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Transport Services



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Editorial statement

The Transport and Communications Bulletin for Asia and the Pacific is a peer-reviewed journal published once a year by the Transport Division of the Economic and Social Commission for Asia and the Pacific (ESCAP). The main objectives of the Bulletin are: to provide a medium for the sharing of knowledge, experience, ideas, policy options and information on the development of transport infrastructure and services in the Asia-Pacific region; to stimulate policy-oriented research; and to increase awareness of transport policy issues and responses. It is hoped that the Bulletin will help to widen and deepen debate on issues of interest and concern related to the transport sector.

Transport services are vital for facilitating the implementation of government policies. An organized public transport service system provides a mechanism for delivering social services, particularly health care and education, to the broader population, including those living in rural areas, which often tend to be poor and in most need of those services. Government policies in terms of budget allocation and fare-setting affect the quality of transport services. Transport services may be subsidized by the government in order to make them affordable to the poor, but this can result in a large fiscal burden on the government and inefficient or poor public transport services. Therefore, instead of generating social benefits and improving welfare, the overall impact would be a social burden on the population, which can constrain growth of other sectors and limit the provision of social services. The needs and capacity of society can affect the transport system. For example, growth of the tourism industry can facilitate progress in the transport service sector and demand for health and education services can lead to better public transport systems.

This Bulletin presents the state of transport services in selected countries, the circumstances that shaped the development of those transport service systems, and their impact on the communities that they serve. It consists of five studies:

- a. Transport, health services and budget allocation to address maternal mortality in rural Indonesia by Edriana Noerdin;
- b. Transport services in the Maldives – an unmet need for health service delivery by Maimoona Aboobakuru;
- c. Enhancing the sustainability and inclusiveness of Metro Manila's urban transportation systems: Proposed fare and policy reforms by Andra Charis Mijares, Madan B. Regmi and Tesuo Yai;
- d. A case study on establishing and running a community bus service in rural Sri Lanka by Ranjith de Silva; and
- e. Saving lives through rural ambulance services: experiences from Karnataka and Tamil Nadu states, India by A Xavier Raj.

The first two studies listed tackle the role of transport services in providing health care to rural communities, focusing on how the lack of an efficient public transport service has resulted in higher maternal deaths and ineffective health policies. The third study examines the government's fare-setting policy for rail-based transport service, and discusses how the aim for social acceptability has put a large fiscal burden on the government and led to impractical and conflicting outcomes for both rail-based and road-based transport services. The fourth study looks into a pilot project on community-driven transport services. It shows how a small rural community effectively established its own transport services. The last study presents how ambulance transport services resulted in more effective health services in two states in India.

In Noerdin's study on Indonesia, the high cost, low quality and often unreliable transport service in the rural areas adversely affect the performance of the health sector in Indonesia. As a result, the maternal mortality ratio (MMR) increases. Noerdin observes that women in rural areas have limited access to health services. Pregnant women are unable to go to health centers for check-ups and expectant mothers choose to give birth at home due to the very high cost of getting to the health centres and hospitals. Noerdin also examines select local governments' budget allocation for the health sector, which is set at 10% under the Health Law, to assess their political will in addressing MMR. She recommends pursuing an integrated approach to lower MMR through a higher budget allocation for health, upgrades in reproductive health service, and reliable and affordable transport services for pregnant women and mothers.

In the second study, Aboobakuru notes that despite progress in improving transport services in Maldives to meet the needs of the growing tourism sector, transportation remains poorly integrated with the other service sectors, particularly the health sector. The public transport service system is mostly comprised of disjointed privately owned sea vessels that travel based on passenger demand, and is poorly integrated with other service sectors. Aboobakuru highlights that increased demand for health services underscores the need for a better public transport service system. She points out that even though mobile outreach clinics are provided in the atolls, the general population prefers to go to hospitals in the capital Male because travel to and from the capital is easier than within the atolls. As a result, local health services are underutilized while health services in the capital are overburdened. Aboobakuru states that an organized public transport service system that facilitates transport between the islands, particularly among and within the atolls, is needed in order to enhance the effectiveness of health policies and further reduce the country's MMR.

Mijares, Regmi and Yai look into the fare-setting policy for rail-based transport in Metro Manila. Their study states that the pricing policy for the Light Rail Transit (LRT) 1 and 2, and the Metro Rail Transit (MRT) services are inefficient. The transport system imposes a large fiscal burden on the government and provides a poor quality service. The government's aim for social acceptability of rail transport prices through very low and highly subsidized fares has increased ridership and made the service more affordable to the poor. However, while carrying out this policy, it has ignored inter-modal equity and spatial equity. Rail-based transport competes with road-based transport, which put private operators at a disadvantage and rail services in the middle stations are constrained due to overcrowding. In order to promote an equitable transport system, the authors recommend that the government consider all modes of transport in setting transport fares, and regulate public transport operations, particularly buses, as well as private vehicles.

Meanwhile, de Silva examines how a pilot project on community-based transport service in Sri Lanka has shown how rural communities can set up and manage their own rural transport service. Community participation along with the personal commitment of the members of the board managing the bus company has sustained the operation of the service beyond the project implementation period. Due to the project, dilapidated roads were repaired to lower vehicle operating costs and new roads were constructed as demand for the service expanded. Lower transportation costs and shorter travel time led to better access to health services and education, and reduced prices of commodities in the communities. However, rural communities have had limited access to bank financing due to their limited technical capacity and the reporting requirements of banks. De Silva recommends that alternative forms of financing and support from non-governmental organizations and community-based organizations should also be made available to rural communities in order to promote the community-based transport system.

Raj tackles emergency-response services in India, focusing on ambulance transport services. The service is seen as key to improving access of rural communities, particularly members of the communities who are pregnant or children, to health care. Out-of-pocket spending for health is high (74%) in India and due to this, illnesses can push families into poverty. The government has launched universal access to basic and advanced health care in rural areas, which includes transport service to health facilities. Raj compares case studies of the service in Tamil Nadu and Karnataka in terms of efficiency, effectiveness and impact. He finds that rural areas in Karnataka use the service more than their counterparts in Tamil Nadu, while transport services provided in Tamil Nadu are more effective in terms of cost. They are also more efficient, given the lower share of its population in rural areas and its more extensive service network. However, both areas have been successful in improving their Millennium Development Goal-related health indicators. Raj notes that the use of professional ambulance services in emergency response systems in rural areas that employ advanced technology and management decision systems supports efforts to take a more holistic approach to health care.

Transport services should cater to the needs of the community and facilitate access to vital services, such as health and education. At the same time, setting up transport services should take into account the on the capacity of the government and the community that it serves. Transport pricing that result in large fiscal burdens does not lead to equitable services, but instead reflects inefficient policies, governments, therefore, the need to adopt policies that deliver quality transport service at a reasonable fiscal cost. Other alternatives, such as public-private partnerships or community-based systems, may also offer better solutions. Communities can work on establishing their own transport services in cases in which private investor participation and government capacity is low. Likewise,

support from the private sector and non-governmental organizations can increase government policy options and also facilitate the implementation of better transport service systems.

The Bulletin welcomes analytical articles on topics that are currently at the forefront, of transport development in the region as well as policy analysis and best practices. Articles should be based on original research and should have analytical depth. Empirically based, articles should emphasize policy implications emerging from the analysis. Book reviews are also welcome. See the inside back cover for guidelines on contributing articles.

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**TRANSPORT AND COMMUNICATIONS BULLETIN
FOR ASIA AND THE PACIFIC
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CONTENTS

	<i>Page</i>
Editorial statement	iii
<i>Edriana Noerdin</i> Transport, health services and budget allocation to address maternal mortality in rural Indonesia.....	1
<i>Maimoona Aboobakuru</i> Transport services in the Maldives – an unmet need for health service delivery	15
<i>Andra Charis Mijares, Madan B. Regmi and Tetsuo Yai</i> Enhancing the sustainability and inclusiveness of the Metro Manila's urban transportation systems: Proposed fare and policy reforms.....	28
<i>Ranjith de Silva</i> A case study on establishing and running a community bus service in rural Sri Lanka	41
<i>A Xavier Raj</i> Saving lives through rural ambulance services: experiences from Karnataka and Tamil Nadu States, India.....	52

Transport, health services and budget allocation to address maternal mortality in rural Indonesia

Edriana Noerdin¹

Abstract

The persistence of high Maternal Mortality Ratio (MMR) in Indonesia cannot be explained by simply looking at inadequate policies in health services and how they are implemented. It is also not only about the meagre budget allocations for reproductive health services, concentration of health workers in urban areas, and insufficient number of adequate community health services. Other factors, such as distance, transportation costs and road quality should also be considered as causes for why women living in remote areas find it difficult to access adequate health facilities. The transportation divide is a serious obstacle to the reduction of the high MMR in Indonesia.

Keywords: state and local government expenditures, transportation divide, health and inequality

Introduction

Over the past few decades, Indonesia has enjoyed a steady reduction in its MMR, dropping from 423 in 1980 to 253 in 1990, rising slightly to 290 in 2000, and then continuing its decline to 229 in 2008 (Hogan and others, 2010, p. 1614). In September 2013, the National Population and Family Planning Board (Badan Koordinasi Keluarga Berencana Nasional or BKKBN) made a shocking announcement that the result of the Indonesian Demographic and Health Survey showed that MMR in 2012 was 359 deaths per 100,000 live births, significantly higher than the figure in 2008 (Jakarta Post, 2013).

However, in its official publication the BKKBN itself warns that "... one must be cautious in interpreting the results" and that "it does not necessarily indicate a failure in reducing the role of maternal deaths on overall adult female" (BPS, 2012, pp212-213). One should definitely be careful in comparing these numbers, as the sample sizes make uncertain estimates. The 95% confidence intervals for the two years have substantial overlaps, and furthermore the sample design was altered slightly between the surveys, limiting direct comparability. Nevertheless, the data suggests that three decades with a declining trend in the MMR of Indonesia is slowing down and possibly reversing.

While changes in the methodology make it difficult to compare the two figures, the recent trends have shocked policy makers as well as the general public as they suggest that Indonesia will definitely fail to achieve the Millennium Development Goals target of reducing MMR to 102 by 2015. Indeed, it suggests that Indonesia's MMR is high compared to the 2013 MMR of other Southeast Asian countries such as the Philippines (120), Viet Nam (49), Malaysia (29) and Thailand (26) (WHO, 2014, pp31-35).

In this article, several major factors contributing to the persistence of high MMR in Indonesia will be explored, including inadequate policies and their implementation, meagre budget allocations for reproductive health services, concentration of health workers in urban areas, insufficient number of adequate community health services, and severe road conditions that prevent easy and fast access to adequate health facilities in rural poor districts.

1. Policies versus practice: an overview of national policies and programme on maternal health

The government has a variety of programmes to address maternal and infant mortality, such as the "Love Mom Movement" (Gerakan Sayang Ibu or GSI) that was launched by the president in December 22, 1996 and has been implemented through various strategies. First, the government

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introduced the Making Pregnancy Safer Movement (MPS). Second, the government developed an effective partnership through a cooperative cross-sector programme to promote the maximal use of available resources and improve coordination of MPS planning and activities. The implementation of GSI used a decentralized approach based on Act No. 22 (1999), Act No. 25 (1999), and a government regulation (Kepmen No.75/Kep/MenUPW/X/1997) concerning the GSI Manual.

Ten years later, to improve the implementation of the GSI programme, the Ministry of Health issued Decision No. 564/Menkes/SK/VIII/2006 concerning the development of a Prepared Village System (*Desa Siaga*). This policy became the foundation for local governments to provide early assistance to women in labour by mobilizing resources owned by the community in the area.

