from where the 108 service was availed, most of the cases were referred from the PHC (46.2%) with the help of referral from the Medical Officer or Staff Nurse. Almost a quarter (26.5%) of the transportation for emergency was initiated from the client's place followed by referral through ASHA worker (22.9%). The least number of referrals were though private practitioners (2.7%).

It was also reported that the place where the client was referred for treatment, more than half of the cases were referred to Taluk Hospital (56.1%) followed by District Hospital (20.5%) and PHC (17.6%). Very few cases were referred to Private Hospital (2.20%) and CHC (2.80%).

Majority of the FGDs also indicated to the fact that the patient is usually transported to a government hospital or nearest PHC from where they are in turn transferred to a higher facility depending on the level of treatment required.

6. Un-Availed Cases

Un-availed cases are those where the call had been made to 108 to avail the service for emergency but when the vehicle reached the spot, the patient has not availed the service due to other reasons.

Figure 8 below depicts the total percentage of un-availed cases to the total number of cases during financial year 2010 to 2013. The number of un-availed cases is very less compared to the availed ones, and most of the callers avail the service when the ambulance reaches the spot. It can be seen from the figure that during 2010-11, 2011-12 and 2012-13, the total percentage of un-availed cases among the study districts were 2.7%, 2.7% and 2.6% respectively. The percentage of un-availed cases decreased from 2010 to 2013.

Graph 14: Year wise trend of un-availed cases among Study Districts (FY 2010-13)
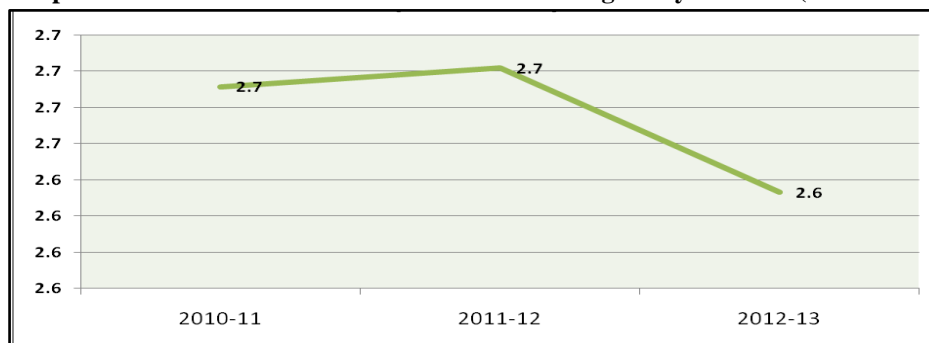
2010-11

It was seen that out of the total percentage of all un-availed cases among the study districts during 2010-11, Mysore district constituted most (18.6%) of the un-availed cases, followed by Belgaum (16.3%) and Chitradurga (12%) districts. Chamarajanagar constituted the least percentage (4.8%) of un-availed cases followed by Bijapur and Dakshina Kannada (7.1%) districts.

2011-12

Belgaum district constituted most (18.2%) of the un-availed cases in 2011-12, followed by Mysore (17.5%) and Chitradurga (12.3%) districts. Chamarajanagar constituted the least percentage (4.3%) of un-availed cases followed by Bijapur (7.2%) and Dakshina Kannada (7.4%) districts.

2012-13

Mysore district constituted most (18.8%) of the un-availed cases in 2012-13 out of the total percentage of all un-availed cases among the study districts, followed by Belgaum (18.2%) and Chitradurga (11.1%) districts. Chamarajanagar constituted the least percentage (4.9%) of un-availed cases followed by Bijapur (7.4%) and Kolar (7.7%) districts.

7. Vehicle Busy Cases

Vehicle busy cases are those where the ambulance was already engaged in emergency referral when there is a need, and no vehicle is free to attend to the condition for which the call is received.

Among the study districts, the percentage of vehicle busy has increases drastically from financial years 2010 to 2013. It was only 3.9% in FY 2010-11 whereas it increased to 11.1% in FY 2012-13. In 2011-12 the number was almost stable at 3.7%. This can be due to increased number of cases availing the service in the districts.

Graph 15: Year wise trend of Vehicle Busy among Study Districts (FY 2010-13)
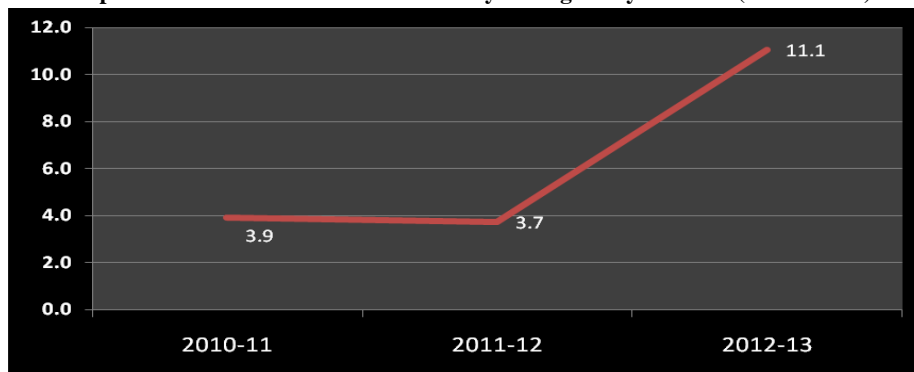
2010-11

The total percentage of vehicle busy cases in each district out of all the study districts during the period of 2010-11 showed that out of the total percentage of all vehicle busy cases among the study districts during 2010-11, Chitradurga district constituted most (21.5%) of the un-availed cases, followed by Mysore (17.8%) and Bellary (15.9%) districts. Dakshina Kannada constituted the least percentage (0.4%) vehicle busy cases followed by Chamarajanagar (3.4%) and Kolar (3.8%) districts.

2011-12

Mysore district constituted most (21.1%) of the un-availed cases out of the total percentage of all vehicle busy cases among the study districts during 2011-12 , followed by Bellary (16.2%) and Chitradurga (14.5%) districts. Dakshina Kannada constituted the least percentage (0.7%) vehicle busy cases followed by Chamarajanagar (3.5%) and Kolar (3.8%) districts.

2012-13

Mysore district constituted most (20.6%) of the un-availed cases in 2012-13, followed by Belgaum (14.3%) and Chitradurga (14%) districts. Dakshina Kannada constituted the least percentage (2%) vehicle busy cases followed by Chamarajanagar (3.8%) and Kolar (6.2%) districts.

This drastic growth was explained by EMRI due to change of definition of vehicle busy cases wherein before June 2012, vehicle busy cases were defined as cases where all the three nearest ambulances cannot be assigned due to ambulance being busy, already on a dispatch for another Emergency. However, after June 2013, vehicle

busy cases were defined as cases where first nearest ambulance cannot be assigned due to ambulance being busy, already on a dispatch for another Emergency and the caller denies the service because of the distance for next available ambulance.

III.   COMMUNITY PERCEPTION

1. Awareness and Utilization of 108 Service

From the community survey conducted, it was seen that 95% of the respondents are aware of the 108 services and only 5% are unaware. It was found that out of the 95% respondents who were aware of 108 EMRI services,72% respondents were aware on how to contact the 108 EMRI services.

Graph 16 : Awareness of 108 Service
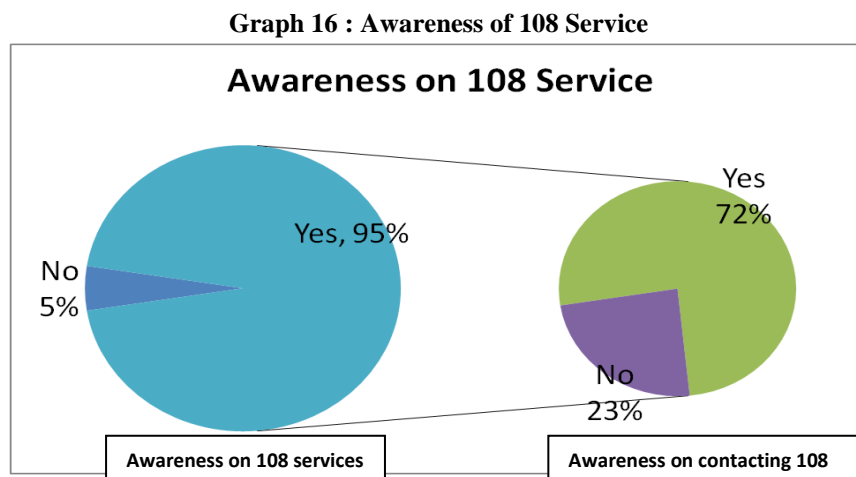
Also, from the FGDs conducted, it was noted that in case of an emergency, majority of the participants were aware on how to contact the 108 services and request an ambulance. Some participants also reported that in case of an emergency, they call PHC/ASHA worker and ask them to inform EMRI Personnel. Majority of the participants also reported that almost everyone in their village is utilizing the 108 services. Also, all the FGDs have reported that their phone calls are responded immediately.

2. Mode of Awareness

It was seen that almost half of the respondents (49.6%) were aware of the 108 service through PHC, followed by through Neighbor (45.8%) and through Health worker (43%). The least mode of awareness was through Radio (3.3%), followed by DH (6.7%), T.V (13.7%) and News paper (14.5%) and Graph 17 below depicts the mode of awareness on the 108 service which says how the respondents were made aware of the 108 ambulance in the district or village.

Graph 17: Mode of Awareness on 108

Mode of Awareness on 108 Service

Category	Percentage
DH	6.7%
Neighbor	45.8%
Newspaper	14.5%
T.V	13.7%
Radio	3.3%
Health Worker	43.0%
Family member	24.8%
PHC	49.6%
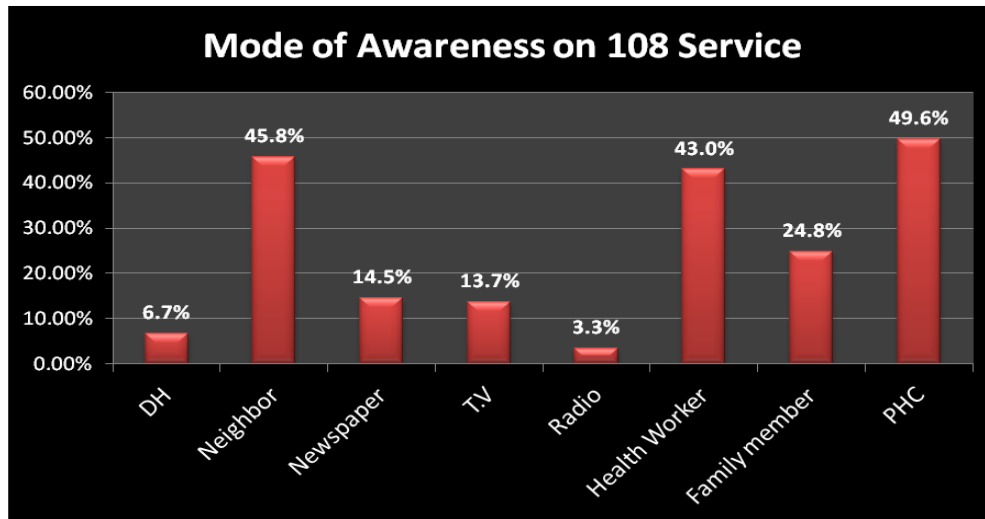
3. Quality of Services

Quality of emergency services was measured under four major aspects namely the Behaviour of the Health staff in the vehicle, Behaviour of the Driver/Pilot in the vehicle, Satisfaction with the 108 service and Preference of either the government vehicle/108 or the Private/Personal vehicle in the future. Table 8 below highlights the perceptions from the community regarding the quality of services offered by the 108 service when the respondents have availed the transport service.

