

HEALTH SYSTEM PREPAREDNESS FOR ROAD TRAFFIC ACCIDENTS IN A RURAL DISTRICT IN KERALA, INDIA.

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Background

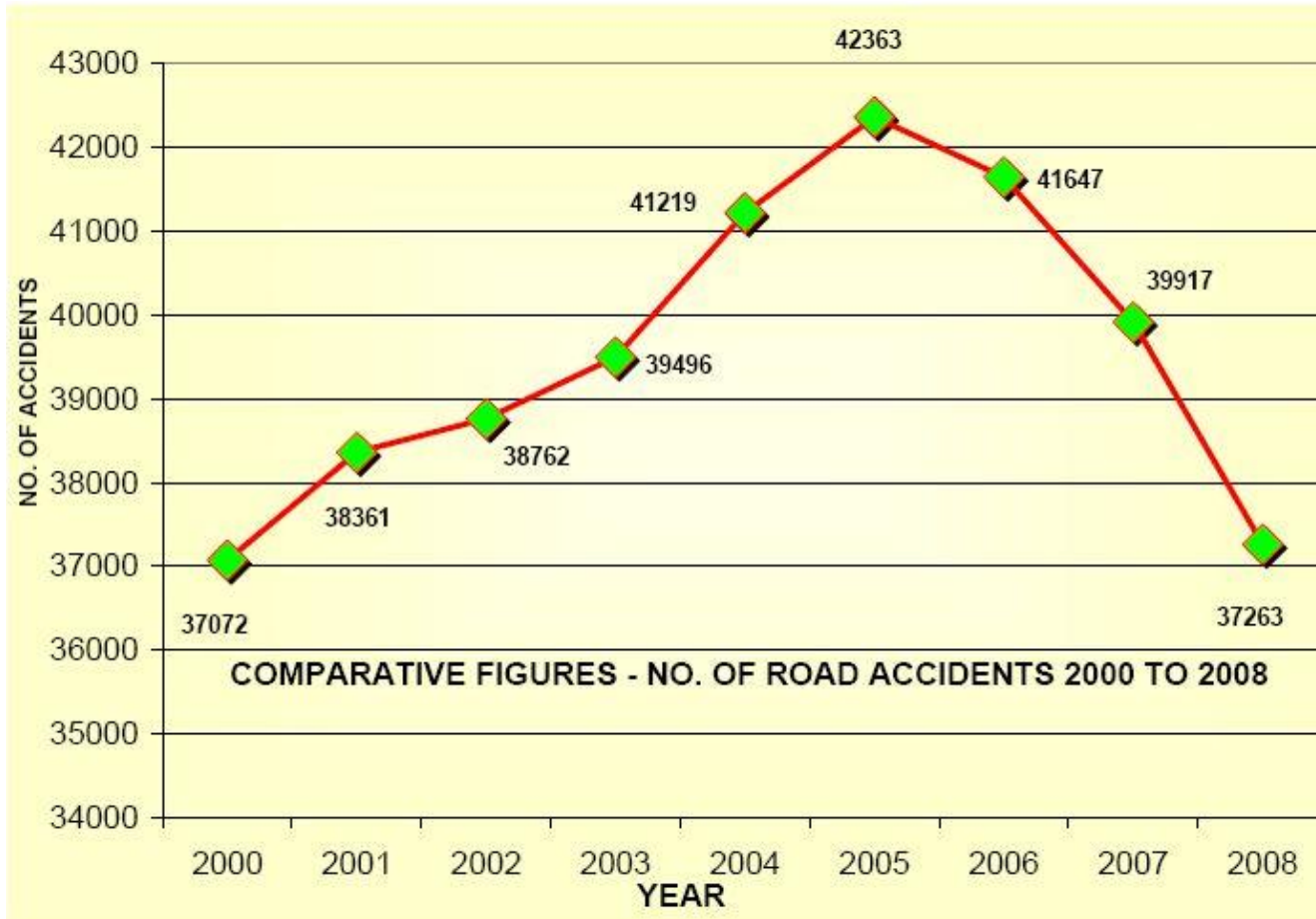


- Over 90% of the world's fatalities on the roads occur in low-income and middle-income countries, which have only 48% of the world's vehicles (WHO 2009).

Indian scenario

- A transport accident is reported every 3 minutes and a death every 10 minutes on Indian roads.
(Joshipura et al)
- It is predicted that by 2020 road accidents will be a major killer in India accounting for 546,000 deaths and 15,314,000 disability-adjusted life years lost.(Peden M et al)