The Health Law No. 36/2009 also stipulates that the central government and local governments at the provincial and district/city level must allocate at least 5% of the national budget and 10% of the local budget, respectively, excluding salaries for public officials, for health programme. The law rules that 2/3 of the total budget should be used to finance public services to improve the standards of people's health. (Prayitno, 2014) The law provides the legal basis for the central and local governments to allocate sufficient budget to develop programmes for the reduction of MMR.

1.1 Lack of political will as reflected in low budget allocations

Judging from the budget allocated to health services in general, and health services for women in particular, however, neither the national nor local governments appear to have the political commitment to improve the health standards in the country. During the period of 2005-2012, budget allocation for health from the national budget only came to an average of 2.2% per annum. In 2013, the percentage of budget allocation for health went down to 1.5% of the national budget (Noerdin, 2011).

Meanwhile, allocations for specific programmes, such as *Jampersal*² (Childbirth Coverage, *Jaminan Persalinan*) and the Pregnant Mother and Reproductive Health Package, have increased only slightly. For example, data on pregnant mothers from the health ministry show that the per capita budget allocation for pregnant women through the *Jampersal* programme experienced a slight increase of Rp. 312,000 from 2011 to 2012. The increase from 2012 to 2013, however, dropped to only Rp. 11,000. Meanwhile, the *Jampersal* programme consumed 92.7% of the total budget for maternal health programme, leaving only 0.2% of the budget to be used for capacity building of reproductive health workers and as operational fund for health facilities for mothers.³ This is in contrast to the fact that reproductive health workers and adequate birth clinic facilities play an important role in reducing MMR.

Furthermore, the key to the success of the GSI and the Prepared Village System programmes is contingent upon the political will of the local government to provide budget allocations, and not many local governments have done so. Most district governments are still reluctant to allocate funds for health programmes in general and for reproductive services in particular to reduce MMR (Prayitno, 2014).

In 2007-2008, the Women Research Institute (WRI) conducted research on health spending for women in six poor districts and one city, Indramayu (West Java), Jembrana (Bali), Lebak (Banten), Lombok Tengah (West Nusa Tenggara), Sumba Barat (West Nusa Tenggara), Lampung Utara (Lampung), and the city of Surakarta. The budget analysis was done by identifying programmes and activities that were directly related to women's reproductive health and the reduction of MMR. The research covered only the budget for women's reproductive health in the areas of health and family welfare.

An overview of the budget allocation for health in the seven areas can be seen in Table 1. The results show that only two of the seven districts/city, i.e., Jembrana (10%) and Lebak (10.7%), had actually fulfilled the mandate of Health Law No. 36/2009 to allocate a minimum of 10% of the local budget (Anggaran Penerimaan dan Belanja Negara or APBD) for health programmes. The decision of the governments of Jembrana and Lebak was striking because the two districts were among the

² The Jampersal programme covers health check-ups for pregnant women, delivery services, post-delivery services related to blood clots, family planning services after delivery, and health services for the newborn baby.

³ See Health Law No. 36/2009, Chapter XV, Article 170-172 concerning Health Financing.

districts with the lowest fiscal capacities. Fiscal capacity is calculated as the percentage share of Net Regional Income (Penerimaan Asli Daerah or PAD) to total income. The higher a district is able to generate income from local sources, the higher is its fiscal capacity and the less dependent it is on the block grants from the national government (Dana Alokasi Umum or DAU). Having low fiscal capacity means that both Jembrana and Lebak had low PAD that could be used to finance local poverty reduction and development programmes. The fiscal capacity of Lebak was 10% while Jembrana's was only 7%, both far below the fiscal capacities of Indramayu (22%) and Surakarta (22%). Despite their meager income from local sources, they both made the political decision to use a significant portion of their budget to fulfill the Health Law mandate to allocate a minimum of 10% of the APBD for health programmes.

Table 1. Fiscal capacities and allocation for health spending, 2007

	Fiscal capacities of selected districts			Allocation for health spending		
	A Total Income (Rp. Million)*	B Local revenues (Rp. Million)	B:A Fiscal capacity (%)	Total (Rp. Millions)	% of APBD (local budget)	Per capita
Surakarta	590,132	129,910	22	37,155	5.8	65,934
Lebak	664,871	67,894	10	75,662	10.7	64,319
Central Lombok	571,075	54,123	9	42,725	7.1	51,740
Indramayu	959,915	210,877	22	73,646	7.3	41,838
North Lampung	542,889	59,647	11	43,593	8.0	74,857
West Sumba	395,144	37,421	9	38,098	9.0	95,182
Jembrana	378,668	26,668	7	38,887	10.0	151,043

Note: *Income consists of funds from the central government and local revenues generated from Net Regional Income (PAD) and Production Sharing Funds

Source: Noerdin (2011, p. 20)

Thus, limited fiscal capacities should not prevent local governments to allocate larger budgets for health programmes. If Jembrana and Lebak could meet this mandate, then the other three districts whose fiscal capacities were approximately equal to those of Jembrana and Lebak, Central Lombok (9%), West Sumba (9%) and North Lampung (11%), and Indramayu and Surakarta whose fiscal capacities were twice as much, could not claim fiscal limitations as a suitable excuse. It is not a higher DAU or PAD that is needed to save the lives of poor women, but the political will of the government to fulfill the Health Law mandate to allocate a minimum of 10% from the APBD budget for health.

The percentage of local budget is actually not an accurate measure of the budget needs for health because districts and cities have different population and budget sizes. We also need to pay attention to per capita health spending. As shown in Table 2, the percentage of budget allocations for health in Lebak and Jembrana was more or less the same, but because the total population in Lebak was much higher than in Jembrana without the APBD budget being proportionately bigger, the budget allocation per capita for health in the two districts was uneven.

If we use the MDG target to determine the budget threshold for health, the target is a budget allocation of Rp. 120,000 per capita. Lebak, which has a higher fiscal capacity than Jembrana, achieved just 50% of the MDG target. But Jembrana, whose fiscal capacity was the lowest among the seven areas, made a health budget allocation that exceeded the international target. It shows that the low fiscal capacity did not stop the government of Jembrana to prioritize spending on health.

1.2 A closer look at budget allocated to women's health services

Two of the seven research areas, such as Jembrana and Lebak, fulfilled the mandate of the Health Law to allocate at least 10% of the APBD for health expenditures. However, the budget allocations for specific programmes to improve women's reproductive health were relatively low, as

shown in table 2. It seems that the Health Law that promotes gender equality had not been able to make local governments allocate an equitable health budget, especially for maternal health, that is sufficient to assure the safety of women's lives in Indonesia.

Table 2. Share of budget for various women's reproductive health programmes to total, in %

Programme	North Lampung	Lebak	Indramayu	Surakarta	Jembrana	Central Lombok	West Sumba
Family planning	0.01	0.06	0.04	0.02	0.01	n/a	0.03
Youth reproductive health programme	0.004	0.00		0.03	0.01	n/a	
Contraceptive services programme	0.01	0.06	0.01	0.02	0.01	n/a	0.16
Training for community	0.01		0.04	0.002		n/a	
Training for family guidance counselors	0.01		0.01	0.002	0.002	n/a	
Gender mainstreaming		0.01				n/a	
Mother, infant and child health programme				0.01		n/a	

Note: n/a – not available

Source: Noerdin (2011, pp. 22-35)

2. Why do poor women in rural areas continue to die from childbirth?

According to data from the Indonesian Demographic and Health Survey, hemorrhaging and eclampsia were responsible for 52% of the deaths of women in childbirth in 2008.⁴ These medical conditions are both preventable, provided that the mother is assisted by a trained childbirth assistant in a childbirth facility that has adequate equipment and medical supplies, as well as the capacity to provide or refer to critical care and emergency services.

This was reaffirmed in a study conducted by the Women Research Institute (WRI) in six poor districts and one city, which indicated that childbirths that took place at home and were attended by a *dukun* often encountered difficulties, such as the lack of clean water, electricity for lighting, sterile space and equipment, and necessary medicines, which carry risks for the health and safety of the baby and mother (Noerdin, 2011).

A closer look at maternity health and services in the poor and remote areas confirms that 59% of all childbirths in the country occurred at home, while the remaining 41% took place at private and public maternity or health facilities (Nurjismi, 2008). According to the Indonesian Midwives Association (*Ikatan Bidan Indonesia* or IBI), a high rate of women in the rural and poor areas in West Nusatenggara gave birth at home. In the 31 poor and remote sub-districts in the province that had high occurrences of maternal mortality, 95.7% of all births took place at home, 85% of the mothers were assisted by traditional midwives (*dukuns*), and 32% of them were assisted by untrained *dukuns*. Only 2.6% of the births in the poor rural areas in the province occurred in hospitals.

The high rate of childbirth at home, the prevalence of untrained *dukuns* (traditional midwives), and the occurrences of hemorrhaging and eclampsia in the poor and remote rural areas in Indonesia are products of multiple causes. In the following sections, we will examine some of these causes, including insufficient number and poor quality of adequate community health services, concentration of health workers in urban areas, and severe road conditions that prevent easy and fast access to adequate health facilities.

⁴ The Director for Maternal Health Services in the Directorate General's Office for Community Health in the Ministry of Health, Dr. Sri Hermiyanti, reported that the Indonesian Demographic and Health Survey (Survei Demografi dan Kesehatan Indonesia or SDKI) indicated that in 2008 the primary causes of death were hemorrhaging (28%), eclampsia (24%), infection (11%), prolonged delivery (5%), and abortion (5%). (Kompas, 2010)

2.1 Poor quality of community health centers and services

Legislative Resolution No II/1983 concerning the Outlines of State's Direction (Garis Besar Halauan Negara or GBHN) mandates the government to establish health service facilities to raise the quality of health of society in general. This mandate concerns the provision not only of medical equipment and health facilities, but also of high quality service that is affordable and accessible to society.

Table 3 shows the hierarchy of health services from the level of households to hospitals. Hospitals are managed by the provincial government, the district government or private companies. In comparison with the other health service facilities, hospitals are the most complete in terms of services and personnel, which include general practitioners, specialists, dentists, nurses, *bidans*, pharmacists, nutritionists, medical technicians, and sanitation specialists.

Services for women's health provided in the hospitals cover nutritional monitoring for expectant mothers, pregnancy examinations, childbirth assistance, postpartum recovery, reproductive health services, and administering of contraceptives. In addition to these services, the public regional hospitals (Rumah Sakit Umum Daerah or RSUD) also provide reproductive health services, including treatments for reproductive organs, infertility, family planning, and dissemination of information through the Communication, Information and Education (Komunikasi, Informasi dan Edukasi or KIE) programme.

Table 3. Hierarchy of health services

Level	Component or element of health service
Household	Treatment by the individual or family
Community	Treatment by community or health workers of <i>Posyandu</i> and <i>Polindes</i> .
Primary-level health service facility	<i>Puskesmas</i> , <i>Puskesmas Pembantu</i> , <i>Puskesmas Keliling</i>
Primary referral level	District hospital
Secondary referral level	Hospital class A or B

Source: Noerdin (2011, p. 84)

At the subdistrict level, health services are provided by the public community health center called *Puskesmas*. Currently there is one *Puskesmas* in every sub-district in Indonesia. The *Puskesmas* serve as a center for the development of community health, promotion of a healthy lifestyle, and provision of a comprehensive, integrated, and quality health services.⁵ *Puskesmas* are located in the urban areas at the sub-district level and most of them are adequately equipped with health facilities and are attended by doctors, midwives and nurses.