More than half of the survey respondents (56.7%) who have availed the service felt that the behavior of the health staff in the vehicle was very good and 42.6% were felt it was good. It is to be noted that only a meager 0.4% told that the behavior of the health staff was bad.

It was seen that almost three-fifth (60.2%) of the respondents who availed the 108 service said that the behavior of the driver was very good and almost two-fifth (39.2%) said they the behavior of the driver was good..

The study revealed that most of the clients who availed the transport service (81.3%) were fully satisfied with the services provided by the 108 ambulance during emergencies and 17.5% told that they were only partially satisfied with the services provided. Around 99 % of the respondents told that they would prefer 108 service in case of future emergencies and only about 1% said that they would choose private or personal vehicle.

Table 13: Community perception of the quality of Service provided

Variables	Frequency	Percent
Behavior of Health staff in the Vehicle		
Vey Good	379	56.7
Good	285	42.6
Bad	3	0.4
Don't know	2	0.3
Behavior of Driver (Pilot)		
Very good	403	60.2
Good	262	39.2
Don't Know	4	0.6
Satisfaction with the 108 Service		
Fully satisfied	544	81.3
Partially satisfied	117	17.5
Not satisfied	1	0.1
Don't Know	7	1
Preference for Governemnt Treansport/108 Service	663	99.1
Privete/Personal Vehicle	6	0.9
Total	669	100

The focus group discussions also revealed a similar picture where majority of the participants reported that the quality of services is good and the ambulances have competent staff and is well equipped. It was quoted by one group of participants that "There was one incident where a small boy called 108 ambulance services, when his mother consumed poison. That time the 108 ambulance services reached on time and saved her life".

REFLECTIONS AND DISCUSSIONS

1. Availability, Accessibility and Awareness:

The 108 service was available in almost all the villages where the Medical Officers were interviewed. In few of the remote villages the service does not reach because of the remoteness, difficulty in finding the route, improper roads and hilly terrains. The MOs felt that the service is accessible to all the people, and most of the people are aware of the 108 services in the villages. It is easy to remember the number and dial 108 through mobile and landline phones for any emergencies. The importance of the 108 service and the advantages of using the facility have been communicated through IEC materials displayed in health faculties like DH, TH, PHC, CHC and SC, and other places like Police Stations and displayed posters and paintings in public places were the it is visible for the people. Also, the ASHA and ANM are helpful to create awareness regarding the service and help them avail it in case of emergencies.

2. Utilization

As there is greater penetration and awareness regarding 108 services in the community all the referrals from the PHC and CHC to the Taluk Hospital happens though 108, and the ambulance available in the TH is used only for the inter-facility transfer and higher referrals from the TH. There is a greater utilization of 108 services as it is a free service, but the ambulance from TH and DH are paid service (as stated by few District Surgeons and Taluk Health Officers). Hence, even for some of the inter-facility transfers the service of 108 is utilized. Most of the people who are aware of the 108 service utilize it for emergencies, and only few who afford avail other means of transportation. In some cases due to delay in the vehicle arrival, people spend out of pocket, and avail auto and taxi service.

Most of the services are utilized for medical emergencies mainly for pregnancy related cases and RTAs. There was no evidence found on any equity related issues.

3. Quality of services

There is a great satisfaction regarding the facility of the 108 service and most of them have responded that the EMRI service is better than the TH and DH ambulance as there is a trained person in the vehicle accompanying the patient. They also highlighted that since there are essential drugs and equipments available to handle the emergencies, the deliveries en route is safe since it is handled by a skilled birth attendant. The centralized call center is very useful since the calls are responded immediately and handled by a competent person who, with the help of technology immediately sends the nearest available vehicle to reach the spot.

It was seen that 60% have responded that 108 service is better compared to D.H ambulance and 10% have told that D.H is better. 30% have responded neutral. Graph 18 below depicts the response from the D.H in-charge regarding the facility of 108 services compared to the D.H ambulance.

Graph 18: Comparison between 108 and D.H Ambulance
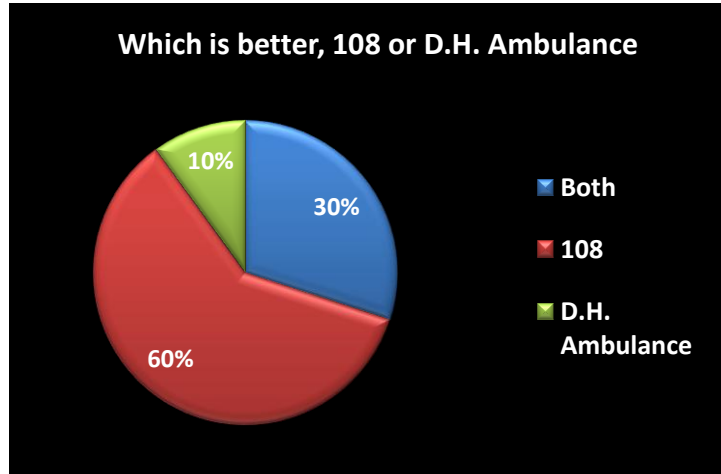
Graph 19 below depicts the response from the T.H in-charge regarding the facility of 108 services compared to the D.H ambulance. It can be seen that 75% have responded that 108 service is better compared to D.H ambulance and 15% have told that D.H is better. 5% have responded neutral.

Graph 19: Comparison between 108 and T.H Ambulance
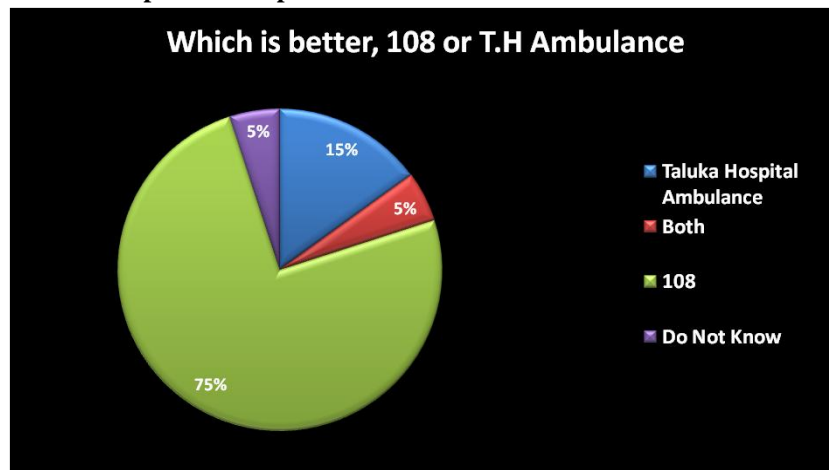
There have been tremendous appreciation from the medical officers regarding the facilities in the vehicle and the overall cleanliness maintained.

4.   EMRI's role in Emergency Scenario of the State:

Perception before the introduction of the 108 service in the state:

Based on the Key Informant Interviews (KII) of the PHC, DH and TH in charge, it was found that there has been great difficulty during emergencies and pregnancies before the introduction of 108 services in the districts. People from remote areas need to travel long distances to reach the PHC. There was a lack of proper referral facility from the lower level to the higher level facilities. There was greater difficulty in handling medico-legal cases and this made the people hesitant in aiding or helping the victims to avail proper transport facility. This resulted in a lot of lives lost mainly due to pregnancy related cases and Road traffic Accidents (RTA). There

were no proper ERS system available at the village level, and in there were delays of the TH and DH ambulances reaching the spot. The ambulances available were not well equipped to manage emergencies immediately within the golden hour. People used to spend a huge sum of money to pay the auto or taxi service which they could not afford. There were lots of home deliveries conducted by unskilled birth attendants leading to a high Infant Mortality Rate (IMR) and Maternal Mortality rate (MMR).

Perception after the introduction of the 108 service in the state:

The introduction of 108 services has improved the emergency transportation from the periphery to the specialty healthcare institutions. As there is a trained emergency technician available in the 108 vehicle there is a greater trust that the complicated cases can be managed effectively. The 108 is equipped with the essential drugs and instruments to stabilize the condition until the patient reaches the healthcare facility where it can be handled. Many of the medical officers at the PHCs have highlighted the fact that it reaches the remote places and is faster in delivering the patients to the PHC from the spot. They added that almost everyone in the village are aware of the 108 service and are utilizing it effectively for any emergency conditions. It has helped the PHC medical officers to refer any complicated pregnancies and other conditions to the higher facility. It is to be noted that the introduction of the 108 service has improved the institutional deliveries and reduced both the IMR and MMR.

In most of the focus group discussions it was said that before introduction of 108 ambulance services, it was very difficult with no proper transportation specially during night time to reach the health centers and even payment for the vehicle was high. It was very difficult for the poor people. Before the introduction of EMRI-108 they were using auto/car/jeep for shifting the patient. The 108 has served the community better by providing the services during the emergencies like medical and the assault cases and reaching on time.

5. **Feedback, Complaint and Grievances from the People:**

As stated by EMRI, there is 48 hour follow up mechanism in place wherein the critical cases are contacted after 48 hrs of availing the service. Data was collected on the status of complaints regarding the 108 service from the beneficiaries or the community as per the response of the in-change of Taluk and District hospital interviewed. Forty percent of the respondents responded that there are complaints regarding the service and 60% responded that there is no complaint regarding the service. Data collected on the status of complaints regarding the 108 service from the beneficiaries or the community as per the response of the in-change of PHC interviewed showed that 25 % responded that there are complaints regarding the service and 75% responded that there is no complaint regarding the service. However, none of the respondents were aware of the grievance redressal system in place.

CONCLUSIONS AND RECOMMENDATIONS

This study brought out various dimensions of the Emergency Response Services (EMRI Model) in Karnataka. The various conclusions and recommendations of the study are as follows:

1. Awareness , Availability and Accessibility

Responses from the community revealed that 95% of the respondents were aware of 108 ambulance services. The facility incharges also perceived that most of the beneficiaries were aware of the services and the service is accessible to all the people. The FGDs revealed that majority of the community were aware and used the 108 ambulance service. However, out of all the reasons stated by the respondents for not availing 108 services by the people in their village, the main reason perceived by the community was found to be lack of awareness (44%) and about 15% of respondents perceived that their village did not have the 108 ambulance facility and hence the people were not availing these services. Most of the people who used the service felt that it is easy to call the 108 ambulance and have reported that their phone calls are responded immediately. It was also highlighted by some that since there are several people who misuse of the 108 service where ambulance is called for general transport from remote areas, alcoholics, minor ailments like mild fever, stomach pain etc.