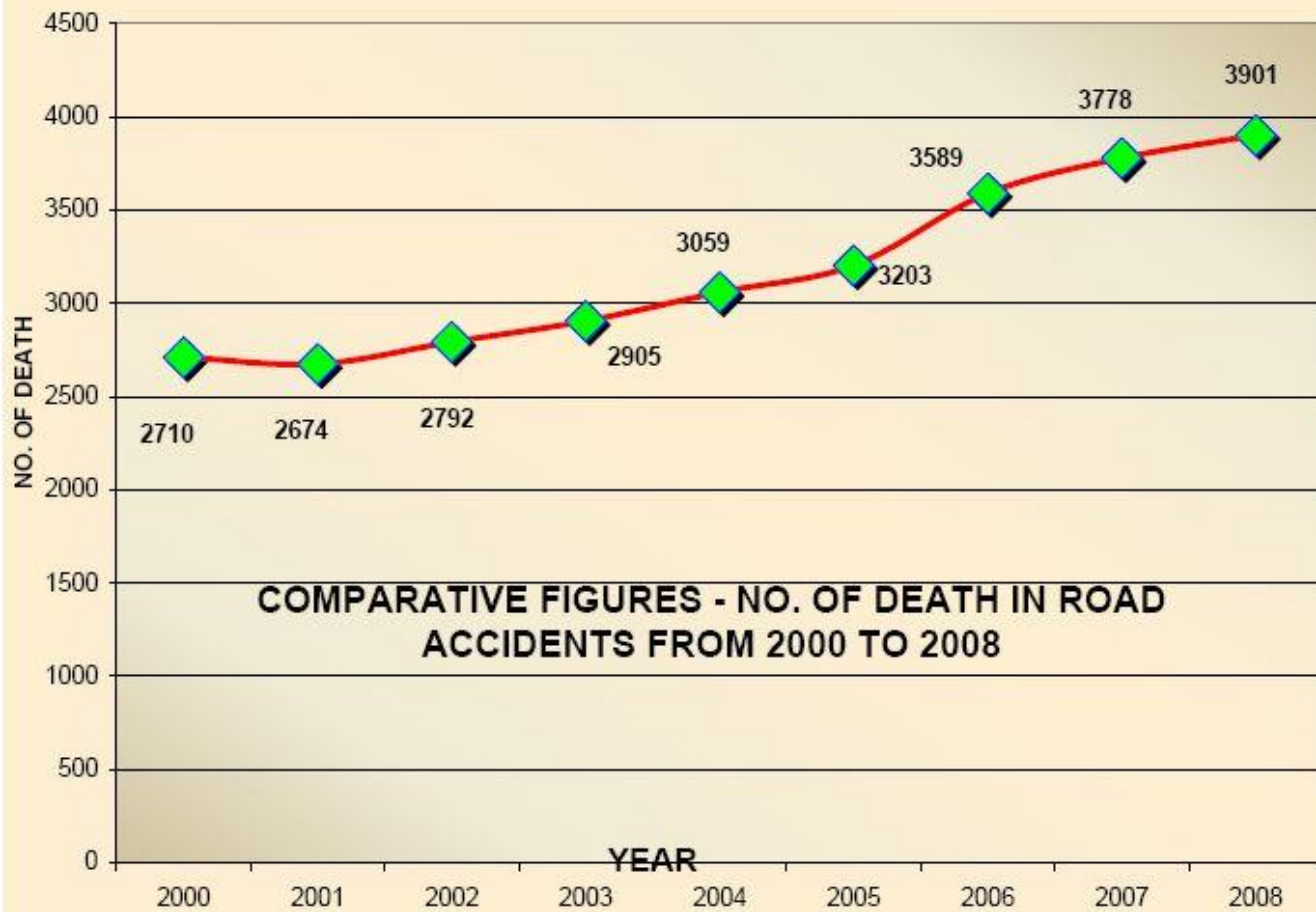
In Kerala



Source: Kerala State Crime Records Bureau

(http://www.keralapolice.org/newsite/pdfs/Road/chart/rd_death_2000_%202008.pdf)

In Kerala (contd.)



Source: Kerala State Crime Records Bureau

(http://www.keralapolice.org/newsite/pdfs/Road/chart/rd_death_2000_%202008.pdf)

Rationale of the study

- People with life-threatening, but potentially treatable injuries are up to six times more likely to die in a country with no organized trauma system than in one with an organized, resourced trauma system (Mock C et al).

Objectives

- To assess the **Health system preparedness** with regard to road traffic accidents, in terms of facilities, equipments and personnel in hospitals of Alappuzha district, Kerala.
- To Study the **distribution** of trauma care facilities its geographical access from accident prone areas in the district.

Data collection and analysis

- Evaluated the resources (based on *Guidelines for Essential Trauma Care for LMIC, WHO, 2004*) in terms of
 - Physical resources
 - Human resources
 - Organizational and administrative functions
- Tools: Check list of 180 physical and human resources and an interview schedule for 14 selected skills and knowledge
- Geo co-ordinates obtained using GPS and analyzed using ArcGIS version 9.1.

Data collection and analysis (contd.)

- Based on levels of hospitals:
 - ▣ Hospitals staffed with GPs
 - ▣ Specialty hospitals
 - ▣ Tertiary hospital
- Each of these institution was assessed for its capacity for ten categories of trauma care and analyzed using SPSS version 17.