To bring health services to the people in the villages and hamlets, the *Puskesmas* is supported by the *pustu* (sub-community health center) and mobile *Puskesmas* (*Pusling*). *Pustu* is smaller than *Puskesmas* and it covers one or two hamlets with a population of 2,500 (outside of Java) to 6,000 (Java and Bali) people. In 2007, there were 60 *pustus* in West Sumba. Since the population of the district was 400,262 people, one *pustu* served 6,671 people. To achieve the ideal ratio, the district needed 100 more *pustus*.

Pustus provide the best possibilities for medical care for the poor in communities that are far from a *Puskesmas*. However, as the Health Department admitted, *pustus* in general were poorly staffed. Usually, there is only one *bidan* or nurse who also takes care of the administrative work. When the *bidan* or nurse is away to provide services or to go the sub-district center or to the *Puskesmas*, then the *pustu* must close and patients must return later for treatment. *Pustus* are not yet effective in extending medical care to the villagers, let alone to pregnant women.

In the rural areas, women assist the government in implementing health-care services at the community level by participating in the *Posyandu* (integrated services post) and the *Polindes* (village maternity house) programme. These are hybrid labour-. Each hamlet is required to have a *Posyandu*.

⁵ *Puskesmas* have five Health Promotion (*Promkes*) programmes consisting of a) Environmental Health (*Kesling*); b) Mother and Child Health (Kesehatan Ibu dan Anak or KIA), including family planning; c) Nutritional Improvement; d) Control of Infectious Diseases; and e) Treatments.

However, *Posyandus* are not designed to provide childbirth services. *Posyandu* sessions are held once every month in each hamlet, usually between 9 a.m. to 12 noon. A *bidan* and a nurse from a nearby *Puskesmas* come to run the *Posyandu* sessions by providing health check-up to pregnant women and infants. *Posyandu* is not a replacement for reproductive services for women provided by *Puskesmas*.

On the other hand, *Polindes* in the villages provide services that are similar to those provided at the *Puskesmas*, i.e., healthcare for mothers and children, family planning, immunizations, and childbirth assistance. *Polindes* is designed to have a resident *bidan* and adequate facilities for pregnant women to give birth and recover.

However, the reality of *Polindes* is far from its ideal design. The reason why *Polindes* currently cannot spearhead the effort to reduce MMR is the poor condition of the buildings and inadequate facilities. The village *bidan* in North Lampung complained about the small size of the *Polindes* building, measuring 2x3m, inadequate facilities for examining patients, and the lack of electricity and clean water. The government provided only medicines and basic equipment for medical treatments and the village *bidan* must supply the other needs herself.

Of the 100 *Polindes* in Central Lombok, 37 were damaged and needed repairs. According to a village *bidan*, although the remaining 63 *Polindes* were not damaged, they lacked furnishings and medical equipment for providing delivery services. Many *Polindes* did not have running water, electricity or bathrooms. Many of them only had one examination room and a bed thus, they can accommodate only one patient at a time.

On top of these, many *Polindes* were located in unsafe remote areas. Since *Polindes* is built on communal land, the community or the village administration tends to use unproductive land with low commercial value that is located far from the village residencies. According to one village *bidan*, several *Polindes* were situated in an abandoned cemetery. The remote locations of the *Polindes* make it difficult for the village *bidans* to live there.

WRI found out that the *Polindes* in the Gerunung subdistrict in Central Lombok was empty and deserted. Similarly, the *Polindes* in Ketare village had been empty for four years and the building was damaged. When the *Puskesmas* finally appointed a *bidan* to Ketare village in 2007, she did not live in the *Polindes*. Although she carried out her duties in Ketare, she lived in Sengkol village, which was the Pujut sub-district center. She went to Ketare only for the scheduled *Posyandu* activities and when there were villagers that needed her services. According to the villagers, the *bidan* did not live there because she did not feel safe and the *Polindes* building was not suitable for residence.

To solve the problem of the persistence of high MMR, the *Polindes* should be made suitable for living and provided with adequate equipment and facilities, human resource support and budgets.

2.2 Uneven distribution of health workers across districts

The high number of *dukuns* attending births at home in poor and rural areas is not caused by a scarcity of *bidans*. While there were almost 71,000 villages in Indonesia, according to the IBI there were actually more than 83,000 *bidans* available in 2006. This means that there were more *bidans* than villages in Indonesia.

The problem was that *bidans* were not equally distributed across districts and cities, and within a district/city they tended to cluster around *Puskesmas* at the subdistrict level and at hospitals in the urban areas. Although data regarding the exact unequal distribution of midwives between urban and rural areas are not available, data on the percentage of delivery services provided by midwives indicate the unequal distribution. Data from the ministry of education shows that in 2007, 64% of all deliveries in the urban areas were conducted by midwives, while the percentage for the rural areas was only 46% (Ministry of Education and Culture, 2010, pp31-32). The government has yet to issue a policy to provide sufficient financial incentives for *bidans* to live in villages, especially those in remote areas. The more isolated the village, the higher the MMR. The MMR in Papua, the most sparsely populated and geographically challenging big island based on data from the provincial office of the Ministry of Health, was 364 deaths per 100,000 live births in 2007 (Yomo, 2014).

The unequal distribution of health workers has caused severe shortages of health workers in poor and remote districts in Indonesia, as shown in Table 4. The shortage was calculated by looking at the ratio of the actual number of health workers in the field and the ideal number of reproductive services health workers. The shortage percentage shows the gap between the actual and the ideal number of reproductive health workers. For different reasons, the city of Surakarta and the district of Jembrana fared better than the other five poor districts. Surakarta did not experience such dramatic shortages of reproductive health workers because it was mostly urban in character and it was able to produce and attract health workers to live in the area. Surakarta even had a high surplus of nurses. Meanwhile, Jembrana is a poor district that has made budget allocations to make education and health services free for all residents (Prasojo, 2014). These policies are the likely reason why the district suffered much lower rates of health worker shortages than the other poor districts.

Table 4. Shortages of reproductive services health workers (%)

Districts	Doctors, general practitioners	Midwives	Nurses
Surakarta (City)	- 35.0	- 60.0	+ 142.0
Lebak	- 81.3	- 82.3	- 81.8
Central Lombok	- 87.6	- 79.5	- 54.5
Indramayu	- 86.7	- 73.3	- 55.5
North Lampung	- 80.0	- 70.0	- 60.0
West Sumba	- 69.3	- 58.7	- 50.6
Jembrana	- 27.0	- 47.0	- 27.0

Note: Data availability varies from 2004 to 2007.

Source: Author's own estimates based on data in Noerdin (2011, pp. 39-81).

The central government is currently attempting to overcome the problem of the limited number of health personnel by introducing the Temporary Employee Programme (Pegawai Tidak Tetap or PTT) that provides attractive financial and career incentives for doctors and midwives. However, since the policy only reaches down as far as the sub-district level, it fails to encourage doctors and midwives to live in villages, let alone in remote villages. There have been no integrated policies to provide midwives in the villages with decent housing and health facilities that are adequately equipped and have electricity, clean water and sanitation.

2.3 Bad roads and high transportation costs inhibit access

Government policies and budget allocations have created a skewed distribution of health workers in favor of urban areas, either at the city or sub-district level. The unequal distribution of health workers has been made worse by the transportation divide that makes it difficult for poor women living in remote villages to access the better reproductive health services offered by hospitals at the provincial, district and city levels and by *Puskesmas* at the sub-district level. The roads they must travel to get there were in poor condition and transportation were neither easily available nor affordable.

Table 5 shows that the five poor districts were not able to maintain the quality of their roads. The Lombok Tengah and Sumba Barat districts fared the worst by having less than 30% of their roads in good condition. Meanwhile, around half of the roads in Jembrana and Lombok Tengah districts were either damaged or heavily damaged. This was in contrast to the city of Surakarta where, due to its urban character, damaged and heavily damaged roads came to less than 10%.

The bad quality of roads contributed to the development of the transportation divide in WRI's six research areas. Data presented in Figures 1, 2 and 3 shows the prevailing perception in poor districts that hospitals and *Puskesmas* were not easy to access because of long travel distances that consumed time and involved high transportation costs. The fees for transportation were influenced by a number of factors, including distance to the hospital, condition of the roads, and the availability of transportation. Only poor women in the city of Surakarta had easier access to hospitals and *Puskesmas* because Surakarta was an urban area that was able to maintain the good condition of its roads.

Table 5. Road conditions in six districts and one city, 2011

	Good (%)	Slightly damaged (%)	Damaged and heavily damaged (%) *
Lebak district, Banten	n/a	n/a	n/a
Indramayu district, Jabar	48.77	25.95	25.21
Surakarta city, Jawa Tengah	57.90	33.26	8.82
Lampung Utara district, Lampung	35.75	20.38	43.85
Jembrana distict, Bali	38.56	11.77	49.65
Lombok Tengah district, NTB	26.06	23.80	50.12
Sumba Barat district, NTT	25.57	31.52	42.89

Note: n/a – not available

Source: Seksi Statistik Neraca Wilayah dan Analisis. (2012). *Lombok Tengah dalam Angka 2012*. Lombok Tengah: Badan Pusat Statistik Kabupaten Lombok Tengah; Seksi Integrasi Pengolahan dan Diseminasi Statistik (Ed). (2012). *Indramayu dalam Angka 2012*. Indramayu: BPS Kabupaten Indramayu; Badan Pusat Statistik Kabupaten Jembrana. (2013). *Jembrana dalam Angka 2013*. Jembrana: BPS Kabupaten Jembrana; Seksi Integrasi Pengolahan dan Diseminasi Statistik (Ed). (2011). *Surakarta Dalam Angka 2011*. Surakarta: Badan Pusat Statistik Kota Surakarta dan BAPPEDA Kota Surakarta; Seksi Integrasi, Pengolahan, dan Diseminasi Statistik (Ed). (2012). *Lampung Utara Dalam angka Tahun 2012*. Lampung Utara: BPS Kabupaten Lampung Utara; Saksi Neraca Wilayah dan Analisis Statistik (Ed). (2012). *Sumba Barat Dalam Angka Tahun 2012*. Sumba Barat: BPS Kabupaten Sumba Barat.

The research by WRI on “Access and Use of Reproductive Health Service Facilities for Poor Women in Seven Districts/Cities in Indonesia” combined qualitative and quantitative research methods to provide an integrated illustration of the problems faced by impoverished women in accessing and using reproductive health care facilities. The quantitative research was conducted through a survey involving 300 respondents in each of the six districts and one city, which came to a total of 2,100 respondents. To complement the results of the quantitative research, WRI also used qualitative research methods by conducting in-depth interviews of 30 people in each district and city (totaling 210 people) and organizing Focused Group Discussions (FGDs) in each area. Each FGD involved 30 people, bringing the total number of participants to 210 people.

The results of WRI's quantitative survey, in-depth interviews and FGDs showed that for poor women living in remote areas, transportation costs to go to a hospital or Puskesmas could be as much as their day wage. In Jembrana, the local health insurance system that provided coverage to all residents did not cover transportation costs. In Central Lombok for example, the distance between Sengkol village and the Puskesmas in the Pujut subdistrict center was 30 km. Ketare village was closer, but the Puskesmas was still 4 km away. Travelling on public transportation, either on a *beno* or *ojek*, usually took 90 minutes to reach the furthest hamlets.