It is very important to ensure a good level of awareness and information within the public irrespective of the Geographic distances, social barriers and perceptions. Also, it is paramount to educate the community for judicious use of the vehicle to avoid misuse.

Reported data from the EMRI showed that currently, out of the 517 ambulances (130 ALS and 387 BLS),511 ambulances are in functional state. This study revealed that most of the study districts have less than expected number of ambulances if we consider the standard norm of one ambulance per one lakh population and the functional ambulances as 517.

It is recommended that more ambulances be provided so that the optimum level is fulfilled and issues related to non availability of ambulances can be catered. Most of the PHC medical officers have suggested that more vehicles need to be provided at the Taluk as it will save time and improve the availability of vehicles during more demand for emergencies.

2. Utilization

Secondary data collected revealed that 99% of services utilised out of all the emergency services availed through EMRI 108 model were mainly medical emergencies within which 51% cases were pregnancy related. The study findings from the primary data revealed that pregnancy related cases constituted around 74.7% of the cases for which the respondents availed 108 ambulance services. The least available services were suicide and poisoning at around 2-3%.

It was seen in the study was that most of the EMRI services are utilized for medical emergencies and less than 1% utilization is for fire or police emergencies. There can be various reasons for this kind of a utilization pattern. One of the main reasons can be that the community is not aware of the scope of services that the EMRI 108 ambulance provides. Also, the common perception may be that an ambulance is utilized only for medical reasons and services like 101 and 100 are utilized for fire and police services. Another reason can be lack of coordination for fire and police services as it requires interagency coordination and cooperation. However, when the EMRI officials were interviewed, they stated that there is good cooperation between the police and fire departments. Also there is regular follow up in such cases.

Hence, it is recommended that a further probing into such a utilization pattern is needed.

It was also highlighted by few medical officers that because of the delay in getting the vehicle, people do not wait and arrange for other means of transport during emergencies. This increased the number of unavailed cases and the ambulance was occupied for no reason. It has to be ensured that such cases are minimized so that there is maximum utilsation of services is ensured.

3. Equity issues and Grievance mechanism

There was no evidence found for any kind of discrepancy in terms of geographical location, distance from PHC, social status or any other demographic characteristic.

Even though the 108 ambulance service is free of cost, there were some cases reported where the beneficiary was charged. There is a need to monitor such issues and a mechanism to address such issues should be in place. A penalty or warning should be subjected on the staff concerned as soon as such a case is reported.

Such a reporting can only be ensured if the community is completely aware of the grievance mechanism for the 108 ambulance service. Though EMRI officials reported to have a grievance redressal mechanism, awareness among the community regarding the same was lacking. Along with the mention of key features of EMRI like free service, types of service etc, it is of prime importance to make the community aware of the grievance mechanism through posters, IEC and through ASHA/ANM.

4. Infrastructure , facilities and quality of services

There have been few comments from the medical officers since the vehicles are old and have served a lot (for almost 5 years),there is a need for new vehicle for better transportation. Also, some have said that in few cases the oxygen cylinders were found empty and the emergency drugs were out of stock.

Timely maintenance of vehicles and equipments along with even more stringent check on emergency drugs and supplies should be carried out. This will ensure further streamlining of process and elimination of the very few incidences of complaints which have arisen in the past.

Calibration of equipments has to be ensured. For Life Saving equipments, every 3 months calibration should be checked and certificates should be maintained in the ambulance. Non life saving equipments should be calibrated every 6 months and certificate should be maintained.

5. Communication and Screening

Most of the respondents and facility incharges agreed that calling the 1-0-8 service is easy and user friendly. In spite of the benefits of the 108 service to the community, there have been few problems faced by both 108 as well as the Medical Officers in charge of the healthcare facilities.

It has been mentioned by both the stakeholders that there are several cases of misuse happening, where there are illegitimate calls and also the calls where the case is minor. However, these are only a fraction of the large number of genuine calls which require 108 services. In some instances, there is no proper details provided by the clients, and there are other cases where many people call to 108 services to avail vehicle for a single patient with lack of adequate details. This leads to dispatching of one or two vehicles for a single case.

These problems could be solved by having proper validation and screening procedures for calls received, and also it is important to create awareness for the community regarding the judicious use and importance of the 108 service.

6. Timeliness

The average time to reach the spot for 108 was found to be within 30 minutes to most of the areas. Few respondents (19 %) reported cases of delay. Many people felt that the delay is due to insufficient number of ambulances as compared to the load of emergency cases. However, it was seen that these are not the only

reasons as delays were reported even in districts where there is adequate number of ambulances as analysed from the secondary data.

It is to be noted that the delay sometimes may be due to the distance, vehicle breakdown, route problems, uneven terrain, bad road conditions, traffic congestion and delay in dispatching of the vehicle because of non-availability.

One of the reasons stated by EMRI for delay in ambulance arrival is interfacility transfer. It is to be decided whether IFT should be included as a service under 108 ambulance or not. If the ambulances are not occupied for IFTs which are not critical and are mobilized for critical cases, the utilisation may improve.

7. Facility Interfacing

While interviewing the in charge of TH and DH, it was brought to the notice that after the introduction of the 108 service, people prefer to come to the higher facilities even when the condition can be effectively managed at PHC or CHC level, and they stated that even the in charge of PHCs refer the cases to higher centers when there are adequate facilities at the PHC to manage those conditions. Due to this, there is overload in the higher centers compromising on the quality of treatment provide.

This issue can be addressed through coordination between the Government and the EMRI service. The Government should clarify and share the information available regarding the facilities available at the PHC and CHC level, and also by orienting the staff nurse and in charge of the CHC and TH regarding the problem faced and the expected responsibilities. The District Health Management need to be cognizant of these issues and take necessary steps in alleviating this problem.

8. Vehicle Busy Cases

The study revealed that the proportion of vehicle busy cases has increases over the years. Though the EMRI officials reported the reason for increase in the numbers to be due to change of definition, it is recommended that the exact root cause for such cases be probed deeply.

9. Human Resources, Training and Development

As it was reported by EMRI officials that one of the reasons for employees leaving was due to relocation from their preferred native place. Also, they reported that no accommodation was provided to the ambulance staff by EMRI. It is therefore recommended that as far as possible, local people to be recruited so that issues of relocation and arranging for accommodation can be rectified ensuring maximum employee satisfaction.

The TH and DH in charge have commented that there have been many cases where there was lack of proper stabilization and management of the condition by the EMRI staff in the vehicle. Also, in most of the cases, after the patient is brought to the facility, the 108 vehicle leaves from the hospital without the consent from the treating doctor or staff nurse. This leads to difficulties if the specialist service is not available in the hospital and if the hospital is unable to handle the case. They stated that 108 services have become more of a transportation service rather than a being a robust ERS system. These issues can be addressed by imparting necessary training and upgrading the skills of EMRI staff and also by monitoring the cases availing the 108 service.

Around 57% of the respondents were fully satisfied with the various aspects of EMRI 108 services like quality and promptness of services and attitude of staff like driver, EMT. Also, around 99% of the respondents preferred 108 ambulance services.

Though the EMRI said that it trains the first respondents on a needs basis, it is recommended that such trainings are conducted on regular basis voluntarily. The local people in the village should also be trained as assistants to help the ambulance staff to reach the spot without wasting time.

10. Documentation and Accountability

It was noticed during the study that during the handing over of the patient to the facility, due to more focus on the stabalisation and treatment part of the patient at the facility, there is lack of coordination in completing the documentation part. Many hospitals and PHCs feel that it wastes critical time which can be used in saving the patient's life. The ambulance staff also feels that at certain instances, the facility staff is busy or not willing to complete the documentation.

To ensure accountability of the entire system, documentation is of paramount importance. The documentation process should be streamlined at all levels of the facility. Coordination between the 108 Ambulance staff and health facility staff should be maintained through proper training and sensitization.

11. Infection Control

It was reported that bio medical waste was segregated and disposed at a nodal point. There was no documentation on the disposal of waste maintained. Also lack of documentation for sterilization procedures for the ambulance equipments, made it unclear on how and where the equipments were sterilized. It is recommended that stringent protocols for disposal, waste management and infection control be laid and regular check and monitoring be ensured. Also training on infection control and biomedical waste management should be included in the curriculum for ambulance staff.

LIMITATIONS OF THE STUDY

1. Due to the limited time duration of the study, a larger sample cannot be attempted.
2. There was not enough documentation on the ambulance services availed at PHC level. This made it difficult to shortlist the respondents for household survey who have availed the service in the village recently.

HOUSEHOLD SURVEY

FOCUS GROUP DISCUSSIONS

INTERVIEW WITH HEALTH FACILITY STAFF

FIELD ACTIVITIES

INFRASTRUCTURE AND FACILITY SURVEY

INTERVIEW WITH EMRI STAFF

TRAINING

ANNEXURES

ANNEXURE 1

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ANNEXURE 2

LIST OF DISTRICTS AND TALUK HOSPITALS INCLUDED IN THE STUDY

S.No.	Name of District	S. No.	Name of the Taluk Hospitals
1	Chamarajanagara	1	Kollegala Tq
2	Mysore	1	Nanjanagudu Tq
		2	Hunsur Tq
		3	Piriyapatna Tq
3	Dakshina Kannada	1	Sullia T
		2	Buntwala T
4	Kolar	1	Bangarapete T
		2	Mulabagilu T
5	Chitradurga	1	Hiriyur T
		2	Holalkere T
6	Bellary	1	Kudligi T
		2	Hospet T
7	Raichur	1	Sindhanur T
		2	Manvi T
8	Bidar	1	Basavakalyana T
		2	Humnabad T
9	Bijapur	1	Sindhagi T
10	Belgaum	1	Khanapur T
		2	Bailahongala T
		3	Gokak T

ANNEXURE 3
LIST OF PHCs INCLUDED IN THE STUDY

S. No.	District	S. No.	Name of PHC
1	**Chamarajanagara**	1	PHC Bedaguli
		2	PHC Panyadahundi
		3	PHC Doddinduvadi
		4	PHC Lokkanahalli
2	**Mysore Dist**	1	PHC Suttur
		2	PHC Thagaduru
		3	PHC Hanchya
		4	PHC Keelanapura
		5	PHC Bannikuppe
		6	PHC Tattakere
		7	PHC Komalapura
		8	PHC Nandipura
3	**Kodagu Dist**	1	PHC Sampaje
4	**Dakshina Kannada**	1	PHC Bellare
		2	PHC Sajjipanadu
		3	PHC Adyaru
5	**Kolar D**	1	PHC Vemagal
		2	PHC Guttahalli
		3	PHC Devarayanasamudra
6	**Chitradurga**	1	PHC Aimangala
		2	PHC Kyasapura
		3	PHC Yalagodu
		4	PHC Chitrahalli
7	**Bellary**	1	PHC Hudem
		2	PHC Chellagurki
		3	PHC Kampli
8	**Raichur**	1	PHC Jawalgera
		2	PHC Ballatagi
		3	PHC Chandrabanda
9	**Bidar**	1	PHC Kohinoor
		2	PHC Dubbalagundi
10	**Bijapur**	1	PHC Goolageri
		2	PHC Aski
		3	PHC Babaleshwara
		4	PHC Mamadpura
11	**Belgaum**	1	PHC Ashoknagar
		2	PHC Londa
		3	PHC Hunshikatti
		4	PHC Ankalagi
		5	PHC Muttaga

ANNEXURE 4

LIST OF VILLAGES WHERE FOCUS GROUP DISCUSSION WAS CONDUCTED

S. NO.	NAME OF DISTRICT	NAME OF VILLAGE
1	Chamarajanagar	Bedaguli
2	Mysore	Suttur
3	Kodagu	Sampaje
4	Kolar	Devarayanasamudra
5	Chitradurga	Yalagodu
6	Bellary	Hudem
7	Raichur	Chandrabanda
8	Bidar	Kohinoor
9	Bijapur	Goolageri
10	Belgaum	Ashoknagar

ANNEXURE 5

DEFINITIONS

Availed cases*:* Total Number of beneficiaries transported through medical dispatches including cases where Victim refused treatment Admitted in hospital, First aid provided, Victim Expired before ambulance Reach, Victim condition stable.