Results

Table 01: Levels of hospitals

Level	Government N (%)	Private N (%)	Total N (%)
Hospitals staffed with GPs	20 (64.5)	11 (35.5)	31
Specialty hospitals	06 (35.3)	11 (64.7)	17
Tertiary hospital	01 (100)		01
Total	27(55.1)	22 (44.9)	49

Table 02 : Hospitals based on average number of accident victims attended in a week

Number of accident victims in a week	Government hospitals N (%)	Private hospitals N (%)
less than 50	22 (81.5)	22 (100)
50 to 100	01 (3.7)	
more than 100	04 (8.2)	
Total	27	22

Table 03: Infrastructure

Infrastructure	Absent N (%)	Inadequate N (%)	Adequate N (%)
Hospitals staffed with GPs			
24 × 7 casualty service		15 (48.4)	16 (51.6)
Ambulance	22 (71.0)	05 (16.1)	04 (12.9)
Procedure room		15 (48.4)	16 (51.6)
Specialty Hospitals ^a			
Ambulance		02 (11.8)	15 (88.2)
Minor Operation Theatre (OT)		02 (11.8)	15 (88.2)
Emergency trauma major OT	14 (82.4)	03 (17.6)	0
Trauma ICU	14 (82.4)	02 (11.8)	01 (5.9)
Ambulance with IC facility	13 (76.5)	02 (11.8)	02 (11.8)
Tertiary Hospital ^{a b}			
Ambulance with IC facility			
Burn care unit			
Trauma ICU			
Triage room			

Equipments and supplies

Table 04

Essential resources for acute resuscitation (ABC) * of accident victims:

Sl no	Level	Not available ^a	Inadequate ^b	Adequate ^c
	Hospitals staffed with GPs	28 (90.3%)	03 (9.7%)	00
	Specialty hospitals	02 (11.8%)	14 (82.4%)	1 (5.9%)
	Tertiary hospital			
	Total	30 (61.2%)	17 (34.7%)	2 (4.1%)

* Physical resources which are deemed essential at GP hospital level in the guidelines for Airway, Breathing and Circulation management.

^a One or more items deemed essential at GP hospital level for Airway, Breathing and Circulation management is/are absent.

^b All the items deemed essential at GP hospital level for Airway, Breathing and Circulation management are present but one or more of them are inadequate.

^c All the items deemed essential at GP hospital level for Airway, Breathing and Circulation management are present and adequate.

Table 05 : Staffing

Level	Not available N (%)	On call N (%)	Available 24x7
GP Hospitals			
Nursing staff			31 (100)
Doctor for emergency		15 (48.4)	16 (51.6)
Specialty Hospitals ^a			
General surgeon	02 (11.8)	15 (88.2)	
Ortho	02 (11.8)	15 (88.2)	
Anesthetist	06 (35.3)	11 (64.7)	
Neurosurgeon	14 (82.4)	03 (17.6)	
ENT specialist	12 (70.6)	5 (29.4)	
Ophthalmologist	12 (70.6)	5 (29.4)	
Tertiary Hospital ^{a b}			
Neurosurgeon			
Pediatric surgeon			
ENT specialist			
Ophthalmologist			
Urosurgeon			
Plastic surgeon			
Cardio thoracic surgeon			
Gastro surgeon			

Table 06: Knowledge and skills

Sl no.	Knowledge and skills	correlation with years of experience ^a	p value
1. Knowledge and skills showing negative correlation			
	Basic immobilization	- 0.490 ^a (**)	.001
	Universal precaution	- 0.448(**)	.001
	assessment of shock	- 0.507(**)	.001
	Assessment of depth and extent of burns	- 0.580(**)	.001
	Assessment of neurovascular compromise	- 0.286(*)	.028
	Clinical assessment of abdominal injury	- 0.390(**)	.001
	Assessment of GCS	- 0.729(**)	.001
2. Knowledge and skills showing positive correlation			
	Alcohol screening	+ 0.444(**)	.001