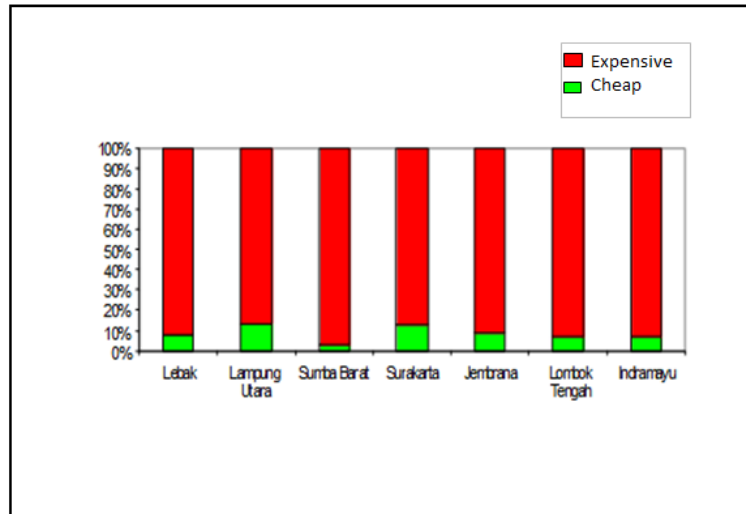
Figures 1 to 3 show the result of WRI's quantitative survey on the perception of poor women regarding the costs and distance to go to hospitals and Puskesmas. The percentages show the share to the total number of respondents to the survey questions. The three figures show that the distance and length of time needed to reach the Puskesmas made the cost of transportation expensive. Marjah and several other women from Ketare village complained about the expensive transportation costs.

"It is difficult for us to find income to feed our family. For us the ojek transportation cost is just too expensive... If they aren't really sick, I don't take my family members to the Puskesmas. They just need to rest a lot at home and they'll get better." (Marjah, 2007)
"For that much money, it's better that I use it to buy food than to go to the Puskesmas."
(Marian, 2007)

These statements show that transportation costs were a heavy burden for poor families. The fee for an *ojek* (motorcycle taxi) from the most remote hamlets in Ketare and Sengkol village to the nearest healthcare facility ranged from Rp. 5,000 to Rp. 30,000, more or less an equivalent of one day's wage for a female labourer in the rice fields. In the North Lampung district, the cost of transportation going to the hospital in the Kotabumi subdistrict center came to around Rp. 2,000 to

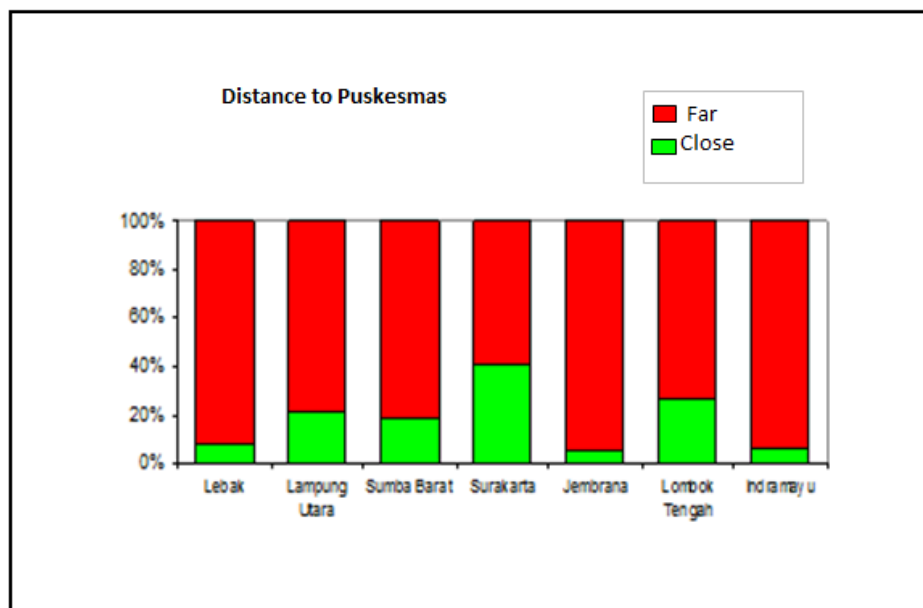
Rp. 20,000, depending on the distance and mode of transportation. Although the government and privately run public hospitals provided free pregnancy examinations, childbirth, medical treatments for illnesses, immunizations, and family planning services for Askeskin (health insurance for the poor) cardholders, the women said that they hardly went to the hospitals because they did not want to spend their money on transportation.

Figure 1. Women's perception of the cost of transportation to hospitals



Source: Noerdin (2011, p. 88)

Figure 2. Women's perception of the distance to Puskesmas



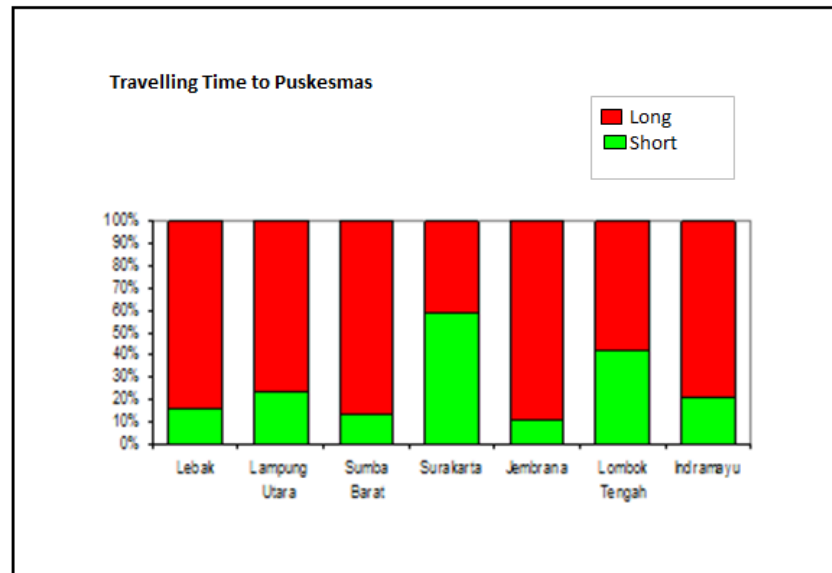
Source: Noerdin (2011, p. 89)

Women in the Hanakau Jaya research area in the Sungkai Utara sub-district and in Tulungmili, both in North Lampung district, said that they were reluctant to go to the hospitals because they must wait for a long time for the bus that only came twice a day. On top of that, in order to get to the bus stop they had to walk along isolated pathways that ran across the vast plantation area where robberies often took place. Therefore, women were often not allowed to leave their homes on their own for safety reasons.

In West Sumba, limited public transportation was a major problem for people living in the

villages. Almost 50% of the land area was hilly with slopes as steep as around 14°- 40°. Because of the topography, the residents of West Sumba had traditionally built their villages on top of the hills to protect themselves from enemies, thieves and wild animals. Presently, many people have started to build houses in the lowlands but they still kept their traditional houses on the hills. The villages on the hills were far from the government centers in the lowlands. Kodaka village, for example, was 7 km away from the administrative center of Waikabubak sub-district.

Figure 3. Women's perception of the travel time to *Puskesmas*



Source: Noerdin (2011, p. 90)

Some hamlets could be reached by *ojek*, but there were many others where people had to go on foot to get there. Women from these villages had serious difficulties in accessing health service facilities. To reach the *Puskesmas*, poor women must walk down from their villages for 4 km at most. Women in rural areas in West Sumba were accustomed to walking great distances, but not when they were at their later stage of pregnancy. At the beginning of their pregnancy, they walked up to 4 km to go for medical examinations by health professionals. As their pregnancies advanced, the poor women chose to be examined by a *dukun* in their village, who also provided a service package to assist in childbirth. *Puskesmas* were simply too far and transportation was neither readily available nor affordable.

Gaura, a village in the Lamboya sub-district that was 48 km away from the Waikabubak sub-district center, presents another example of public transportation difficulties. The winding road to and from this village had sharp turns and it ran along the edge of a deep ravine. Only trucks dared to pass through the heavily damaged roads to carry passengers. The roads were very slippery and dangerous when it rained. Although the fee to ride the truck, which was Rp. 5,000, was considered inexpensive, most pregnant women did not dare ride on the truck to go to the *Puskesmas* in Kabukarudi village. Other than trucks, *ojeks* were also available to go to Waikabubak. But the cost was Rp. 100,000 for a one way trip and it was considered way too expensive.

The results of WRI's research also indicated that poor women in the six districts considered it difficult to access *bidans* since *bidans* tended to cluster in urban areas. Only in the city of Surakarta did the majority of respondents say that a *bidan's* practice was easily accessible. In the other areas, conditions were much worse.

Because *bidans* were not accessible, poor women such as Paile Deke (2007) from Kalembu Kuni village in Waikabubak used the services of the cheaper and more accessible *dukuns*. Four of her children died either in childbirth or shortly after birth. Wini Mude (2007) from the same village also used the services of *dukuns* and had suffered two miscarriages. Those poor women living in remote areas did not have other alternatives because health services at the community level were neither staffed with competent health workers nor adequately equipped to provide safe childbirth assistance.

3. Case studies: Sumba and central Lombok districts in West Nusatenggara province

The three case studies were part of a series of case studies conducted by WRI to complement the survey, in-depth interviews and FGDs. The case studies were selected based on information about the plights of poor women in accessing reproductive services that WRI came across during the in-depth interviews and FGDs. Selected women were then interviewed further to get their detailed experiences and WRI researchers also conducted background checks on the local condition of reproductive services. The combination of quantitative and qualitative methods and case studies is expected to provide a comprehensive picture of the problems faced by poor women in accessing and using reproductive health service facilities. The three cases outlined below state for more transport services, low cost and accessibility of health services.

3.1 Case Study 1: West Sumba: Rahel R. Dapa, Gaura village, Lamboya subdistrict

Rahel R. Dapa was born on October 5, 1984 in Gaura village, Lamboya subdistrict, West Sumba District. At a relatively young age she had had four children, one of whom died not long after the baby was born. Rahel admitted to getting married at a very young age because her family's poverty had forced her to get married quickly. Her husband was a farmer and Rahel, after taking care of her family and her children, helped her husband plant vegetables in their garden. The produce from their garden was the income source for their family.

When she gave birth to her youngest child, Rahel just summoned a *dukun* in her village. She did not want to ask for the help of a midwife. However, the childbearing was very difficult. The convulsion and stomach ache lasted for almost two days. When she was dying, she remembered that a similar incident had fallen upon her adjacent neighbor who died because of excessive bleeding. Unable to bear the pain, Rahel told her husband to summon a midwife. Before the midwife arrived the baby was safely born but the bleeding on the oviduct did not seem to stop. Rahel was dizzy and her body became so feeble, and the last thing she could remember was the hysterical screaming of the *dukun* because the bleeding would not stop.

When the midwife came, she gave some injections and told Rahel's husband to find a vehicle to take Rahel to the *Puskesmas*. It was very difficult to find a vehicle. Gaura village is located on a mountainous area. It took two hours to reach the *Puskesmas* through damaged and steep roads. The only means of transportation was a truck that operated just once a day. Other than the truck, people use *ojek* for a fare of Rp100,000. It was quite impossible to take a dying patient on an *ojek*. In some referral cases, bleeding women died on the way to the hospital because of the bad road conditions and long travel time.

After failing to take her to the *Puskesmas*, the midwife succeeded in getting help from another midwife. For almost four hours the two midwives struggled to stop the bleeding. Slowly the bleeding stopped and Rahel's life was saved.