Un Availed Dispatch (UAD)*:* Dispatches where ambulance could not find or serve the patient.

Vehicle Busy Cases: Cases where first nearest ambulance cannot be assigned due to ambulance being busy, already on a dispatch for another Emergency and the caller denies the service because of the distance for next available ambulance.

Total Number of Calls offered = Number of Call Answered + Number of Un Answered (UAC) Calls

- ❑ Total Calls Offered : Total number of attended and Unattended calls

- ❑ Total Calls Answered : Total calls answered by Emergency Response Officers

- ❑ UAC: Total Calls unattended =>5 seconds (2 Rings) on 108.

Number of Call Answered = Number of Emergency Calls + Number of Effective Call + Number of Ineffective Call

- ❑ Emergency Calls : Total calls warranting dispatch of Medical, Police & Fire vehicles (As the case may be)

- ❑ Effective Calls : Total Number of emergency calls plus Inquiry calls, appreciation calls, follow up calls, response with doctor calls, Service not required calls, IFT calls, Escalation calls, EMT to ERCP calls, caller concern calls, EMT to ERO calls, repeated calls.

- ❑ Ineffective Calls: Total calls answered minus total Effective calls(Prank calls, disconnected calls, silent call, nuisance calls, no response calls, abusive calls, child calls, wrong call, missed calls.

Number of Total Emergencies = Number of Total Medical Emergencies +Number of Total Police Emergencies +Number of Total Fire Emergencies

Utilization or Number of trips per ambulance = (Availed cases of a month + Unavailed cases of month)/Number of Ambulances

Utilization or Number of trips per ambulance per day = (Availed cases of a month + Un Availed cases of month)/Number of Ambulances /Number of days in that month

Response Time*:* Ambulance reach from the time of receiving call to the time of reaching the scene*.*

ANNEXURE 6

In-depth Interview Schedule of the Clients Availing Transport Service

Confidential and to be used for Research Purpose

2A

Greetings!!

My name is _____and I am conducting survey for Department of Health and Family Welfare, Government of Karnataka and Institute of Health Management Research on the EMRI 108 services, to know about the utilization pattern, different stakeholder's perception regarding the service and to measure the impact of the program. All information will be held for statistical and study purposes only, and any identifying information will be kept confidential. Your participation is valuable, and it will benefit to the community, as it may help the Government further in improving the services.

Schedule No.: _____   Date: _____

Investigator Name: _____Signature of the Investigator:_____

S.No.	Question	Options/Answer	Response
SECTION 1			
1.1	Name of the District		
1.2	Name of the Taluk		
1.3	Name of the Village		
1.4	Name of PHC in that area		
1.5	Name of the Respondent		
1.6	Gender	1) M 2) F	
1.7	Age (Years)		
1.8	Religion	1) Hindu 2) Muslim 88)Others	
1.9	Caste	1) SC/ST 2) OBC	

		3) Others/General	
1.10	Marital status	1) Married 2) Unmarried	
1.11	Education	1) Illiterate 2) Just Literate (1st -4th Class) 3) Primary (5th – 7th Class) 4) Middle School (8th –9th Class) 5) Secondary (10th –11th Class) 6) Higher Secondary (12th Pass) 7) Graduation and Above	
1.12	Occupation		
1.13	Monthly Income of Household		
1.14	Color of Ration card	1) White 2) Yellow 3) Red 4) No Ration card	
1.15	Type of family	1) Nuclear 2) Joint	
1.16	Total Family members		

SECTION 2			
			Remarks
2.1	Are you aware of Govt. Ambulance/Emergency/108 services?	1) Yes 2) No **(Skip to Q 2.5)**	
2.2	If Yes, do you know how to contact them **(give details)**	1) Yes 2) No	
2.3	If you are aware of 108 service, from where did you know about it	1) PHC 2) DH 3) Neighbor 4) Newspaper	

		5) Radio	
		6) TV	
		7) Health Worker	
		8) Family member	
		88)Others	
2.4	Do people avail 108 service in your village commonly	1) Yes 2) No 99)Do not know	
2.5	Did any member of your family needed transportation for emergency (Health, Fire) in recent (6 months) time?	1) Yes 2) No **(Skip to Q 2.18)**	If yes how many times:

2.6	If yes, what kind of transport facility have you availed	Categories	Incidence		
			1	**2**	**3**
		1) 108 AMBULANCE? 2) Private/Personal 99)Don't Know			

2.7	If not availed 108 Service in any incidence, what were the reasons behind not availing 108 ambulance?	1) 2) 3)	
2.8	What was the cause of referral?	1) Accident 2) Delivery 3) Poisoning 4) Abdominal pain 5) Sick New born 88)Others (Mention) 99)Don't Know	
2.9	From where the referral has been made	1) From the PHC 2) By a Private practitioner 3) On clients request 99) Don't Know	

2.10	What was the Referred Place?	1) PHC 2) CHC 3) TH 4) DH 5) Private Hospital 99)Don't Know	
2.11	What was the time response to get the transport?	1) Within 15 minutes 2) 15 min-30min 3) More than half an hour but less than 1 hr. 4) More than one hour 99)Don't Know	
2.12	Cost claimed by the driver		
2.13	Cost paid by the client		
2.14	Was counseling done by MO for referral?	1) Yes 2) No 99)Do not know	
2.15	How was the behavior of health staff	1) Very good 2) Good 3) Bad 99)Don't Know	
2.16	How was the behavior of transport staff	1)Very good 2)Good 3)Bad 99)Don't Know	
2.17	Are you satisfied with the ambulance service you get?	1) Fully satisfied 2) Partially satisfied 3) Not satisfied 99)Don't Know	
2.18	Did any of your neighbors avail transportation for emergency?	1) Yes 2) No 99)Don't Know	

2.19	If yes, was it govt. transport from PHC/108?	1) Yes 2) No 99)Don't Know	
2.20	What was the cause of referral?	1) Accident 2) Delivery 3) Poisoning 4) Abdominal pain 5) Sick New born 88)Others (Mention) 99)Don't Know	
2.21	If people do not avail Emergency transport/108 facility, why? (Give details)	1) No Facility 2) Not Aware 3) Poor Services 4) Delay in arrival 5) Higher cost claim 88) Others………… 99)Don't Know	
2.22	If in future you need transportation for emergency (Health, Fire), what will you prefer	1) 108 ambulance? 2) Private/personal	

ANNEXURE 7

An Evaluation of the EMRI 108 in the State of Karnataka
Questionnaire for the PHC Medical Officer

$2B_1$

Consent

Greetings!!

My name is _____and I am conducting survey for Department of Health and Family Welfare, Government of Karnataka and Institute of Health Management Research on the EMRI 108 services, to know about the utilization pattern, different stakeholder's perception regarding the service and to measure the impact of the program. All information will be held for statistical and study purposes only, and any identifying information will be kept confidential. Your participation is valuable, and it will benefit to the community, as it may help the Government further in improving the services.

Schedule No.:

SECTION 1: BASIC PROFILE			
1.1	Name of PHC		
1.2	Village		
1.3	Block/Taluka:		
1.4	District:		
1.5	Sanctioned Beds:		
1.6	Functional Beds:		
1.7	Population covered:		
1.8	Total number of SC covered:		
1.9	Total Radius covered by the PHC		
1.10	Time taken to reach next higher level of Public/Private health facility **(in minutes)**		
1.11	Medical officer	Name	
		Qualification	
		Age	
		KMC/MCI Reg. No.	
		Signature	
1.12	Date of Interview		
1.12	Name of the interviewer		

SECTION 2: USE OF THE EMRI SERVICE			
S. No.	**Questions**		**Comments**
2.1	Is EMRI (108 Ambulance) Service available in your Village	**1 -- Yes** **2 --No**	
2.2	In your opinion what percent of people aware about the service in your serving area?	**1 -- Yes** **2 --No**	
2.3	Is it accessible for the People in the surrounding areas?	**1 -- Yes** **2 --No**	
2.4	Does the PHC have its own ambulance?	**1 -- Yes** **2 --No**	**(If No, Skip to Q 2.7)**
2.5	If yes, is it functional and used for emergencies?	**1 -- Yes** **2 --No**	
2.6	In your opinion which is better among EMRI/108 and PHC ambulance?	**1 -- Yes** **2 --No**	**Why?**
2.7	Were there any difficulties, faced before the EMRI/108 facility?	**1 -- Yes** **2 --No**	**If yes What?**
2.8	After the introduction, has it improved the emergency health care in the villages?	**1 -- Yes** **2 --No**	**If yes, in what way?**
2.9	Are the beneficiaries getting EMRI in time?	**1 -- Yes** **2 --No**	**If No Why?**

2.10	How do you manage complaint regarding transport?	
2.11	What complaints related to EMRI do you normally receive in Hospital?	
2.12	Do you send those feedbacks to the concerned authority?	**1 – Yes** **2 –No** **Explain:**

2.13	What is your opinion regarding the utilization of EMRI/108 services?	**1. Very Good** **2 Good** **3 Bad** **4 Very Bad**	**Explain:**

2.14	Your comments for improvement	

ANNEXURE 8

An Evaluation of the EMRI 108 in the State of Karnataka $2B_2$

Questionnaire for the District Surgeon

Consent

Greetings!!

My name is _____and I am conducting survey for Department of Health and Family Welfare, Government of Karnataka and Institute of Health Management Research on the EMRI 108 services, to know about the utilization pattern, different stakeholder's perception regarding the service and to measure the impact of the program. All information will be held for statistical and study purposes only, and any identifying information will be kept confidential. Your participation is valuable, and it will benefit to the community, as it may help the Government further in improving the services.