^a Spearman's correlation Coefficient

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

GEO- SPATIAL ANALYSIS

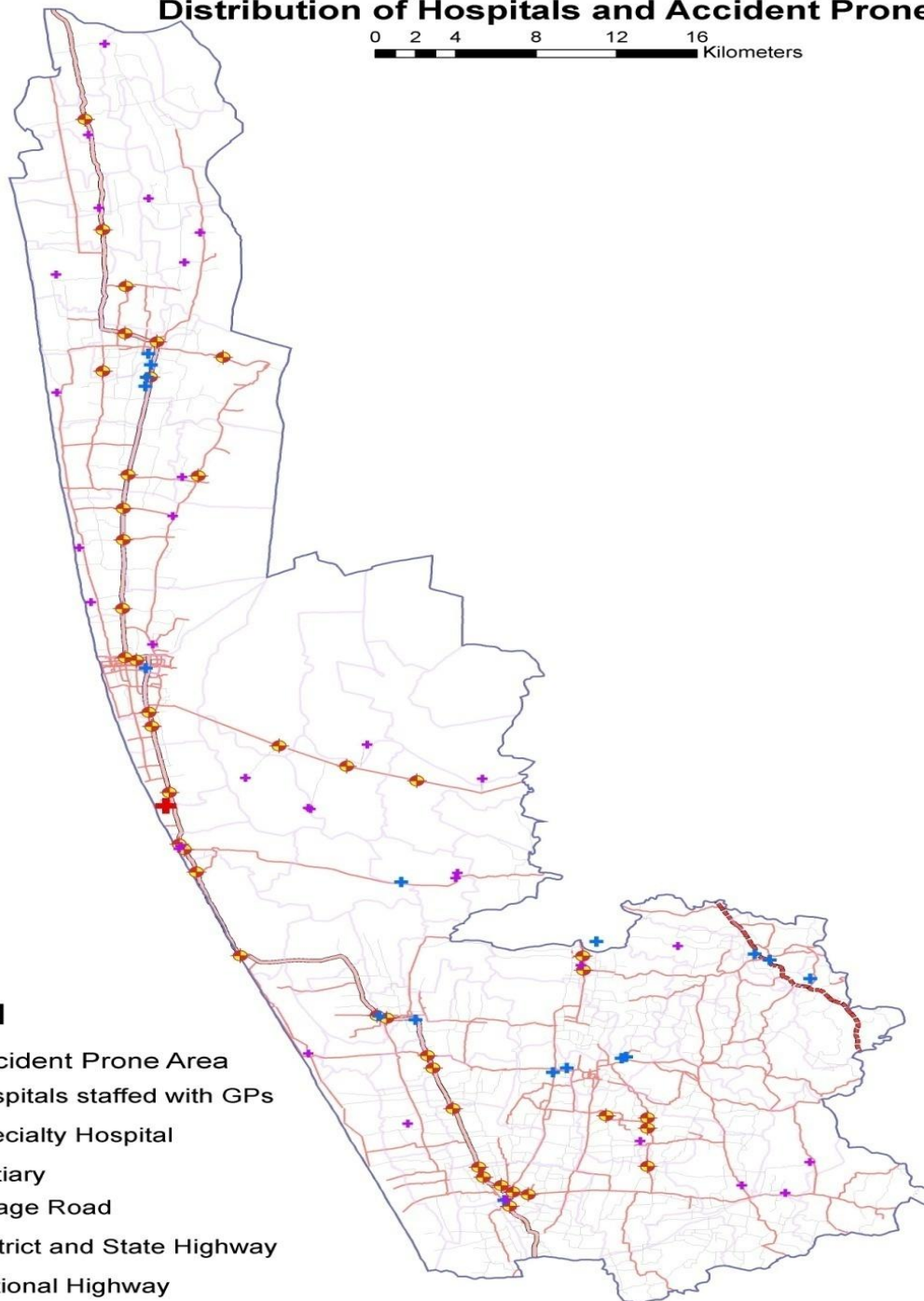
Distribution of Hospitals and Accident Prone Areas