3.2 Case Study 2: Central Lombok, Mariam, Ketare village, Central Lombok

Mariam was born 40 years ago in the Embung Rungkas hamlet in Katare village. During the time of the interview, she had six children and was still breastfeeding her youngest, a 9-month old baby. Mariam admitted to having been pregnant eight times, but one of her children died at the age of 50 days while another died when it was still in the womb. Out of the eight pregnancies, seven got medical check-ups and their births were assisted by the *dukun* in her hamlet. Only one of her children was born in the *Puskesmas*. Although it was free of charge, there were other expenditures much bigger than the cost spent for a *dukun*'s assistance. After that, Mariam never gave birth in the *Puskesmas* again.

When she was pregnant with her fourth child, Mariam had a miscarriage. For one week she bled heavily and for two days after that she could not walk because of a terrible pain in the upper part of her vagina. However, her suffering did not relieve her of doing household chores. Mariam still had to wash her blood-stained clothes and cook for her husband and children.

When giving birth to her last child, Mariam had a horrible colic for one day and one night, causing pain and cramp on her stomach. The pain made her think of not having more children but she

could not do anything about this because she could not pay the Rp15,000 for the contraceptive injection. She thought it was better to use the money to provide food for her family.

A *dukun* was summoned to help with the childbearing. Arriving at Mariam's house, the *dukun* told Mariam to take a sitting position. The *dukun* said that sitting down would make it easier to deliver the baby. After giving birth, Mariam bled for seven days. The pain and cramps in her vagina made her unable to walk for three days. On top of that she had high fever for two days and her breasts were swollen.

There were no midwives in Ketare village and the Puskesmas in Sengkol was 7 km away. The distance from her house to the highway was 3 km and an ojek would cost Rp. 5,000. From the highway, she would need to take public transportation for Rp. 2,500. This means that to get to the Puskesmas and back Mariam would have to spend Rp. 15,000, which was more than what her husband earned for a one day work in the field. So it was quite impossible for her to have regular medical checkups.

3.3 Case Study 3: Lebak, Salima Pasir Tanjung Village, Rangkasbitung subdistrict, Lebak district

As soon as Salima realized that she was pregnant, she went to the midwife in the *Posyandu* for a medical check-up. She had her pregnancy checked by the midwife on a regular basis every month. But when she was four months pregnant, she started to go to the *dukun* instead, a common thing to do in the village. Her decision to go to the *dukun* was because of the difficulty of accessing midwives. The village midwife who was assigned to work in her village lived in the urban area. She could see the midwife only once a month during the *Posyandu* activities. According to Salima it was very rare to see a midwife in their village.

The unavailability of midwives in her village made Salima look for other midwives in the neighboring villages or in the city. The distance between her village to the neighboring villages was around 2 km and there was no public transportation available. She would have to use an *ojek*, which was very difficult to do when she was pregnant. Salima's village was located in a mountainous area with steep and winding roads. Most of the roads were not asphalted and were very slippery during the rainy season. Moreover, the road passed through forest and plantation areas which were not safe. Another reason that made it difficult for Salima to visit a midwife was the high transportation cost.

When she gave birth, Salima was attended by a *dukun*. For her second childbirth, she also looked for help from a *dukun*, although she had heard and known that a childbirth assisted by a midwife could be free of charge if she used a Gakin insurance for the poor card.

In remote villages in Indonesia, there are usually no midwives who live in the village. Midwives cluster in the subdistrict and urban areas. The three case studies show that distance, transportation and transportation costs, and bad road conditions had left many women with no options other than to go to a *dukun* when they gave birth. Policy to ensure the distribution of midwives to remote villages is as important as budget allocations to improve road infrastructure and public transportation.

4. Conclusions and policy recommendations

This article has highlighted the fact that lower fiscal capacities of a district cannot be blamed for the meager budget allocation for women's reproductive health services. When there is political will of policymakers, even poor districts facing fiscal constraints could provide higher budget allocations to address women's reproductive needs. It is also important to bear in mind that the unequal distribution of reproductive health workers, especially midwives, between urban and rural areas has made it difficult for poor women living in remote rural areas to access reproductive health services. It is important for the national and local governments to issue policies to provide incentives for reproductive health workers to live in the rural and remote areas. The access barriers faced by rural poor women consist of the actual distance to the closest adequate reproductive facilities, the amount of time it takes to go to the facilities, and the costs they have to pay. Bad road conditions exacerbate the enormity of distance, time and costs.

When it comes to efforts to reduce MMR, most academicians, policymakers and women non-governmental organizations (NGO) activists focus their attention on the capacity, quality and availability of reproductive health facilities and workers. Meager budget allocations for reproductive health services at the national and local level are often viewed as the root cause of the inadequate reproductive health services.

While this article supports the view that budgetary allocations are one factor contributing to Indonesia's high MMR, other factors such as distance, transportation costs and road quality should also be considered. Since a large part of the Indonesian population still live in the rural areas, the government, women activists, and the public at large have to start including the transportation divide as a serious obstacle to the reduction of the high MMR in Indonesia. It is still common for budget advocacy activists to criticize the budget allocation for the development of road infrastructure, and to advocate for more to be spent on reproductive programmes and services and not on road development. What is needed is an integrated approach including budget allocation for both health services provision and transport development, as well as policies to encourage more health workers to address rural women's needs.

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Transport services in the Maldives – an unmet need for health service delivery

Maimoona Aboobakuru⁶

Abstract

The article aims to look at the use of transportation in the delivery of health services in the Maldives. Being a small island nation with thousands of tiny islands scattered in a vast area of sea, transportation is an important factor for equitable access to services. Providing services to a great majority of islands with small population sizes has proved challenging and resource intensive. The diseconomies of scale, and retaining and sustaining the health-care work force have continued to be major challenges.

The government of Maldives stayed committed to improving the health situation and the steady focus it has given to maternal and child health fared well for the overall health development. The maternal death review process initiated in the 1990s and efforts to improve on the process resulted in addressing specific care related needs. Maldives achieved the Millennium Development Goals (MDG) 4 and 5 well ahead of the targeted time frame. The Maternal Mortality Ratio (MMR) declined from a high of 500 per 100,000 live births in 1990 to less than 50 per 100,000 live births at present.

However, the lack of an organized public transport system increased the burden for the equitable provision of health care and was a setback to the 4-tier referral health care delivery system. The health sector approach of mobile outreach did not prove sustainable due to the high cost of maintenance and therefore continued with increased diseconomies of scale in providing health care to the sea locked small populated communities.

Keywords: public health, transportation planning

1. Introduction

1.1 Brief profile of the country

Located in the Indian Ocean 600 km south of the Indian sub-continent is the archipelago of the Maldives (Figure 1). It consists of 1192 tiny coral islands that form a chain stretching 820 km in length and 120 km in width. These islands cover a geographical area of approximately 90,000 square kms of which land area comprise only 300 sq kms. The islands form 26 natural clusters (atolls) which are grouped into 20 administrative atolls. The islands are surrounded by varying levels of sea and access to the islands is by the sea route. The islands and the atolls are mainly connected by boats.

With a population growth rate of 1.7% based on the latest estimates from the 2006 census, the Maldives has passed three phases of demographic transition (Ministry of Planning and National Development, 2008). The high stationary stage where birth rates and death rates were high prevailed through the 1960s (Figure 2). Death rates started to fall with the introduction and establishment of organized health care services under the primary health care approach. The 1970s and a major part of the 1980s saw a rapid increase in population growth. Total Fertility Rate (TFR) remained high at around 6 to 7 children per women during the period. A family planning programme was initiated in the early 1980s and rolled out to the islands throughout the country. TFR fell to 5.4 children between 1995 and 2000. Currently, the TFR is at 2.5 children (Maldives Demographic and Health Survey, 2009).

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Figure 1. Map of Maldives

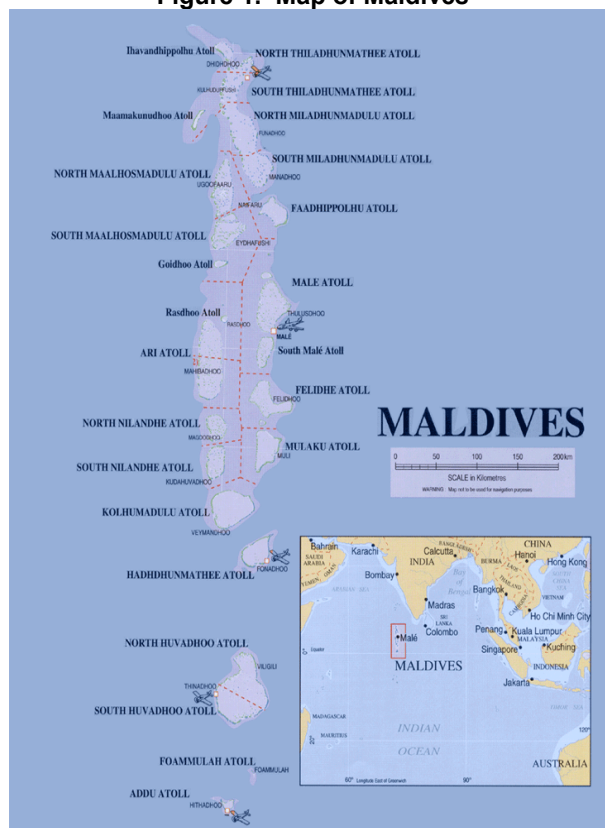
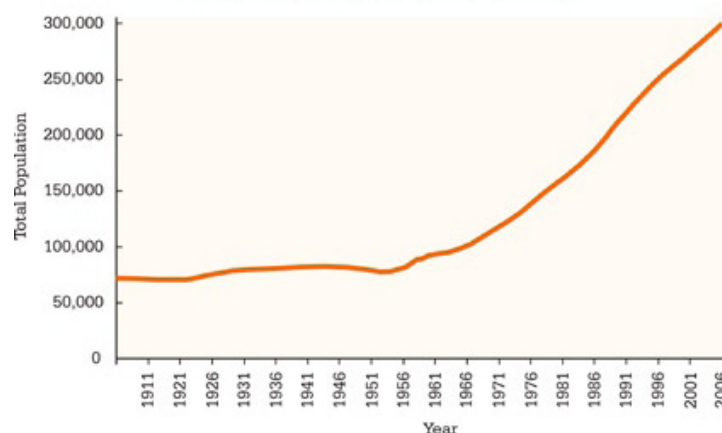


Figure 2. Population of Maldives 1911-2006



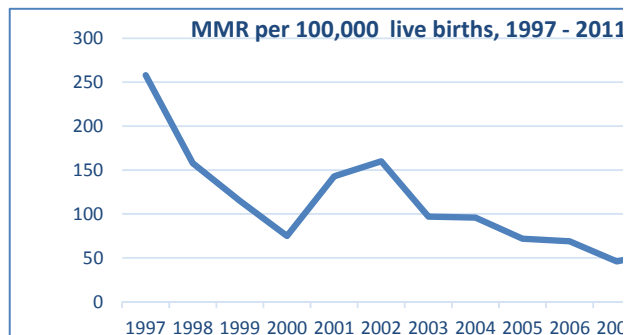
Source: Population and Housing Census, Maldives (2006)

Remarkable progress has been achieved in the health status of Maldivians during the past few decades. Life expectancy at birth rose from a low of 50 years in 1980 to 70 years by 1995. From the early 1990s female life expectancy was noted to have increased slightly. Currently the female life expectancy has reached 75 years while that of males stands at 73 years (Ministry of Health, 2012). Child mortality declined four folds between 1990 and 2010. Currently, under five mortality and infant mortality stand at 11 and 9 per 100,000 lives respectively. The MDG target for child mortality was reached about 10 years ahead of the target date. Maternal mortality, though at a slower rate, also fell from 257 per 100,000 live births in 1997 to 57 per 100,000 live births in 2011 (Ministry of Health, 2012).