Schedule No.:

SECTION 1: BASIC PROFILE			
1.1	Name of Hospital		
1.2	Block/Taluka:		
1.3	District:		
1.4	Sanctioned Beds:		
1.5	Functional Beds:		
1.6	Population covered:		
1.7	Total number of TH covered:		
1.8	Time taken to reach next higher level of Public/Private health facility **(in minutes)**		
1.9	District Surgeon	Name	
		Age	
		KMC/MCI Reg. No.	
		Signature	
1.10	Date of Interview		
1.11	Name of the interviewer		

SECTION 2: USE OF THE EMRI SERVICE			
S. No.	**Questions**		**Comments**
2.15	Is EMRI (108 Ambulance) Service available in your District	**1 -- Yes** **2 --No**	
2.16	In your opinion what percent of people aware about the service in your serving area?	**1 -- Yes** **2 --No**	
2.17	Is it accessible for the People in the surrounding areas?	**1 -- Yes** **2 --No**	
2.18	Does the Hospital have its own ambulance?	**1 -- Yes** **2 --No**	**(If No, Skip to Q 2.7)**
2.19	If yes, is it functional and used for emergencies?	**1 -- Yes** **2 --No**	
2.20	In your opinion which is better among EMRI/108 and Hospital ambulance?	**1 -- Yes** **2 --No**	**Why?**
2.21	Were there any difficulties, faced before the EMRI/108 facility?	**1 -- Yes** **2 --No**	**If yes What?**
2.22	After the introduction, has it improved the emergency health care in the villages?	**1 -- Yes** **2 --No**	**If yes, in what way?**
2.23	Are the beneficiaries getting EMRI in time?	**1 -- Yes** **2 --No**	**If No Why?**

2.24	How do you manage complaint regarding transport?	
2.25	What complaints related to EMRI do you normally receive in Hospital?	
2.26	Do you send those feedbacks to the concerned authority?	**1 – Yes** **2 –No** **Explain:**
2.27	What is your opinion regarding the utilization of EMRI/108 services?	**1. Very Good** **2 Good** **3 Bad** **4 Very Bad**	**Explain:**
2.28	Your comments for improvement	

ANNEXURE 9

2B₃

An Evaluation of the EMRI 108 in the State of Karnataka
Questionnaire for the Taluk Health Officer/Chief Medical Officer at Taluk Hospital

Consent

Greetings!!

My name is _____and I am conducting survey for Department of Health and Family Welfare, Government of Karnataka and Institute of Health Management Research on the EMRI 108 services, to know about the utilization pattern, different stakeholder's perception regarding the service and to measure the impact of the program. All information will be held for statistical and study purposes only, and any identifying information will be kept confidential. Your participation is valuable, and it will benefit to the community, as it may help the Government further in improving the services.

Schedule No.:

SECTION 1: BASIC PROFILE			
1.1	Name of Hospital		
1.2	Block/Taluka:		
1.3	District:		
1.4	Sanctioned Beds:		
1.5	Functional Beds:		
1.6	Population covered:		
1.7	Total number of CHC covered:		
1.8	Time taken to reach next higher level of Public/Private health facility **(in minutes)**		
1.9	Medical officer	Name	
		Age	
		KMC/MCI Reg. No.	
		Signature	
1.10	Date of Interview		
1.11	Name of the interviewer		

SECTION 2: USE OF THE EMRI SERVICE			
S. No.	**Questions**		**Comments**
2.29	Is EMRI (108 Ambulance) Service available in your Taluk	**1 -- Yes** **2 --No**	
2.30	In your opinion what percent of people aware about the service in your serving area?	**1 -- Yes** **2 --No**	
2.31	Is it accessible for the People in the surrounding areas?	**1 -- Yes** **2 --No**	
2.32	Does the Hospital have its own ambulance?	**1 -- Yes** **2 --No**	**(If No, Skip to Q 2.7)**
2.33	If yes, is it functional and used for emergencies?	**1 -- Yes** **2 --No**	
2.34	In your opinion which is better among EMRI/108 and Hospital ambulance?	**1 -- Yes** **2 --No**	**Why?**
2.35	Were there any difficulties, faced before the EMRI/108 facility?	**1 -- Yes** **2 --No**	**If yes What?**
2.36	After the introduction, has it improved the emergency health care in the villages?	**1 -- Yes** **2 --No**	**If yes, in what way?**
2.37	Are the beneficiaries getting EMRI in time?	**1 -- Yes** **2 --No**	**If No Why?**

2.38	How do you manage complaint regarding transport?	
2.39	What complaints related to EMRI do you normally receive in Hospital?	
2.40	Do you send those feedbacks to the concerned authority?	**1 – Yes** **2 –No** **Explain:**

2.41	What is your opinion regarding the utilization of EMRI/108 services?	**1. Very Good** **2 Good** **3 Bad** **4 Very Bad**	**Explain:**

2.42	Your comments for improvement	

ANNEXURE 10
An Evaluation of the EMRI 108 in the State of Karnataka
Checklist for the Focus Group Discussion

2C

Greetings!!

My name is _____ and I am conducting survey for Department of Health and Family Welfare, Government of Karnataka and Institute of Health Management Research on the EMRI 108 services, to know about the utilization pattern, different stakeholder's perception regarding the service and to measure the impact of the program. All information will be held for statistical and study purposes only, and any identifying information will be kept confidential. Your participation is valuable, and it will benefit to the community, as it may help the Government further in improving the services.

Name of the District:

Name of the Taluk:

Name of the Village:

I. General

1. What types of Emergencies are common in your village (Health, Fire, Police)

2. What do people do when faced with those emergencies (Especially Health)

3. What are the provisions or facilities available for villages during emergencies?

4. Where do people prefer to go during the emergencies?

5. What is the nearest health facility available in your village

II. Awareness and Utilization of EMRI

1. Is Emergency Response Ambulance (108) available in your village during emergencies

2. What is the procedure to avail those services and the cost for it

3. How much is it utilized during the emergencies in your village

4. What are the problems in availing or not utilizing the 108 service during emergencies?

III. Service

1. How is the service provided in the 108 Ambulance?

2. Does the ambulance come within 40 minutes of call?

3. Was the phone call immediately answered?

4. Did the persons in ambulance do the necessary procedures satisfactorily?

IV Opinions

1. Do you think the 108 service is suitable for your community?

2. Do you think there is delay in the ambulance reaching the community, most of the times

3. How do you think the 108 service helped your community is seeking proper care during emergencies

4. What was the situation during emergencies before 108 services was introduced
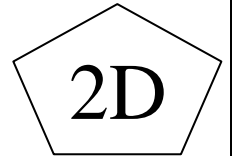
5. How can the service improved

Thank you for your participation and valuable time!!

ANNEXURE 11

An Evaluation of the EMRI 108 in the State of Karnataka

Questionnaire for the EMRI Official

2D

Consent

Greetings!!

My name is _____and I am conducting survey for Department of Health and Family Welfare, Government of Karnataka and Institute of Health Management Research on the EMRI 108 services, to know about the utilization pattern, different stakeholder's perception regarding the service and to measure the impact of the program. All information will be held for statistical and study purposes only, and any identifying information will be kept confidential. Your participation is valuable, and it will benefit to the community, as it may help the Government further in improving the services.

I. Identification

Name:

Qualification:

Designation:

Working from:

II. EMRI Facility

1. No. of Ambulances available:

2. Total No. of Referral Facility (Including Private):

3. No. of Ambulances per lakh population:

4. Average referrals per day:

5. Average trips per day:

III. Guidelines and training

1. Do you have Standard Operating procedure for referral using EMRI?

2. What are the guidelines, if available?

3. What are your responsibilities?

III. Usage of EMRI services

1. List in decreasing order the cases which is more frequent in availing the service

1.1.

1.2.

1.3.

1.4.

2. What are the factors which make people not to avail EMRI during emergencies?

1.1.

1.2.

1.3.

1.4.

3. What is your opinion regarding the:

3.1. Accessibility of the services

3.2. Affordability of the services

3.3. Equity of the services

IV. Quality and Monitoring

1. Did you receive any complaints and Explain about it?

2. If yes, how is it handled?

3. Do you receive feedback mechanism from hospitals and users?

4. Who is responsible to monitor the services?

5. How does the monitoring happen?

V. Opinion

1. Did you notice any improvement after introducing the system?

2. What are the challenges faced by you in your work

3. How can be the services improved in terms of utilization and quality

Thank you for your valuable time!!

Signature of the Interviewer

Signature of the EMRI Official

ANNEXURE 12
Checklist for Secondary Data Collection for Operational Efficiency
Confidential and to be used for Research Purpose

<div style="border:1px solid;display:inline-block;padding:4px">2E</div>

Greetings!!

My name is _____and I am conducting survey for Department of Health and Family Welfare, Government of Karnataka and Institute of Health Management Research on the EMRI 108 services, to know about the utilization pattern, different stakeholder's perception regarding the service and to measure the impact of the program. All information will be held for statistical and study purposes only, and any identifying information will be kept confidential. Your participation is valuable, and it will benefit to the community, as it may help the Government further in improving the services.

Records and Data to be looked in to after validation

A. Vehicle Availability

1. No. of ambulances presently deployed

2. No. of Ambulances per lakh population

3. No. of Ambulances Required

B. Utilization

1. Type of Cases

2. Mortality rate

3. Pattern Quarterly/Monthly and Yearly

4. Need

5. Pregnancy as percentage of emergency cases

6. Trauma/Accident as percentage of emergency

7. No. of Users and Non-users

C. Operation

1. Average No. of trips per Ambulance per day

2. Distance travelled per trip

3. Ambulance dispatched as percentage of calls received

D. Cost

1. If a BPL client:

2. If an APL client

3. Average cost per referral per PHC

4. Total capital cost per Ambulance

5. Total Operating cost per Ambulance

6. Share of EMRI in operating cost

7. Salaries as percentage of total operating cost

8. Administrative overheads as percentage of operating cost

E. General

1. Selection process for outsourcing

2. Distance in Km (Total)

4. Ratio of staff to ambulance (operational)

F. Quality

1. Minutes of RKS

2. Redressal Mechanism

3. Monitoring Mechanism

4. Operational guidelines for the vehicles

5. Record and logbooks of vehicles

ANNEXURE 13

2F

QUESTIONAIRE FOR HUMAN RESOUCE PERSONNEL AT EMRI

Confidential and to be used for Research Purpose

Greetings!!

My name is _____and I am conducting survey for Department of Health and Family Welfare, Government of Karnataka and Institute of Health Management Research on the EMRI 108 services, to know about the utilization pattern, different stakeholder's perception regarding the service and to measure the impact of the program. All information will be held for statistical and study purposes only, and any identifying information will be kept confidential. Your participation is valuable, and it will benefit to the community, as it may help the Government further in improving the services.

Name of Respondent :

Name of Interviewer :

Date of Interview :

1. What is the process of conducting training ?

2. How many Trainings were conducted in each cadre of employee in the previous 3 years ?

3. Is training of first responders conducted ? If yes, the process? Specify number of trainings conducted.

4. Is training of helpers/volunteers conducted to help the ambulance staff at incident place ? If yes, explain the process? Specify number of trainings conducted.

5. Is there any training given for mass casuality management and triage ?

6. How is the competency of staff and instructors evaluated?

7. What are the welfare measures for ambulance staff to ensure safety?

8. What is the attrition rate at EMRI ? Furnish data regarding the same.

9. What are the reasons for leaving the organization as stated in EXIT interviews commonly ?

ANNEXURE 14
QUESTIONAIRE FOR OPERATIONS PERSONNEL AT EMRI
Confidential and to be used for Research Purpose

2G

Greetings!!