0 2 4 8 12 16 Kilometers



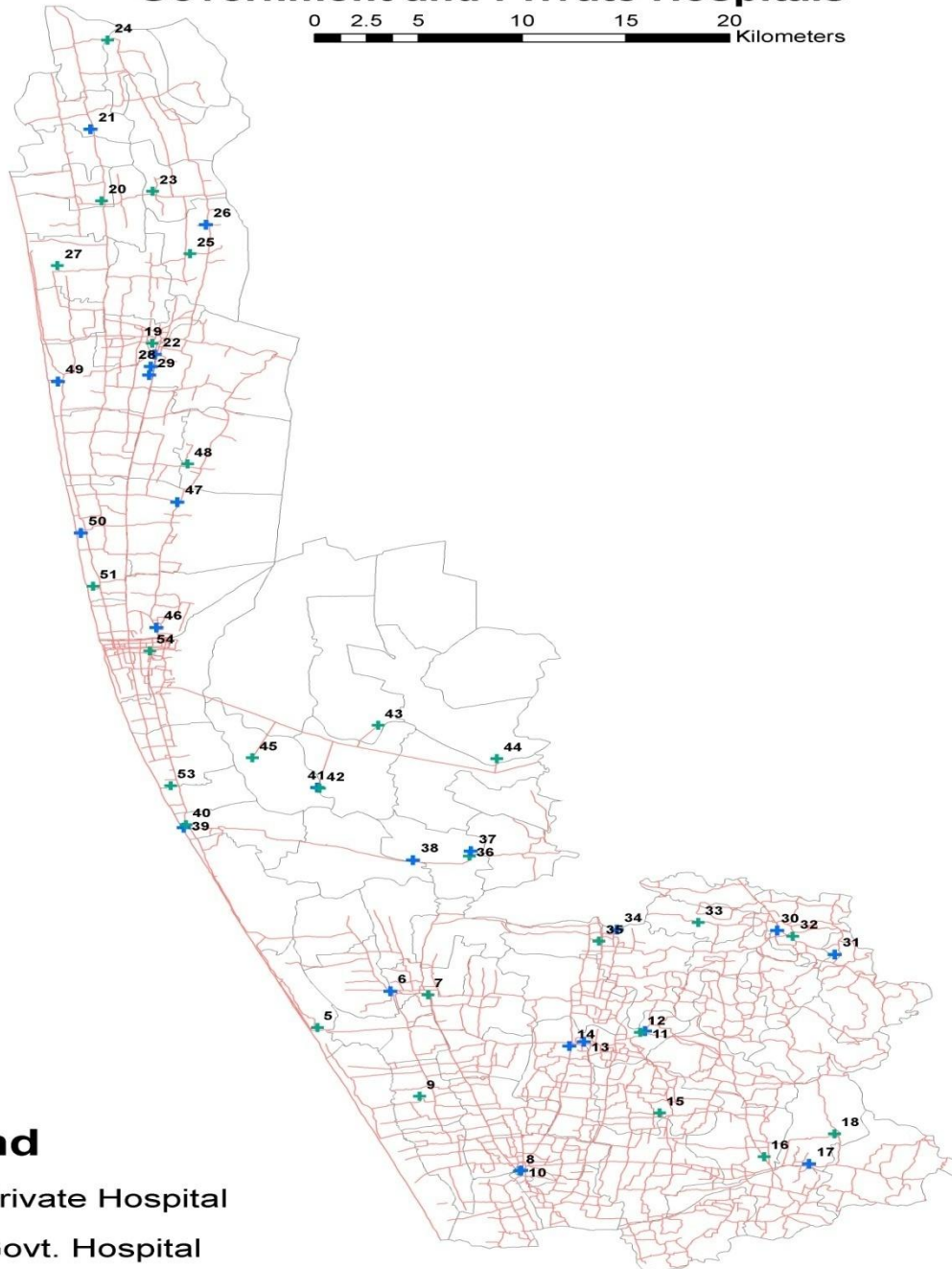
Legend

-  Accident Prone Area
-  Hospitals staffed with GPs
-  Specialty Hospital
-  Tertiary
- Village Road
- District and State Highway
- National Highway



Government and Private Hospitals

0 2.5 5 10 15 20 Kilometers



Legend

 Private Hospital

 Govt. Hospital

 Road

Ambulance Service

0 2.5 5 10 15 20 Kilometers



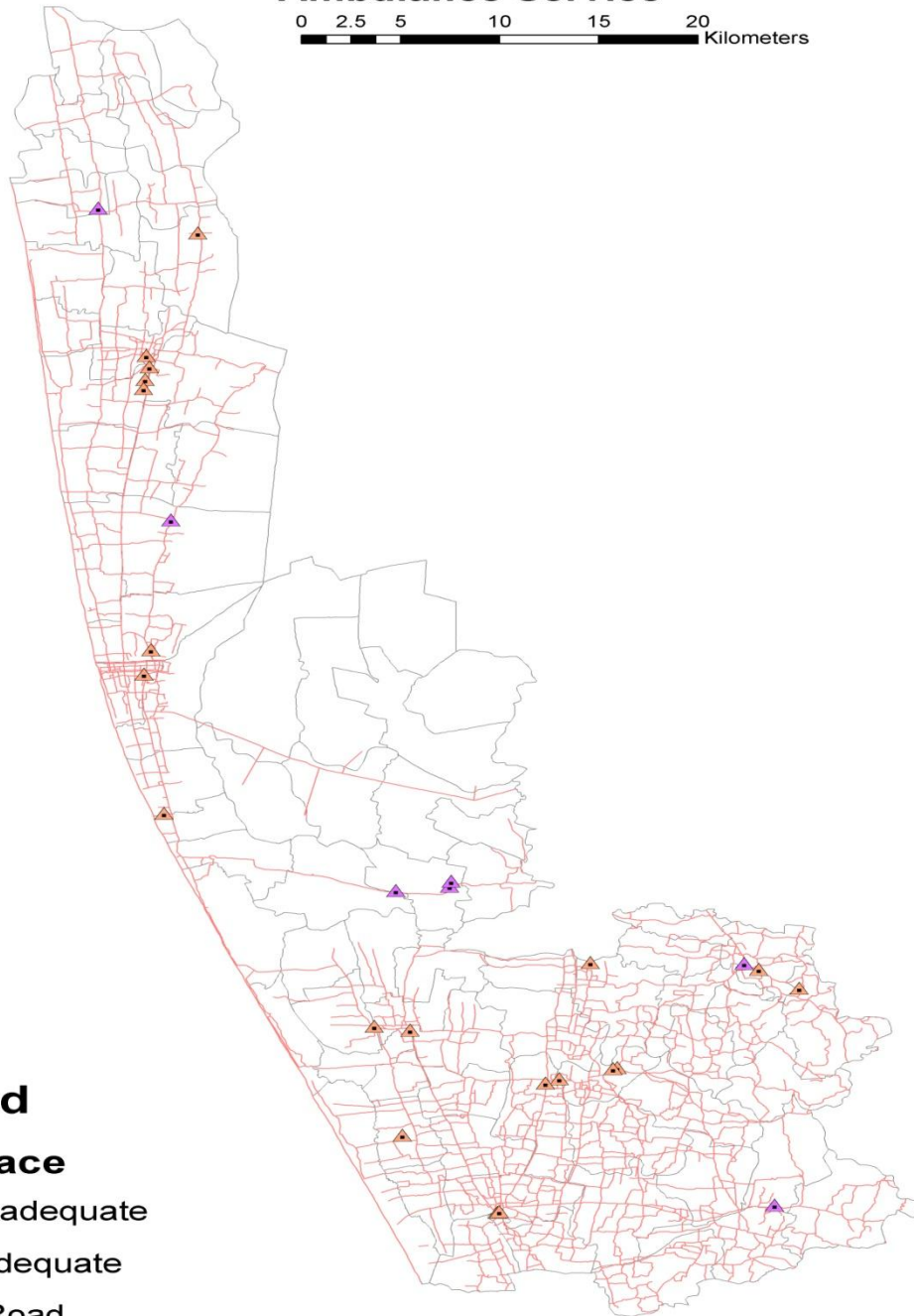
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Ambulance