1.2 Maternal health and maternal health care services

Maldives was one of the first countries in South Asia to achieve MDG 5. Significant improvements in maternal health have been seen over the years. This is evident from the falling rates of maternal mortality. Maternal mortality in 1990 was recorded at 500 per 100,000 live births. The MDG target for reaching MMR of 125 per 100,000 live births was achieved by the early 2000s (Figure 3). Access to health services improved. The antenatal care (ANC) coverage has been raised to 90% of pregnant women making their first ANC visit during the first trimester and 85% of women having had 4 or more antenatal check-ups (Ministry of Health and Family, and ICF Macro, 2010). Almost all women (99%) received antenatal care by a skilled birth attendant.

Figure 3. Maternal mortality ratio per 100,000 live births, 1997-2011



In the Maldives, 95% of the deliveries occur at health facilities and thus, 95% of births are attended by a skilled provider (Skilled provider includes gynaecologist, doctor, nurse midwife or community/family health worker). Such improvements have been the result of the government's commitment for providing access to better services as well as the socioeconomic development that has occurred during the past few decades. The total fertility rate that stood at around 6 children in the early 1980s has fallen to 2.5 children in 2009. The patterns of age-specific fertility rates (ASFR) have shown increased age of child bearing. The ASFR peak of 20-24 years in the year 2000 increased to 25-29 years in 2006 (Ministry of Planning and National Development, 2008). Equal opportunities for men and women for education and other social development policies have led to the improvement in the maternal health situation. Women fared better in the achieved literacy rates and are therefore better oriented in health awareness and health care seeking.

Maternal and child health (MCH) has always been given high priority within the health care set-up. Maternal health services are organized under the 4-tier health care delivery system. Services are provided at all levels within the MCH and reproductive health services. Antenatal care and basic obstetric care is available at the lowest level (island level) health centers most of which are manned by a medical officer, nurses and community health workers. The second level (atoll level) includes emergency obstetric care services and serves as the first referral to the island level. Regional hospitals in 6 strategic locations in the country are the 3rd referral facility where more specialty services are available. Tertiary level services are available at the central level hospitals in Male, the capital city of the Maldives.

Maternal health services are provided free and even after the implementation of the universal health insurance scheme, the policy is not to charge for these services in the allotted insurance premium.

1.3 Objectives

This report is aimed at analyzing the use of transportation in the delivery of health services in the Maldives. Maldives being a maritime nation whose territory is 90% water, people of the Maldives highly depend on sea transport for accessing services as well as trading goods and other commuting needs. In the absence of an organized public transportation system, the health sector of the Maldives has invested in extending health care services to the remote but very small communities, resulting to high diseconomies of scale.

Information compiled in this article is based on review of available documentation, service records and information gathered through interviews carried out with experienced personnel who have worked in the health sector, specifically in the maternal and reproductive health services. The personal experience of the author who has been in the planning and implementation of health care services and has been involved in the monitoring of health care situation was an added advantage. At the same time, the non-availability of documentation on management of health care services is a limitation for bringing out a better picture of the health services situation.

2. Factors and related interventions contributing to recent reduction in maternal deaths

Health care services began to be established at various parts of the country in the 1960s. Prior to this health care was only available at a small hospital established in Male with a couple of doctors and a few nurses. The island communities lived a very remote and isolated life confined to their closed community. Remedies to ailments were provided by the local healers who practiced traditional medicine. Health care in the atolls was first established with the construction and equipping of a small health center facility in a few islands targeted for high populated areas. Health services gradually expanded to all parts of the country and today health center facilities are available in all inhabited islands. Following are the most probable factors and service developments that have contributed the most to the improvement of maternal health and subsequently lower maternal mortality.

2.1 Midwifery service and training

At the time when very few of these facilities were delivering health care, antenatal and maternal health care was provided by the traditional birth attendants (TBAs) who were always a frequent friendly visitor to families and homes. These TBAs were provided with delivery kits with minimal tools for a clean home delivery in the early 1970s, and were given instructions on how to use them. A training programme for the TBAs was initiated shortly after, conducted by teams travelling to locations close to the trainees. A formal 6 month training course was developed later and TBAs from across the country were trained in batches. The trained TBAs were later employed by the government as bonus for service continuity. TBAs were trained on the basis that every 500 population is served by at least one.

Prior to the development and improvement of atoll level health facilities, training for community health workers included a strong midwifery module. The community health workers managed the health center facilities and played a supervisory role for the TBAs and family health workers. With the development of regional hospitals and service expansion of health center facilities midwifery nursing took priority position in the human resource development policy of the government. Diploma level nursing training was established in the country in 1990 with compulsory midwifery component. Nurse midwives were deployed to island level health care centers and today most health centers are manned with nurse midwives.

2.2 Organization of referral health care mechanism

The community level based health care workers were to follow strict referral protocols. The TBAs were well instructed for early referral with indication of high risk and possible complications. Referral to higher centers means people have to cross sea to follow and comply. Referral was not easy due to the unavailability of an organized public transportation system. The referral mechanism was highly dependent on the availability of a boat and the willingness of the owner to make the trip. The difficulty eased as transportation needs for trade and other commuting needs of the people grew. The operation of the regional airports led to the operation of hired and paid transportation in the islands. Mechanized boats and speed launches that cater for airport transfers were useful for health care referrals.

The referral health care organization gradually resulted in the government facilitating the availability of vehicles of high speed capacity to every hospital in the atolls. The regional hospitals do not only wait to receive referral cases but also acted as an outreach service center that caters to the needs of the surrounding atolls and islands. Regular mobile team activities are conducted by community health care workers for immunization, health screening activities, including maternal and child health programmes, and health awareness activities. Each regional hospital is given the

responsibility of taking care of 2-3 designated atolls in the vicinity. The referral system prescribes all lower level health facilities in the region to report and take advice from the hospital and it is the regional hospital that would make arrangements and facilitate referrals that require help beyond the services available in the locality.

2.3 Expansion and strengthening of emergency obstetric services

Since obstetric emergencies are the main and most common emergencies, it was the emergency obstetric care that became the hub of the strengthening and expansion of services at the atoll level health care facilities. Emergency obstetric care was extended to the atoll population through the establishment of regional hospitals. The first regional hospital located in the far north of the country began its services in 1982. Development of regional hospital level facilities in other parts of the country followed suit shortly after and a total of 6 regional hospitals at strategic locations were functioning by end of 1990s. Each of the regional hospitals served a catchment area of 2-3 atolls and operated as the referral center for secondary level health care. Gynecology and obstetrics was the first specialty services provided at these facilities. Today the regional hospitals offer additional specialty care services.

Very early on the atoll level health center facilities provided basic obstetric care. Based on the size of the population the island level health post facilities were upgraded to health center level in additional islands of the atoll. The main health center facility which serves as the first referral point was located in the capital island of the atoll. The development today is that each island has a health center facility with capacity to provide basic obstetric care, manned by a medical officer, nurses and community health care workers.

Another major development to extend emergency obstetric care happened in the early years of 2000s. All health center facilities at the atoll capitals were upgraded to atoll hospitals targeting the provision of emergency obstetric care as well as new-born care. Thus gynecology and obstetrics and pediatric services were made available at closer proximity for the atoll population. Today, all atolls are equipped with at least an atoll hospital facility.

2.4 Standards for maternal and reproductive health care

Maldives is a country where majority of the medical professionals and other paramedics are expatriates who are usually in service for a short period of 1-2 years. Due to this high turnover of service providers, maintenance of service standards has to be given special attention. Service protocols and standard operating procedures, maternal and child health as well as reproductive health had been among the first developed. Written and printed protocols on ante-partum, intra-partum care are provided to all health facilities. However, the challenge of effective enforcement of the proper use of these protocols still remains. Training programmes and orientation sessions are conducted from time to time for in-service capacity building.

2.5 Monitoring of services and maternal mortality reviews

The maternal and child health (MCH) programme also pioneered the conduct of regular and close monitoring of services at all levels. In early 1990s, a reporting mechanism was initiated by the MCH programme to centrally monitor high risk pregnancies. When the TBAs became employees of the health care facility in their respective islands, health facilities started to keep records of pregnant women treated at the facility. The TBA, with the help and guidance of the family health workers, maintained these records. This helped the health facility keep track of the pregnant women and to make arrangements for scheduled visits. The TBA and the family health workers in the island conducted regular monitoring visits to all pregnant women. They made sure that all pregnant women are registered and that they follow the check-up schedules that they are given. This was not difficult for most of the health workers since they had to look after a small and manageable population size. Monthly reports are sent to the central level via the main atoll health facility. The atoll health facility is given the responsibility of leading any assistance required and to give advice. The central level monitoring enabled good and attentive provision of care at the local level.

During early 1990s, a maternal death auditing process was initiated in order to identify the causes and to reduce the preventive causes of maternal mortality. The auditing process that began

with a self-completed pro forma was taken over by a more comprehensive active maternal death auditing process that began in 1997. Since then all maternal deaths are notifiable and all health facilities are obliged to send in a report on the maternal death within 24 hours of occurrence. A maternal death review committee comprised of a senior gynecologist, physician, nurse midwife, representative from the MCH/reproductive health programme, representative from the health services management and representative from Health Management Information Systems (HMIS) was formed in the year 2000. The committee sits and reviews each single maternal death upon receipt of the reports from the place of occurrence. If additional information or documentation is required further enquires are made. After ruling out the possible cause of death, corrective action is recommended by the committee which is passed on to health facilities and the relevant authority for implementing the committee's recommended corrective action. Since the implementation of the death review process, the Maternal Mortality Ratio (MMR) dropped from 257 per 100,000 live births in 1997 to 46 in 2007 (Ministry of Health, 2013). Although fluctuations are seen in the annual trends due to the small ratio, there has been steady decline in MMR, which can be attributed to the close monitoring efforts and death reviews. A recent development in such monitoring for the improvement of maternal health services is the review being initiated on near misses of maternal mortality.

3. Role of transport services and costs

3.1 The transport systems in Maldives

The main modes of transport in the country are by sea and air. Need for land transport is minimal as most of the islands are very small. Almost 70% of the islands are less than 1 square km in size. All commuting between islands are dependent on sea transport. Having about 90% of the country's territory covered by sea, development of marine transport is vital to the country's economy.

3.1.1 Types and organization of sea transportation

The mechanization of sea transport vessels during the first half of 1970s was a breakthrough in the development of transportation in the Maldives. Prior to that, the commonest mode of commuting by the island communities was the sail boat, which today is used as a luxury sporting facility in the tourism industry.

The types of sea transport include mechanized locally constructed boats, speed boats and launches (Table 1). Most commonly used sea vessels are the wooden mechanized boats majority of which are fishing vessels. These are locally called 'dhoanis'. The Transport Authority of Maldives records a total of 6,293 dhoanis registered at the end of 2011 (Transport Authority of Maldives, 2014). The speed of these boats varies depending on the size as well as the capacity of the engine. Second in line are the fast speed launches of varying sizes used to carry people from place to place. While dhoanis are used for travel inter island in the locality for lower prices, the launches are mainly attached to tourist resorts for the transfer of tourists between airport and resorts. By the end of 2011, there were 2,083 launches in operation (Transport Authority of Maldives, 2014). The third and fourth types of vessels for people's travel are the 'boats' and 'baththeli', which are much larger in size and are the cargo-cum-passenger transport vessels built for long distance travel. These are the main means of commuting between atolls that are far from the capital city, for trading goods and other transport needs.