My name is _____and I am conducting survey for Department of Health and Family Welfare, Government of Karnataka and Institute of Health Management Research on the EMRI 108 services, to know about the utilization pattern, different stakeholder's perception regarding the service and to measure the impact of the program. All information will be held for statistical and study purposes only, and any identifying information will be kept confidential. Your participation is valuable, and it will benefit to the community, as it may help the Government further in improving the services.

Name of Respondent :

Name of Interviewer :

Date of Interview :

1. Is there a plan for resource allocation in case of mass casualty and disasters?

2. Please specify how u manage

a. Men

b. Material

c. Medicines

d. Ambulances

ANNEXURE 15
QUESTIONAIRE FOR STORES INCHARGE (SUPPLY CHAIN MANAGEMENT) AT EMRI
Confidential and to be used for Research Purpose

2H

Greetings!!

My name is _____and I am conducting survey for Department of Health and Family Welfare, Government of Karnataka and Institute of Health Management Research on the EMRI 108 services, to know about the utilization pattern, different stakeholder's perception regarding the service and to measure the impact of the program. All information will be held for statistical and study purposes only, and any identifying information will be kept confidential. Your participation is valuable, and it will benefit to the community, as it may help the Government further in improving the services.

Name of Respondent :

Name of Interviewer :

Date of Interview :

1. How are the medicines and equipments supplied and maintained ?

2. Are there any stock outs recently (6 months)? If yes, how do you manage?

3. How are the emergency drugs supplied? Which drugs are stored in the ambulance ? is there a checklist maintained ? Provide a list of emergency drugs.

4. What is the procedure for replenishing oxygen cylinders?

Signature :

ANNEXURE 16

INCEPTION REPORT

EMERGENCY RESPONSE SERVICES (EMRI MODEL) 108, IN STATE OF KARNATAKA: AN EVALUATION STUDY

BACKGROUND AND RATIONALE BEHIND THE STUDY

EMRI is a historic landmark in the provision of health care in the Nation. EMRI is created with bringing Emergency Medical Response on to the nation's agenda. A much discussed and successful PPP model for ERS is the 108 Emergency Response Service being managed and operationalized by EMRI (Emergency Management and Research Institute) in many states. The emergency transportation provided in a state-of-the-art ambulance coordinated by a state-of-art emergency call response centre, which is operational 24 hours a day and 7 days a week. In addition, the call to the number 108 is a Toll Free service accessible from landline or mobile, which helps to save the loved ones who would be willing to shower EMRI with praise and call for the strengthening of this system-whatever it takes to do so.

108 is dialed for the purposes mentioned below:

1. To save a life

2. To report a crime

3. To report a fire

108 Emergency Response Services has also signed MOU with over 6800 hospitals in Karnataka which provides initial stabilization and transportation of the patient free of cost for the first 24 hours.

Types of Emergencies:

Medical Emergencies	Police Emergencies	Fire Emergencies
Serious Injuries	Robbery/Theft/Burglary	Burns
Cardiac arrests	Street Fights	Fire breakouts
Stroke	Property Conflicts	Industrial fire hazards
Respiratory	Self-inflicted injuries/Attempted suicides	
Diabetics		
Maternal/Neonatal/Pediatric	Fighting	
Epilepsy	Public Nuisance	
Unconsciousness		

Animal bites		
High Fever		
Infections		
Pregnancy and Related Issues		

Emergency management Services requires the integration of three cardinal pillars: Sense, Reach and Care. Emergency Management requires partnership with multiple institutions to provide quick and quality response. EMRI has therefore integrated with Government and private hospitals for timely response in case of medical emergencies. The call center is in contact with the police control room for easy dispatch of police and fire brigade in case of Police and Fire emergencies
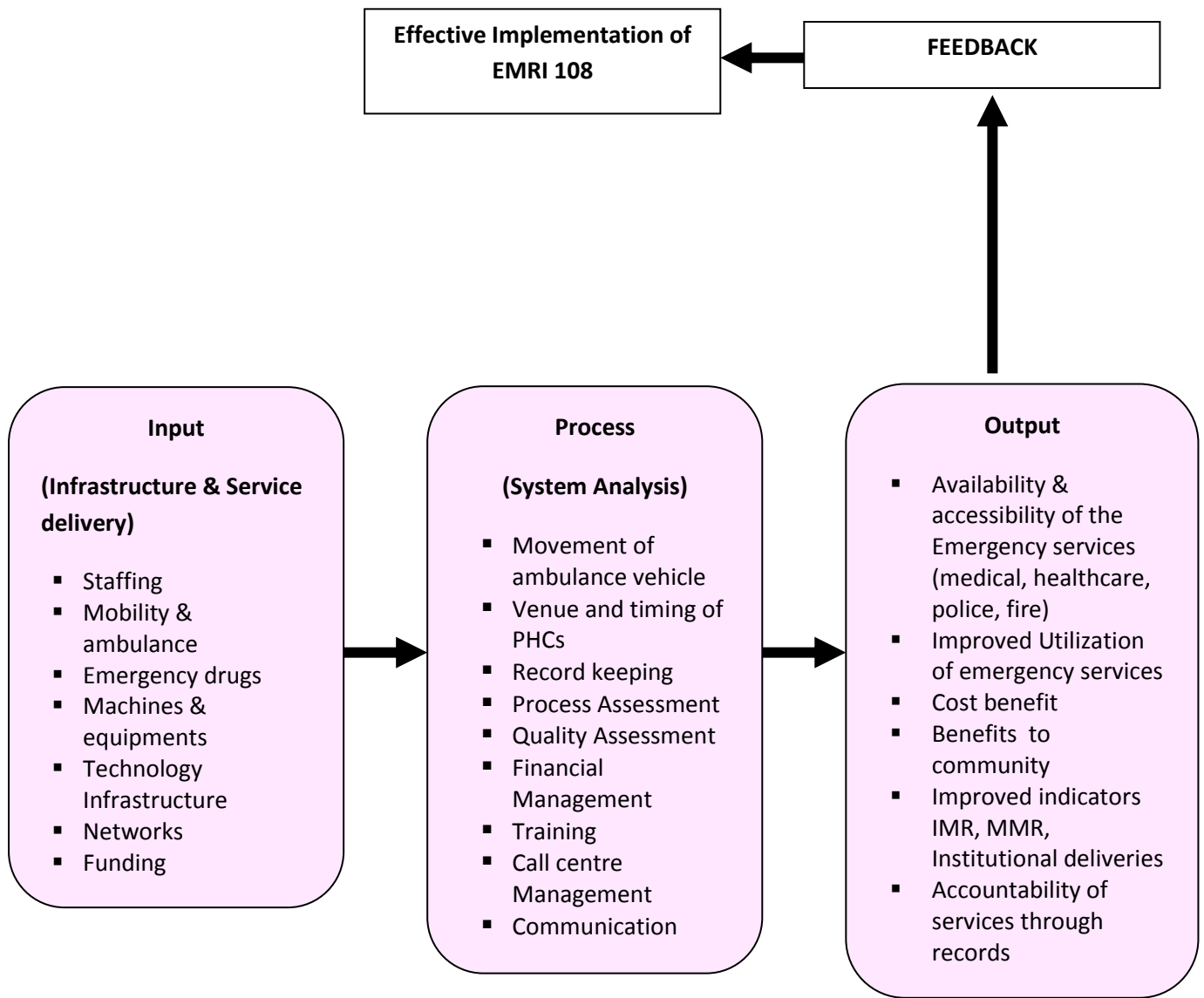
GVK EMRI entered into an agreement with the Government of Karnataka on 14th August 2008. This Program is called the "Aarogya Kavacha". Following the MOU signing, a total of 517 ambulances have been deployed in phased manner till 2010. The 108 Emergency Response Service in Karnataka was launched on 1st November 2008 with a fleet of 113 ambulances spanning across the state. Currently GVK-EMRI Karnataka covers all districts of the state with 517 ambulances deployed at various strategic locations throughout the state. Presently, the entire cost is borne by Government of Karnataka.

In Karnataka, road accidents have been increasing day by day; in road accidents 33% pertains to pedestrians and 22% are on two wheelers. In our state, the infrastructure facility available to deal with emergencies is very inadequate especially in rural areas its entirely lacking. Further 40% of maternal deaths in the state are due to lack of timely transport facility. Hence timely response and care to save lives, limbs and property of citizens in emergencies is need of the hour and the role of the Government is crucial in providing relief through agencies such as police, fire, medical and other Government Departments.

EMRI is providing timely emergency services by quick response through technology supported environments, state of the art ambulance with enabling instruments and skilled manpower with adequate training to handle the onsite medical emergency.

The Evaluation Matrix

Effective program evaluation is a systematic way to improve and account for public health actions by involving procedures that are useful, feasible, ethical, and accurate.

Effective Implementation of EMRI 108	←	FEEDBACK

Input

(Infrastructure & Service delivery)

- Staffing
- Mobility & ambulance
- Emergency drugs
- Machines & equipments
- Technology Infrastructure
- Networks
- Funding

→

Process

(System Analysis)

- Movement of ambulance vehicle
- Venue and timing of PHCs
- Record keeping
- Process Assessment
- Quality Assessment
- Financial Management
- Training
- Call centre Management
- Communication

→

Output

- Availability & accessibility of the Emergency services (medical, healthcare, police, fire)
- Improved Utilization of emergency services
- Cost benefit
- Benefits to community
- Improved indicators IMR, MMR, Institutional deliveries
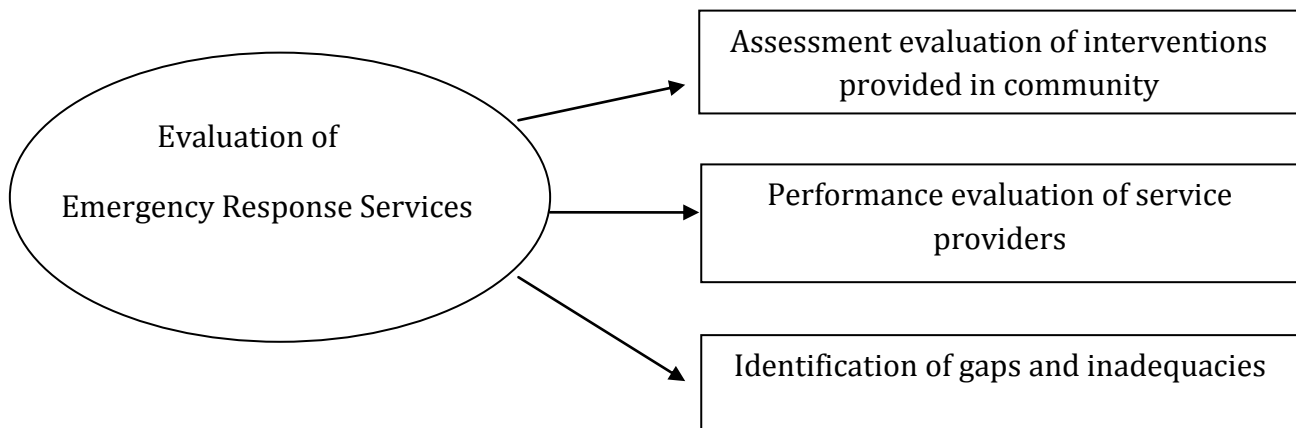- Accountability of services through records

EVALUATION FRAMEWORK

Purpose of Evaluation

The purpose of this evaluation is to facilitate the Department of Health and FW, Govt of Karnataka to understand the functioning of the programme on field, its success and failures, gaps, ways to address them and to suggest replication and improvement of the programme and also help build systematic linkages so as to maximize health outcomes from this scheme.