 Inadequate

 Adequate

 Road



Route to Hospitals

0 2 4 8 12 16 Kilometers



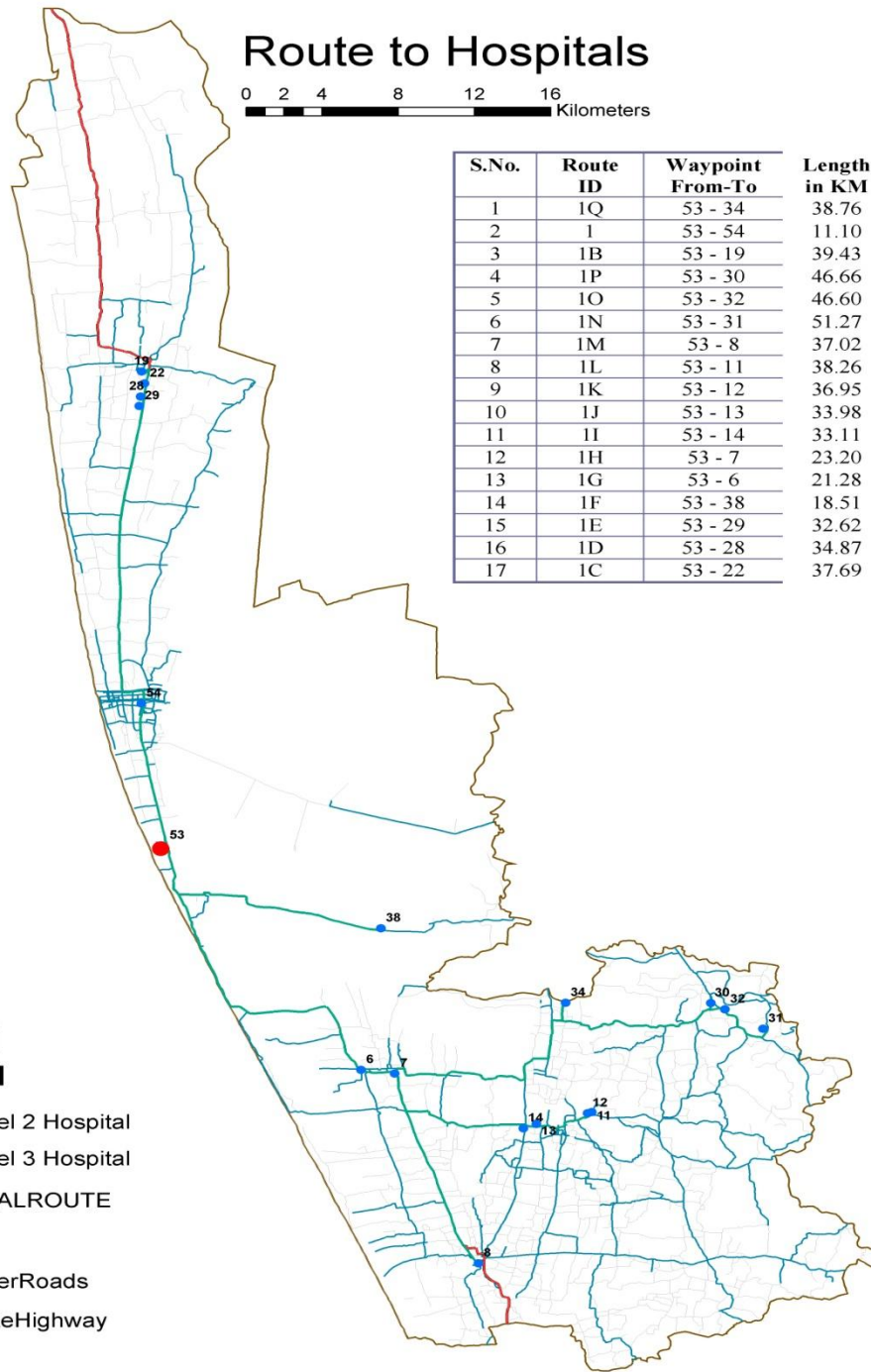
S.No.	Route ID	Waypoint From-To	Length in KM	Time in Minute
1	1Q	53 - 34	38.76	51.49
2	1	53 - 54	11.10	12.07
3	1B	53 - 19	39.43	40.93
4	1P	53 - 30	46.66	64.44
5	1O	53 - 32	46.60	64.30
6	1N	53 - 31	51.27	71.89
7	1M	53 - 8	37.02	39.18
8	1L	53 - 11	38.26	48.03
9	1K	53 - 12	36.95	45.99
10	1J	53 - 13	33.98	41.41
11	1I	53 - 14	33.11	39.49
12	1H	53 - 7	23.20	24.10
13	1G	53 - 6	21.28	22.14
14	1F	53 - 38	18.51	29.93
15	1E	53 - 29	32.62	33.76
16	1D	53 - 28	34.87	36.00
17	1C	53 - 22	37.69	38.63

Legend

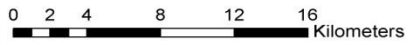
- Hospital**
- Level 2 Hospital
 - Level 3 Hospital