Table 1: Types of vessels for sea transport in use, 2011

	CATEGORIES	Number
1	Dhoani	6,293
2	Launch	2,083
3	Boat	521
4	Baththeli	155
5	Barge	130
6	Tug	32
7	Landing Craft	50

	CATEGORIES	Number
8	Dredger	5
9	Bokkuraa	1,234
10	Yacht	129
11	Catamaran	3
12	Manavaru	1
13	Jet Ski	1
14	Glass Bottom Boat	1
15	Passenger Ferry	2
16	Others	7
TOTAL		10,647

Source: Maldives Transport Authority (2011)

The 'bokkura' which takes the third place in number is a small dingy type dhoani used for loading and unloading goods and in some situations, people from the vessels to the shore or jetty. Since most of the harbor areas in the islands are shallow waters, the vessels have to be anchored further away from the jetty and these small boats are then used. These are also used for inter-island travel between nearby islands as well as for reef fishing.

3.1.2 Maritime transportation services

Regular and scheduled transport is rare in the case of maritime travel. Most of the sea transport services are privately organized and made available for hire and at the owner's convenience. Private boat owners operate the cargo-cum-passenger boats for travel between a particular atoll and Male. These travelling arrangements are quite popular and due to high demand it is found to be routine and frequent for larger islands. Based on demand and the population size, these operators make arrangements to stop over at other atolls along the route. Other islands only have the choice of early booking for travel and making their own arrangements to catch the boat in good time, which may involve hiring of locally available transport and arranging for accommodations at the place of departure.

a) Island Ferry Services, a recently initiated intra-atoll transport system

Some island communities, particularly few closer to Male, operate privately-owned regular ferry services for their commuting needs, such as trade, shopping, and health care. These island ferry services are usually scheduled once or twice a week. On a public private partnership basis, a transport network was initiated recently where interested operators were invited. Thus, a ferry transport system operating separately in each atoll was started in 2009/2010 by different operators. However, due to several management and other resource lags, the inter-island ferry services could not continue as intended. Only a few atolls currently operate the service.

b) Ferry services in greater Male

Regular and frequent ferry service is organized between Male and two nearby islands that are inhabited by the population in Male, the islands of Villingili (Villimale) and Hulhumale. The ferry service between these islands and Male is the means of transport for people who commute daily for work, school and other purposes. This ferry service is operated by the public company, the Maldives Transport and Contracting Company plc (MTCC). The MTCC which formed in December 1980 has been the first public company in the Maldives. It offers a multitude of services which include modern transport services, logistics operations, construction and project management services, and serves as a major vendor of reputed brands of heavy machinery, marine engines, compulsion systems and lubricants (Maldives Transport and Contracting Company (MTCC), 2014). The MTCC also operates occasion based launch ferry services to other parts of the country in addition to launches for hire.

c) Airport ferry service

The ferry service between Male and the airport is the longest established ferry service in the country. As the airport in the Maldives is located in a geographically separate island (Hulhule), the only transport means to access the airport is by sea.

Ferry services between Male and Hulhule, and Male and Hulhumale, now include an express ferry service by speed launches.

More organized system of sea transport in the Maldives is found to be associated with the development of air transport and the tourism industry. This is basically linked to the transfer of passengers to and from airport catering to both locals and tourists. These transport services are operated by private boat owners and resort owners in collaboration with the government owned Airports Company.

3.1.3 Air transportation

Regular air transport has been operating in 4 locations for the past couple of decades and has now expanded to 9 locations. The Island Aviation Services Ltd, a limited liability company established in April 2000 under a Presidential Decree, serves as the main operator of local air travel and the local airline, the 'Maldivian' (Maldivian maldivian.aero, 2014). The airline began international flights in January 2008, operating to nearby destinations in India and Sri Lanka. Two other companies, Villa Air and Mega Maldives now operate to select locations in the country as well as a few international destinations.

In addition, two companies, the Maldivian Air Taxi (PTE) Ltd and the Trans Maldivian Airways operate sea planes that cater to tourist resorts. Air travel is popular but quite expensive and travel by air has to be always accompanied by sea travel except for those residing in the island where the airport is located.

Airport transfers for the local community in the atolls is mostly hired transport since there are no regular ferry service available in the atolls similar to that found in Male. Limited access to air taxi service is available to locals in areas where they operate, subject to availability of seats after serving the tourist transfer needs.

3.1.4 Land transportation

The need for land transportation for everyday commuting is minimal in the Maldives. Except for a few islands, the land area of islands is very small – most of them are less than a square kilometer. Land transport vehicles are found in the capital island, Male. The island is around two and half kilometers in land area and is full of land vehicles, the commonest of which are motor-bikes. As of end 2011, the Transport Authority of Maldives records 51,631 land vehicles of which 42,062 are motor-bikes (Transport Authority of Maldives, 2014). Taxi cars and the recently started mini bus service are the public land transport services in Male. Taxi services are also available in other large islands.

3.1.5 Transport development and regulation

The Ministry of Transport and Communication has the overall responsibility for matters relating to transport and communication in the country, including the formulation of environment friendly and safety procedures, and regulation pertaining to aviation, shipping and maritime industry, land and sea transportation (Ministry of Transport and Communication, 2014).

a) Transport Authority of Maldives

The Transport Authority of the Maldives has the key function of regulating and promoting the development of maritime and land transport sectors in the Maldives. It also takes the role of setting policies to mitigate the negative impact of transport on the environment, as well as setting vessel and vehicle safety standards and implementing land and maritime regulations. The authority provides registration services for vehicles and vessels, issues driving licenses, roadworthiness and vessel

safety certificates, and promotes and issues certification for the Maldivian Seaman.

b) Civil Aviation Authority of Maldives (CAA)

The Civil Aviation Authority has the responsibility for the development and administration of policies and regulations to ensure safety, security, order and development of aviation in the Maldives. It develops national safety standards that are in compliance with international aviation standards and implements economic and safety regulations through the regulation of airports, air traffic services and airlines.

3.2 Transport operation experience of the health sector

Sea transportation is an independent factor for the provision of equitable health services in the Maldives. The government of Maldives organized provision of basic primary health care in every inhabited island of the country, irrespective of the size of the population to be served.

From the beginning of health care development, the services depended on transport assistance made available by occasional donor assistance and government led small-scale projects. In 1961, the British government donated a launch with sea ambulance facility which was used in the south of the country. During the year 1970, the government and UNICEF signed a memorandum of understanding for providing and operating health launch services for health care facilities in the atolls. In 1973, three such launches were provided to three health center facilities in the north of the country. The project did not materialize as anticipated. With the allocated funds for the project, the government tried developing mechanized speed boats at lower cost and provided these to the health center facilities in 1978. A major challenge was the maintenance of these vehicles.

The Ministry of Health received two launches as donation by the Lebanese government in 1980 to be utilized for travelling between the central level and other islands. Due to the maintenance difficulties and lack of resources in the health sector, the launches given out to the atoll level hospitals were handed over to the atoll administrative offices that have better operational capacity than the health facility. As the maintenance and other operational expenses were borne by the atoll offices, its availability for health sector use had been limited. By 1990, most of these launches were unusable.

Due to the pressing transportation needs of the hospitals, in 2005 the Ministry of Health through another government funded project again started providing speed launches to all regional hospitals and atoll hospitals covering all atolls. These have been used for outreach activities and other travelling needs of the hospital as well as for transfer of patients, with a subsidized charge levied on the families. With the attempt of the government that came to office in 2008 to corporatize the health care services, their use was not monitored by the Ministry of Health. Health care facilities were de-corporatized in 2012 and the launches were back in the control of the Ministry of Health. The latest development was the handing over of these launches to the National Defence Force by the new government that came to office in 2013 to facilitate proper maintenance of the vehicles.⁷

3.3 Transport challenges for patients seeking access to services

Until recently, there has not been an operational public transportation system in the country. As a pledge of the previous government, efforts were made to establish a public transportation mechanism in the country where it contracted out the provision of ferry service in each atoll.

To access health care not available locally, the islanders have to depend on private boat owners. Boats available in the islands are either fishing vessels or boats used for transport of goods and passengers between Male and islands. There are few high speed private launches also available in most of the atolls. For attending to referrals to higher levels of care as well as for seeking better health care within the atoll and within the region, people have to either hire available transportation at a rate or pay fuel costs for the travel. When and where only fishing vessels are available, people have to wait for the time when these boats are not out fishing, which usually falls on the weekend.

⁷ The information here is an outcome of interviews carried out by the author with personnel and colleagues at the Ministry of Health who worked in various health programme areas. The information also represents reports and records in the Ministry of Health.

For quick and more convenient travel, people who can afford travel by air but only between the regional location and Male. The sea travel that has to be made in connection with air travel is more expensive and time consuming. Another debilitating situation is that small transport vehicles available are not buoyant in bad weather conditions, which means that transfer of maternal emergencies during bad weather face additional risks.

3.4 Transport challenges for health workers to reach patients

Health services in the beginning were provided to the atoll population through mobile health teams. Mobile teams from Male, the central level, set out on a journey that lasts 2-3 weeks, reaching out to various parts of the atolls to provide services such as immunization, health screening, and to run occasional health care camps. Later, when community health workers were deployed to the atoll level, their services were also of mobile outreach, reaching out to cover and provide their designated services to the island communities. The community health workers move around the atoll to provide assistance and advice to island level family health care workers and TBAs. These scheduled trips are usually organized monthly and transportation is provided by the atoll offices, and thus are dependent on the limited transportation facility available. For attending an emergency, the patient side usually facilitates the transportation, which is very much reliant on the availability of a boat and community support. This was how it worked in the past. When services improved the outreach service needs changed but did not diminish. With the improvement of services at higher levels, demand for services increased thereby increasing the need for better outreach services. Although atoll level health care facilities were provided with their own transport facilities, lack of maintenance capacity and resources made sustainability of services challenging and difficult.

One of the main responsibilities of the community health worker at the atoll level is supervision of lower level health care. Proper and adequate supervision is hindered by non-availability of feasible transportation.

3.5 Government policies on transport and health

An inter-island maritime transport network has been thought of many times. In the National Development Plan (NDP) 2006-2010 (Ministry of Planning and National Development, 2005), it has been identified that for the holistic development of the nation, an efficient maritime domestic transport network is critical (see Box 1). To facilitate this development, the government focused on and continued its commitment to building harbors and access points in all the islands in the country. Each year, a good amount of government funds is allocated for upgrade and renovation of the harbor. As public sector investment projects, the government invests on harbor development to facilitate transportation access.

Box 1. Transport policies and strategies – National Development Plan 2007-2010

Policy 1: Ensure that the transport system meets the mobility needs of the people

Strategies

- a. Continue access improvement programme for inhabited islands
- b. Facilitate the development of adequate harbors throughout the country
- c. Establish a sustainable harbor maintenance programme
- d. Enable access to finance for private and public enterprises to establish Inter-Atoll and Intra-Atoll Ferry Services
- e. Enable private and public enterprises to invest in public transportation schemes in the Atolls
- f. Enable and provide support to private and public enterprises to develop and operate domestic airports
- g. Ensure the travel needs of local passengers are integrated and catered for in the sea plane operations

One of the major health policy goals is to ensure that all citizens have equitable and equal access to health care. To achieve the goal optimum health care delivery through the 4-tier health

delivery system and make this referral system an effective one is considered important. Given the geographical situation of the country, an efficient transport system is essential to access health care at affordable prices and to promote timely health care seeking behaviors. This need is highlighted in the major health plans. However, the effectiveness of the referral system is challenged by the lack of an appropriate and efficient maritime transport system.