For effective and efficient intervention of Emergency Response Services (EMRI Model) 108, there is a need for evaluation of the performance of this initiative.

The evaluation will include three pronged approach:

Evaluation of

Emergency Response Services

Assessment evaluation of interventions provided in community

Performance evaluation of service providers

Identification of gaps and inadequacies
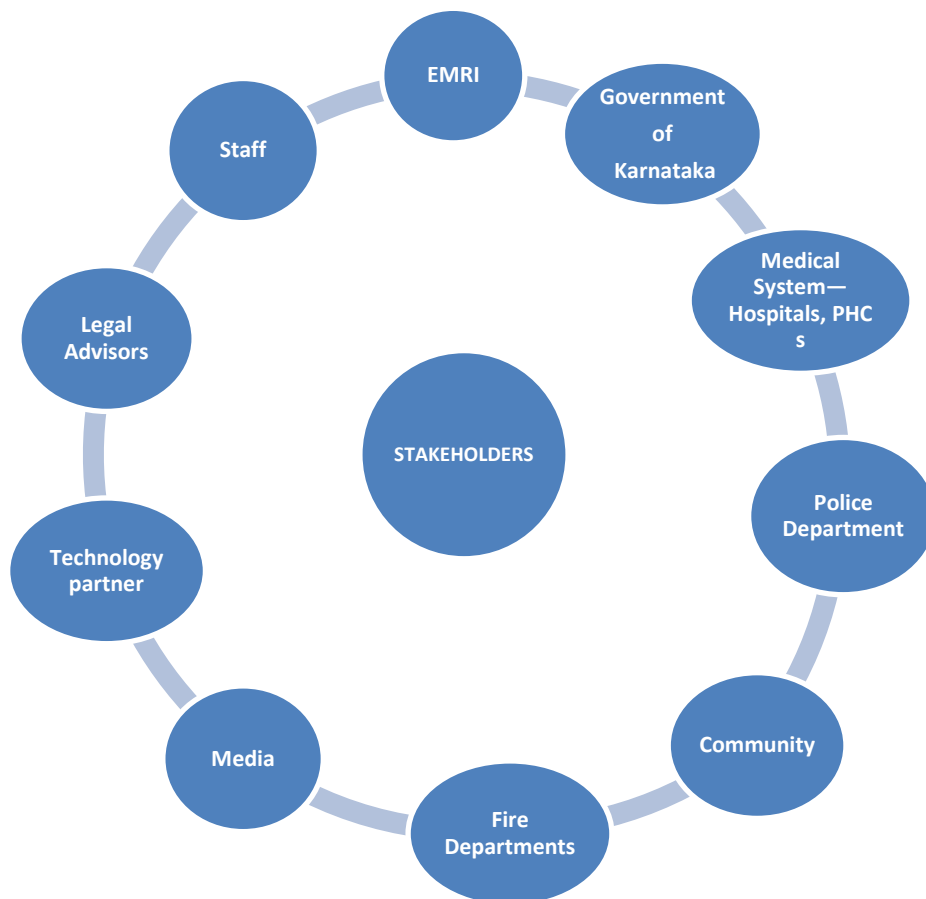
SCOPE OF THE STUDY:

It will cover:

- Access to medical, health care, police and fire services.
- Proportion of services in each area like pregnancy related cases, neonates, infants, children etc.
- Impact on health indicators like IMR, MMR, institutional deliveries etc.
- Coverage of emergency by EMRI.
- Process and implementation of the scheme.
- Maintenance of the records.

Key Stakeholders

- EMRI
- Government of Karnataka
- Medical System— Hospitals, PHCs
- Police Department
- Fire departments
- Media
- Community
- Technology partner
- Staff :Ambulance operators, emergency technicians ,call centre staff and Hospital/PHC /SC Staff

OBJECTIVES

For effective and efficient intervention of Emergency Response Services (EMRI Model) 108, evaluation of the performance of this initiative will be carried out. The Specific objectives of the study will be:

4) To examine and comment on patterns of utilization of services in 30 districts of Karnataka to understand present and potential demand for these services and the effectiveness of EMRI to respond to this
5) To review the operational aspects of EMRI scheme. This would include operational efficiency of EMRI, financial management, and management of contractual obligations.
6) To examine the design aspect and the framework of the EMRI model, in the context of larger health systems issues and ERS requirements, including equity issues and institutional frameworks including governance and accountability issues.

LIMITATIONS

1. Due to the limited time duration of the study, a large sample cannot be attempted.

INDICATORS

a) Need and utilization of services; rising utilization; pattern of utilization
b) Quality of Services
c) Hospital linkages
d) Present no. of ambulances
e) Average no. of trips per ambulance per day
f) Distance travelled per trip
g) Ambulances dispatched as percentage of calls received
h) Pregnancy related cases as percentage of emergencies transported
i) Trauma/accident cases as percentage of emergencies transported
j) Resources contributed by EMRI
k) Total capital cost per Ambulance
l) Total operating cost per ambulance (annualized) operating cost per trip
m) Total Share of EMRI in operating cost
n) Salaries of service providers (Operational staff) as percentage of total operating cost
o) Administrative overheads as percentage of total operating coast
p) Direct vehicle/ambulance operations and maintenance cost as percentage of total operating cost
q) Operating cost

r) Ratio of staff (operational cost) to Ambulance.

EVALUATION METHODS AND TECHNIQUES

Quantitative Assessment:

The quantitative assessment for the evaluation of EMRI will broadly include service record analysis, desk surveys and household survey in the area of PHCs and their associated SCs. Available records and MIS data at District Hospitals, Taluk Hospitals, PHCs and SCs will be assessed to collect secondary data.

Qualitative Assessment:

The qualitative tools for the assessment of performances of EMRI 108 Programme will be based on interviews with community people, stakeholders and service-providers in the 10 districts (arrived by PPS sampling). All concerned staff at District Hospitals, Taluk Hospitals, PHCs and their attached Sub-Centers will be interviewed. Interactions with beneficiaries by community survey will be carried out. For collection of data by interviews, semi-structured interview schedules will be used.
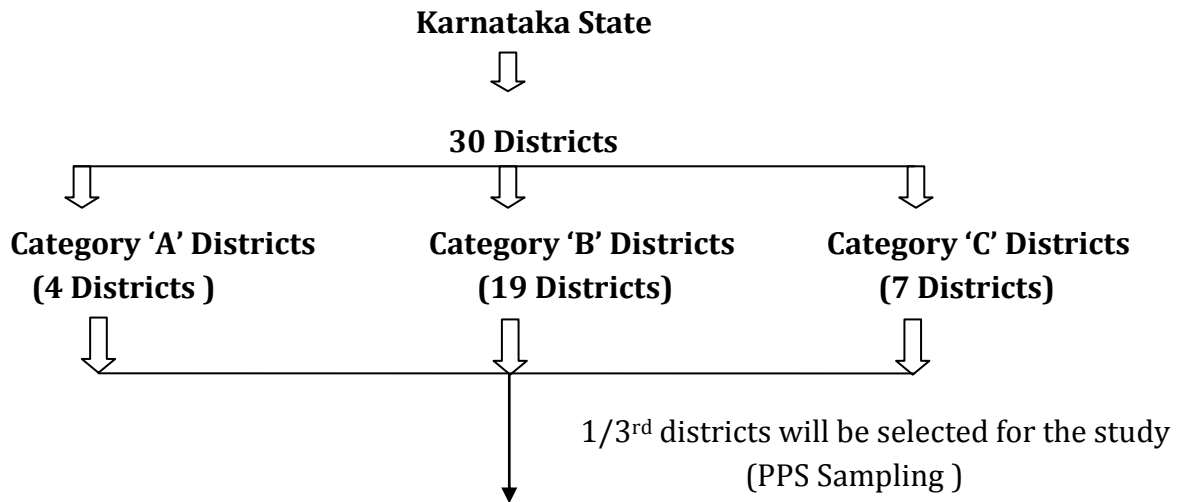
SAMPLE AND SAMPLING DESIGN

This study will be conducted in all 30 districts of Karnataka. According to the performance of health indicators, the state has been divided into 3 categories, 'Category A', 'Category B', 'Category C'. 'Category A' contains four districts, 'Category B' contains nineteen districts and 'Category C' contains seven districts.
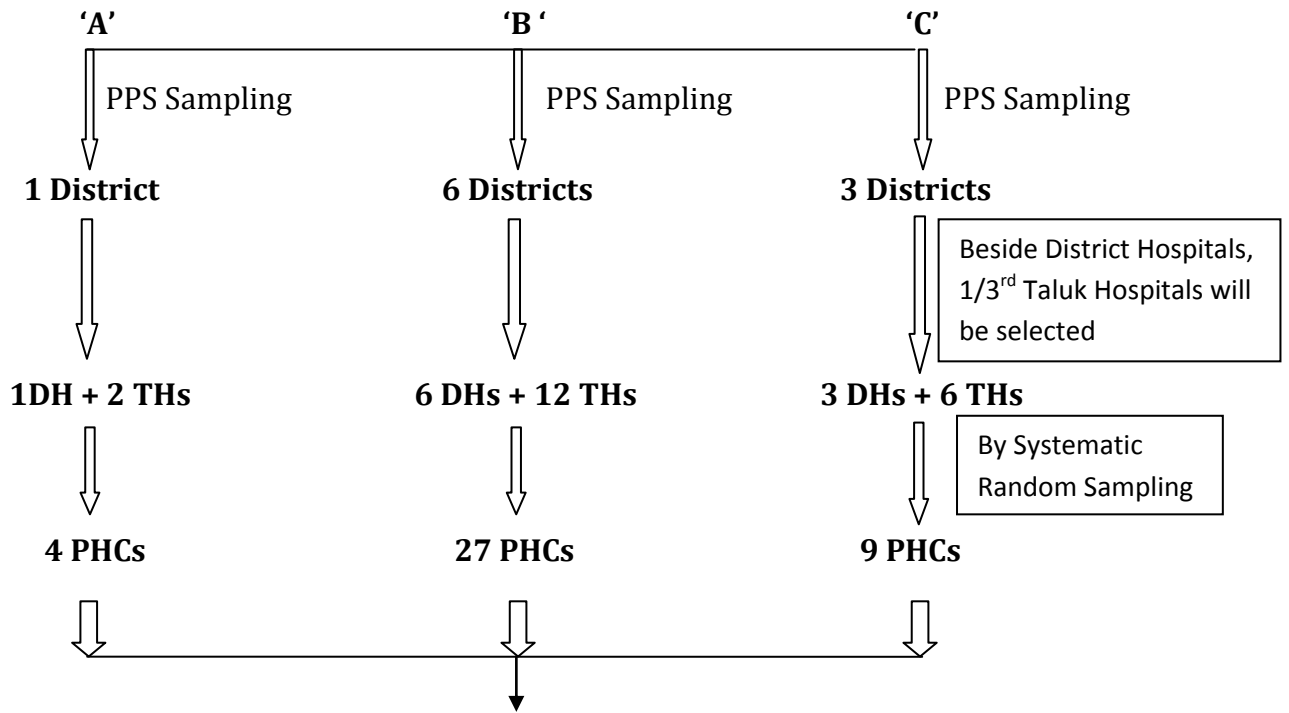
This study will be conducted in one third districts (10 districts) of the state. Probability proportion to size (PPS) sampling technique will be applied to get the required study districts from each of the 3 categories. Thus, one district (out of 4), six districts (out of 19) and three districts (out of 7) will be selected from category A, B and C respectively. Selection of districts in each category will be done by simple random sampling.