ROAD

- FINALROUTE
- OtherRoads
- StateHighway
- NH

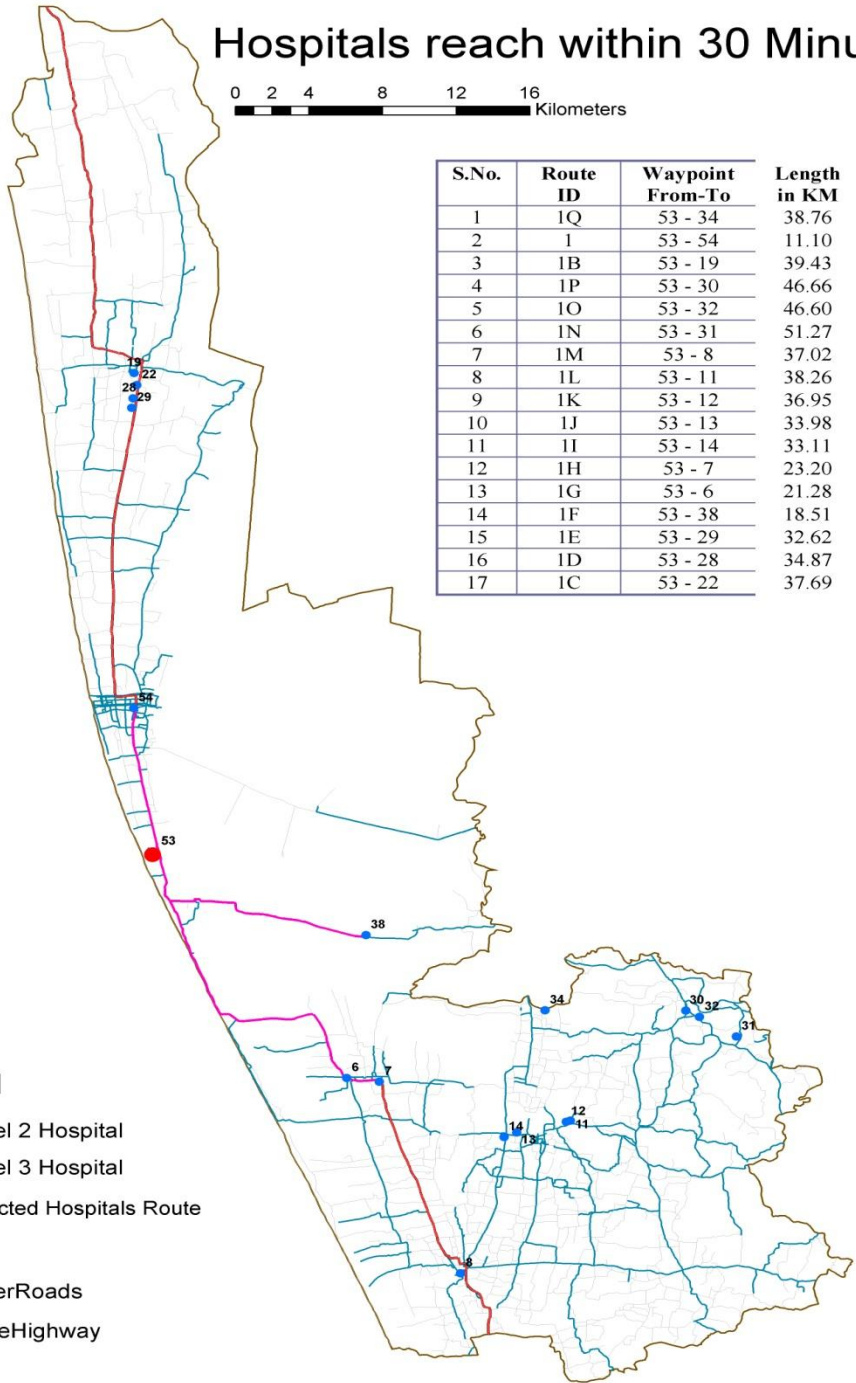


Hospitals reach within 30 Minute



S.No.	Route ID	Waypoint From-To	Length in KM	Time in Minute
1	IQ	53 - 34	38.76	51.49
2	I	53 - 54	11.10	12.07
3	IB	53 - 19	39.43	40.93
4	IP	53 - 30	46.66	64.44
5	IO	53 - 32	46.60	64.30
6	IN	53 - 31	51.27	71.89
7	IM	53 - 8	37.02	39.18
8	IL	53 - 11	38.26	48.03
9	IK	53 - 12	36.95	45.99
10	IJ	53 - 13	33.98	41.41
11	II	53 - 14	33.11	39.49
12	IH	53 - 7	23.20	24.10
13	IG	53 - 6	21.28	22.14
14	IF	53 - 38	18.51	29.93
15	IE	53 - 29	32.62	33.76
16	ID	53 - 28	34.87	36.00
17	IC	53 - 22	37.69	38.63

- Legend**
- Hospital**
- Level 2 Hospital
 - Level 3 Hospital
 - Selected Hospitals Route
- ROAD**
- OtherRoads
 - StateHighway
 - NH



GEO- SPATIAL ANALYSIS

Table 07 : Distribution of specialty hospitals based on road distance to the tertiary hospital

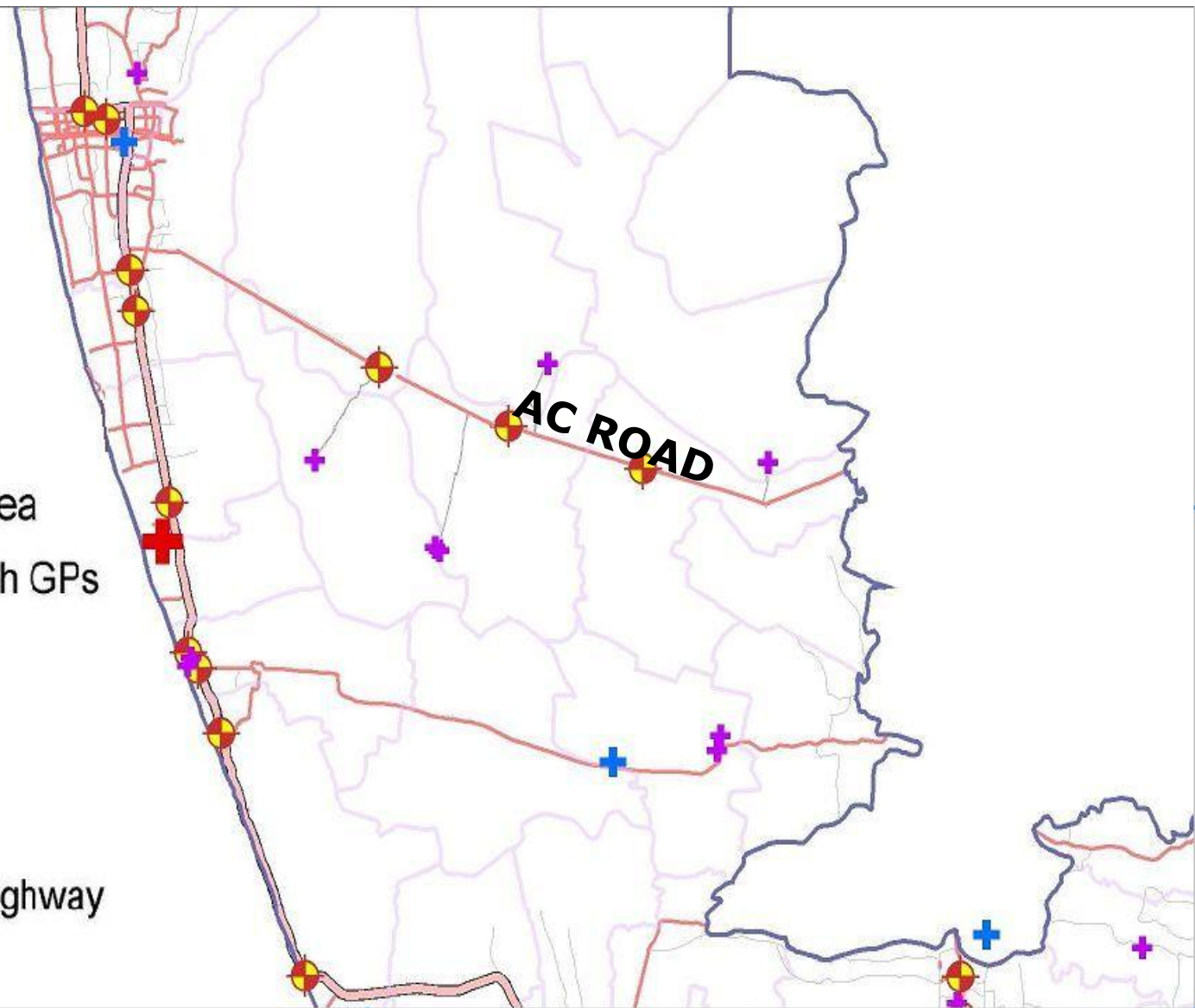
Sl no		< 30 kms	30 to 45 kms	45 to 60 kms	>= 60 kms
	Number and percentage of specialty hospitals	05 (29.4%)	06 (35.3%)	03 (17.6%)	03 (17.6%)

Table 08 : Distribution of specialty hospitals based on travel time to the tertiary hospital

Sl no		< 30 mins	30 to 45 mins	45 to 60 mins	>= 60 mins
	In ambulance ^a	02 (11.8%)	05 (29.4%)	06 (35.3%)	04 (23.5%)
	In other vehicles ^b	01 (5.9%)	02 (11.8%)	05 (29.4%)	09 (52.9%)

Legend

-  Accident Prone Area
-  Hospitals staffed with GPs
-  Specialty Hospital
-  Tertiary
-  Village Road
-  District and State Highway
-  National Highway



Distribution of accident prone areas based on road distance to nearest specialty hospital

Sl no		< 5kms	5 to 10 kms	> 10 kms	Total
	Number and percentage of accident prone areas	28 (66.7%)	08 (19%)	06 (14.3%)	42

Trauma related administrative and organizational functions at tertiary hospital:

	Absent	Inadequate
Trauma registry with severity scores		
Training for trauma care		
Performance improvement programs for trauma care		
Trauma care accreditation		

Conclusions and Recommendations

- Physical resources for life saving were not adequate even at specialist hospitals and facilities for advanced care were lacking in the tertiary hospital.
- The study identified several items which can be better supplied, especially at specialist hospital.
- There is a need to strengthen organization and planning of trauma care services through regular in service training, improved procurement and placement of physical resources, use of trauma related quality improvement programs and timely access to hospital for road accident victims.

Impact:

- Alappuzha district chosen for pilot for 108 emergency ambulance services. Ambulance points will be given based on the study.
- Project for comprehensive development of trauma care system in Alappuzha will be submitted for NRHM-PIP 2011.
- Permission for conduct of similar exercise for entire state.

References

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Thank U