From each of the selected districts, the District Hospital and one third of the taluk hospitals, by PPS, will be selected. Forty PHCs associated with these taluk hospitals will be selected by Systematic Random Sampling (Annexure A).

The Serving area of the PHC will be divided into three parts (inner $1/3^{rd}$, middle $1/3^{rd}$ and outer $1/3^{rd}$)   based on individual PHC coverage area (see diagram below). From every part fifteen households will be interviewed which will be selected by adopting simple random sampling. List of households which have availed the 108 EMRI service will be taken into consideration to select the households.

Karnataka State
⇩

30 Districts

Category 'A' Districts
(4 Districts)

Category 'B' Districts
(19 Districts)

Category 'C' Districts
(7 Districts)

1/3rd districts will be selected for the study
(PPS Sampling)

Total Districts selected for the study = 10

'A'   **'B '**   **'C'**

PPS Sampling   PPS Sampling   PPS Sampling

1 District   **6 Districts**   **3 Districts**

Beside District Hospitals,
1/3rd Taluk Hospitals will
be selected

1DH + 2 THs   **6 DHs + 12 THs**   **3 DHs + 6 THs**

By Systematic
Random Sampling

4 PHCs   **27 PHCs**   **9 PHCs**

Total PHCs = 40

First 1/3rd of CA*   **Second 1/3rd of CA***   **Third 1/3rd of CA***

15 HH (15 x 40 = 600)   **15 HH (15 x 40 = 600)**   **15 HH (15 x 40 = 600)**

Total HH = 1800

* CA refers to the "COVERAGE AREA" from each PHC

Total HH / PHC = 45
Total PHCs = 40
Total HH to be surveyed = 1800
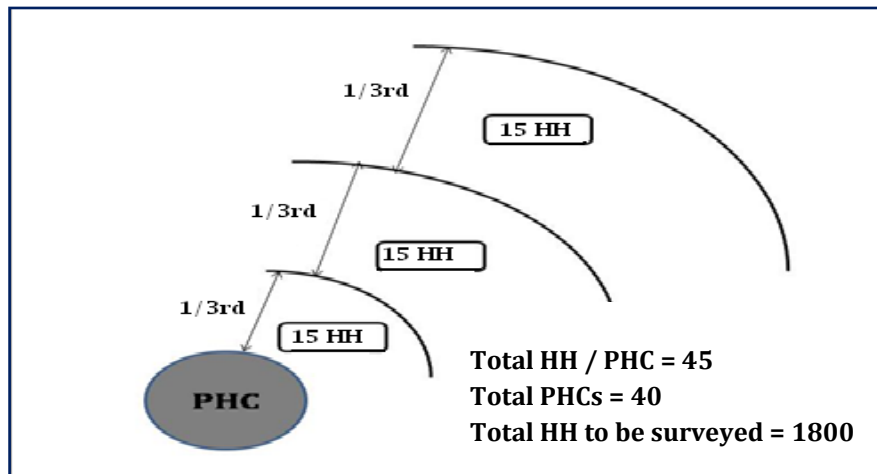
The list of the selected 40 PHCs for this study is given in the Annexure A.

DATA COLLECTION TOOLS

Primary and Secondary data will be collected to address all the evaluation questions with the help of the following data collection instruments:

e) Checklist for Record analysis (Secondary data and reports produced by internal monitoring system of EMRI, for the last one year)
f) Interview schedules for EMRI and other related officials and concerned staff at PHCs to evaluate operational efficiency.
g) Interview schedule for financial feasibility study.
h) Survey questionnaire and Interview schedules for beneficiaries evaluation (Community survey)

METHOD OF DATA ANALYSIS

Both primary and secondary data will be analyzed using SPSS v.16 software. Appropriate tables/graphs will be generated and statistical tests (SQC) will be applied to draw inferences.

LAYOUT OF THE FINAL REPORT

I. Summary

    i.   Abstract
    ii.   Executive summary

II. Background of Study

    i.   Rationale behind the study
    ii.   Review of Literature
    iii.   Key Stakeholders
    iv.   Participants
    v.   Objectives
    vi.   Activities for the evaluation
    vii.   Resources used to implement the evaluation
    viii.   Project's expected measurable outcomes
    ix.   Limitations

III. Evaluation study questions

    i.   Questions addressed by the study
    ii.   Questions that could not be addressed by the study

IV. Evaluation procedures

    i.   Sample selection methodology
        a.   Sample
        b.   Representativeness of the sample

    ii.   Data collection
        a.   Methods
        b.   Instruments

    iii.   Summary matrix
        a.   Evaluation questions
        b.   Variables
        c.   Data gathering approaches
        d.   Respondents
        e.   Data collection schedule

V. Findings
    i.   Results of the analysis

VI. Conclusions
    i.   Broad-based, summative statements
    ii.   Recommendations

WORK SCHEDULE

The study will be conducted for a period of 6 months from the date of assignment. The project will be conducted in phased manner.

First phase: Designing and finalization of tools and schedules, training and collection of secondary data will be done to assess the patterns of utilization of services in 30 districts of Karnataka.

Second phase: Operational efficiency and financial feasibility of the "Emergency Response Services (EMRI Model) 108 will be evaluated.

Third phase: Community survey will be conducted and interim report will be submitted.

Forth phase: Finalization of the interim report as per the feedbacks and submission of final report will be done.

Given below is the activity plan for the evaluation of EMRI programme:

PHASE	Activities	Month 1				Month 2				Month 3				Month 4				Month 5				Month 6			
		W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20	W21	W22	W23	W24
PHASE 1	Development Of Survey Tools	▓	▓																						
	Finalization Of Survey Tools And Printing		▓																						
	Training Of Field Investigators			▓	▓																				
	Secondary Data Collection					▓	▓	▓	▓	▓	▓	▓													
PHASE 2	Operational Efficiency Study							▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓				
	Financial Feasibility Study								▓	▓	▓	▓	▓	▓	▓	▓	▓								
PHASE 3	Community Survey											▓	▓	▓	▓	▓	▓	▓	▓	▓	▓				
	Data Analysis														▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
	Sharing Of Key Findings																	▓	▓	▓	▓	▓	▓	▓	▓
	Interim Report																					▓	▓	▓	▓
PHASE 4	Final Report																							▓	▓

SHARING OF RESPONSIBILITIES

A. Responsibilities of Karnataka State Health and Family Welfare Society :

1. Ensure that the IHMR personnel have access to files, reports, publications, list of works, list of beneficiaries, list of other stake holders and other information that is relevant to evaluation.

2. Nominate nodal Officer(s) at the head office and also in the districts where field work/surveys will be taken up for coordination and providing necessary administrative and logistical support for the evaluation work.

3. Respond promptly to the IHMR evaluator's requests for briefing/debriefing on contextual, facts and figure, for approving changes/modifications to the inception Report, for release of funds as per agreement, for offering comments on any drafts, for arranging meetings with stakeholders and local experts.

B. Responsibilities of the IHMR, Bangalore:

IHMR will:

1. Adhere to the evaluation calendar laid down without any major deviations. Tentative schedule of field visits will be indicated. Any deviations in the agreed schedule will be informed to the nodal officer in advance. Invariably the nodal officer will be debriefed at the end of every field visit.

2. Engage with all stakeholders, particularly those belonging to the deprived sections of the society. The right of such communities to participate, to air their views, to share the information, to know the evaluation findings, to respond to the findings and so on will be fully recognized and such events will be recorded. Potential places to do this survey will be identified.

3. Potential risks and practical limitations of the study will be identified beforehand and remedial measures for overcoming them will be decided.

ANNEXRE 17

Project Team

Principal Investigator	**Dr Sreenath Reddy**	**PhD, FIPHA, FRFHHA**
Co-Investigator	**Dr Manoj Kumar Gupta**	**MD (Community Medicine)**
Senior Principal Advisor	**Dr Dhirendra Kumar**	**PhD**
Consultant Statistics	**Dr J P Singh** **Dr Reshmi**	**Msc. Stastistics** **PhD**
Research Officers	**Dr Veena R** **Dr Divya Desai** **Dr Srinath V** **Dr Yashoda T C**	**BDS, MSc (HA), QM & AHO** **BDS, PGDHM** **MPH** **MPH**

ANNEXURE 18
SHORT PROFILE OF PRINCIPAL INVESTIGATOR

Dr. Sreenath Reddy is a distinguished hospital and health management consultant and currently Faculty & Research Coordinator, IHMR Bangalore. He has over seven years experience in Cancer Biology, Hospital management, public health, PPP management and administration and Disaster Management Studies. Before taking up the responsibility as Faculty & Research Coordinator at the Institute, he was holding the positions at AIIMS, New Delhi, QCI &various corporate and not-profit hospitals of repute. He has played an instrumental role in streamlining the health systems across the country.Besides having expertise in hospital& Health management and administration, he is also well recognized quality expert. He is the lead assessor for National Accreditation Board for Hospitals NABH/ISO/NABL/OHSAS. Besides this, he has been an expert consultant for number of research projects and Evaluation studies.

He also has sound experience in developing research proposal for project and studies. With sound understanding on both qualitative and quantitative research methodologies, he has been involved in conducting and evaluating different projects falling in the domain of health and other development areas. Most of these research projects and studies are funded by Government Departments and International Development and Funding Agencies.

He has expertise in Cancer Biology, Cancer Research, Quality Assurance, Evaluation projects, capacity building, Operational activities, Development studies, Occupational health hazards, Process improvement, Product development & Customer relationship management, Expansion projects in Hospital Industry.

• Successfully implemented Quality management systems in Health care sector, Preparing Hospitals for NABH/ISO Accreditation Process, Hospital Quality Performance evaluation studies, Financial Feasibility studies, Manpower planning and due-diligence studies etc.

• Associated with CMC Vellore, Infectious Disease Control Specialist

• Associated with AIIMS, New Delhi, Hospital Administration & quality Department regarding various hospital administration aspects from 2010 to till now

• Consultant & Assessor for NABH/NABL/ISO/OHSAS/GLP/GMP

• Certified lead auditor for IS0 9001-2008, 19001,OHSAS.