The Health Master Plan 1996-2005 (Ministry of Health, 1995) stipulated that the services of a regional hospital level care have to be accessible within a maximum of two hours of travelling distance. Services at various levels were developed accordingly. However, accessing these services was challenged by the non-availability of a convenient transport system. Developing a transport mechanism for the delivery of health care is not a feasible option. To counteract the challenging situation in transport services, the health sector opted for developing and expanding services in more islands in order to bring the services closer to the people. This way the mobility need of the people for accessing health care is reduced.

4. Lessons and policy recommendations for cross-sectoral collaboration in reducing maternal mortality

4.1 Lessons learned

4.1.1 High cost of health services and diseconomies of scale

The limitation in transport availability has been recognized and dealt with by the government by extending and expanding services to lower levels. The mobile health care approach was considered from the very beginning of health care organization in the atolls. The community health worker placements in the atolls was planned to be connected to transport support and facilitation by the local community and the relevant local administrative authorities. It began as the main reason for inter-island travel by the atoll offices. However, as demands rose and health care services improved, what was then available at the local community and atoll offices did not suffice and the health sector faced the challenge of providing transport for health care delivery in the atolls. In the absence of an organized public transport system and a sustainable mechanism for operating one by the health sector, mobile health services did not succeed. What resulted was the raised cost of health care for both the government and the people. The mobility needs of the people to seek health services were not met. The more feasible and cost effective mobile health care service provision has not materialized.

Under-utilization of services at the peripheral levels overburdened the central level. The absence of an appropriate and convenient transportation network resulted in the inability of the 4-tier health care delivery system to function as planned. As transportation to and from Male is easier, many people bypass the atoll and regional level health services and travel to the central level to seek medical care. This has made the central level health care facility overburdened not only for attending to referrals for tertiary care but also for the provision of basic health care that is skipped in the referral system. This also leaves most of the atoll level health services under-utilized. The lower use of the services leads to skill redundancy of the health care professionals as well as resource wastage and thereby lower economies of scale.

4.1.2 Sustainability of services

The under-utilization of services also poses the problem of retention of health care professionals. Being highly dependent on expatriate health workforce, recruitment and retention will be difficult in case of low professional skill application. This is true for local professionals too. Many local doctors oppose taking up their jobs at a lower level health facility in fear of lower professional application. This situation poses an issue in sustainability of the services.

4.2 Recommendations

4.2.1 Strengthening the outreach maternal health services (mobile clinics)

As a dispersed and scarcely populated island nation, an effective, well organized outreach maternal health services in the form of mobile clinics is seen as a more feasible and sustainable

option. The mobile clinic approach is preferred because it facilitates the service to reach women in risky and immobile conditions. Early screening, early diagnosis and timely action by a mobile service is more appropriate than for women to reach out to the service for timely action. Such a mobile service well connected to a feasible transport network is ideal for a small island nation like the Maldives.

4.2.2 Application and integration of the market forces approach for an effective transport mechanism that facilitates efficient and quality health care

Transport facilities in the Maldives have improved significantly. High speed maritime transport and air travel is established and functioning for its designated purpose. What is lacking is integration with other needs such as health care. Transport service development is however seen in the arena of tourism development which is functioning on the market approach. In a small country like Maldives, diseconomies of scale for running a vertical transport mechanism will be very much minimized if such integration is applied. It will yield dual benefit – an expanded market for local travel as well as reduced cost of health care.

4.3 Conclusions

Being a small island nation of extensively dispersed populations in several tiny islands, an important role of organized and well managed marine transportation is envisaged. In the Maldives, transport services developed with other economic developments – tourism and local trade. Development of aviation services in the country increased the demand for marine transport. Such developments in transportation helped increase the health seeking behavior of the people. However, health care seeking as per the organized referral health care system has not materialized due to the absence of a systemized public transportation system. High cost and difficult maintenance and management of health owned transportation has not proven to be a feasible option for the health care access. These circumstances resulted in continued stress on health care resources. Health sector investments to improve health care services continue, and work is on extending tertiary care to have an aligned transport network in order to benefit the population at large. The burden of escalating health care costs can be reduced if services development considers integration into the available and more feasible transport system.

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Enhancing the sustainability and inclusiveness of the Metro Manila's urban transportation systems: Proposed fare and policy reforms⁸

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Abstract

This article describes new and better ways to solve urban traffic congestion problems. It emphasizes win-win strategies that help achieve multiple planning objectives and therefore maximize overall benefits. This reflects a new planning paradigm which expands the range of impacts and options considered in the planning process. Win-win strategies include improvements to resource efficient modes such as walking, cycling and public transport; incentives for urban-peak travelers to use the most efficient option for each trip; and smart growth development policies that reduce travel distances and therefore total congestion costs. This article discusses the importance of comprehensive and multi-modal transport planning, describes omissions and biases in current planning, identifies various win-win congestion reduction strategies, and provides examples of successful urban transportation improvement programs. The win-win approach can be applied to many types of transportation problems, and is particularly appropriate in rapidly-developing Asian cities.

Keywords: government pricing and policy, multimodal transportation planning, travel time

Introduction

Developing megacities such as Metro Manila are facing significant challenges due to rapid motorization and deteriorating public transport systems. This trend is expected to worsen as urban population continues to increase. UN-Habitat forecasts that the world's urban population will increase from 3.6 billion in 2011 to 6.3 billion, or from 50% of total world population to 70%, by 2050 (UN-Habitat, 2013). Motorization trends also indicate that there will be over two billion cars on the road by 2050 (International Energy Agency, 2012), bringing with it the threat of more traffic gridlock. These growing problems are a barrier to both economic and social inclusion, and have negative impacts on health and the environment (UN-Habitat, 2013).

While many developed cities are struggling to increase public transport ridership, public transit systems in developing megacities are congested due to insufficient capacity to address demand. On the other hand, the present substantial modal share of public transport is likely to decrease as people grow increasingly dissatisfied with poor public transport and as private modes become more affordable with rising incomes.

Despite having a national policy framework to promote sustainable transport, as well as many well-intentioned policies to address specific aspects of the transport system, the Philippine government is facing many challenges in transforming the country's transport system. The most populous region, Metro Manila, is considered as one of the most notorious megacities in terms of lack of urban mobility and inefficient public transport systems. As in the case of many developing cities, public transport fares are often kept low through national government subsidies in order to address the social equity concerns of the poor. However, the affordable fare policy comes at the expense of huge tax burdens and deteriorating service quality, which eventually leaves everyone at a disadvantage. These issues, combined with other factors such as too much demand for the given supply and poor maintenance of vehicles and facilities that lead to breakdowns, result to the poor and unacceptable service quality of public transport, to the point that it is no longer appealing to use.

⁸ The views expressed in this paper are those of the authors and do not necessarily reflect the view of the United Nations.

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This article makes an in-depth analysis of the situation in Metro Manila to illustrate that it is highly improbable that the Government will be able to attain sustainable urban transport without reforms in the current transport system. The paper gives an overview of the trade-off between fare affordability and service quality by showing how fare policies, capacity and frequency affect the quality of the city's public transport systems. It also suggests specific policy reforms to address these issues and help bridge the gap between the Government's vision for a seamless, multimodal, low-carbon transport system and the realities on the ground.

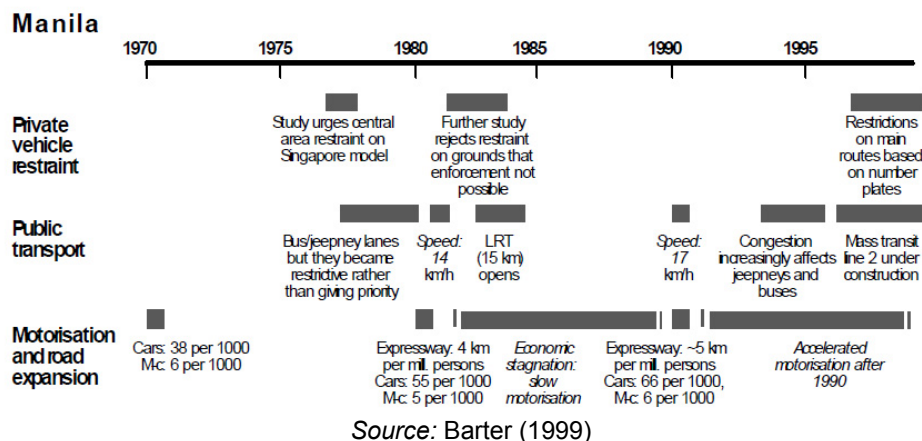
1. Overview of Metro Manila's transport systems and its challenges

Metro Manila is the Philippines' chief metropolitan area and serves as the political, economic, social and cultural center. It has a population of 11.5 million growing at a rate of 2% per year. Like other developing megacities in the region, the government authorities in Metro Manila are facing significant challenges due to rapid motorization and deteriorating public transport systems. Government authorities here refer to several agencies whose functions are unclear and thus sometimes overlap and conflict (NEDA, 2010), such as the Metropolitan Manila Development Authority (MMDA), the Department of Transportation and Communications (DOTC), the Department of Public Works and Highways (DPWH), rail authorities, local government units, the police and other concerned agencies. In 2011, the city ranked 64th out of 66 cities in a global study on urban mobility which included 50 of the world's largest cities in terms of population and regional GROSS DOMESTIC Product (GDP), and 16 focus cities (Lerner and others, 2011).

Several factors have contributed to the city's current congestion problems. Historically, Metro Manila's transport and land use development patterns have been derived from the automobile-dependent planning style of many developed country cities. As a result, two urban growth patterns can be observed in Metro Manila: (1) sub-urbanization or the increase in the number of person-trips and trip distances which leads to severe traffic congestion; and (2) the proliferation of informal settlements in the city center as well as the establishment of big commercial centers along Epifanio de los Santos Avenue or EDSA, the main thoroughfare of Metro Manila, and other major corridors, leading to greater congestion and highly mixed land-use patterns (Montalbo and others, 2005).

These patterns have led to increased demand for urban transportation facilities and services, which has been met in a haphazard way by both public and private service providers. In Figure 1, Barter (1999) outlines key events that transformed transportation in Metro Manila. Notably, motorization accelerated after 1990 while no restraint on private vehicle ownership or use was put in place until the late 1990s. As a result, it is estimated that there are currently around 2.3 million vehicles plying Metro Manila, with motorization rates growing at a rate of around 6% per year.

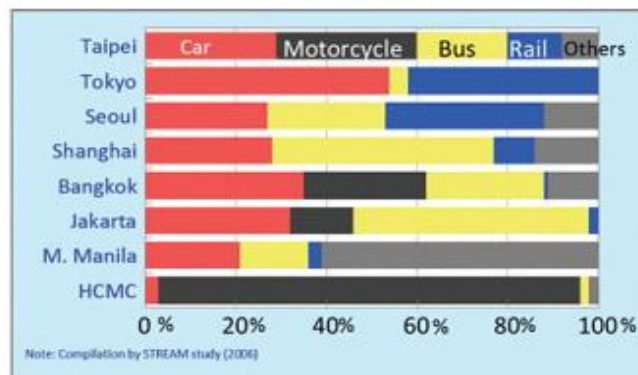
Figure 1. Transport development in Metro Manila from 1970s to late 1990s



Despite these trends, when compared to other megacities in the region, it is notable that the share of private car use is still relatively small in Metro Manila (Figure 2). The main transit modes are public transport, generally road-based such as jeepneys, buses and AUVs, but also rail-based with three urban rail lines (Light Rail Transit Lines 1 and 2 (LRT1 and LRT2), and Metro Rail Transit Line 3

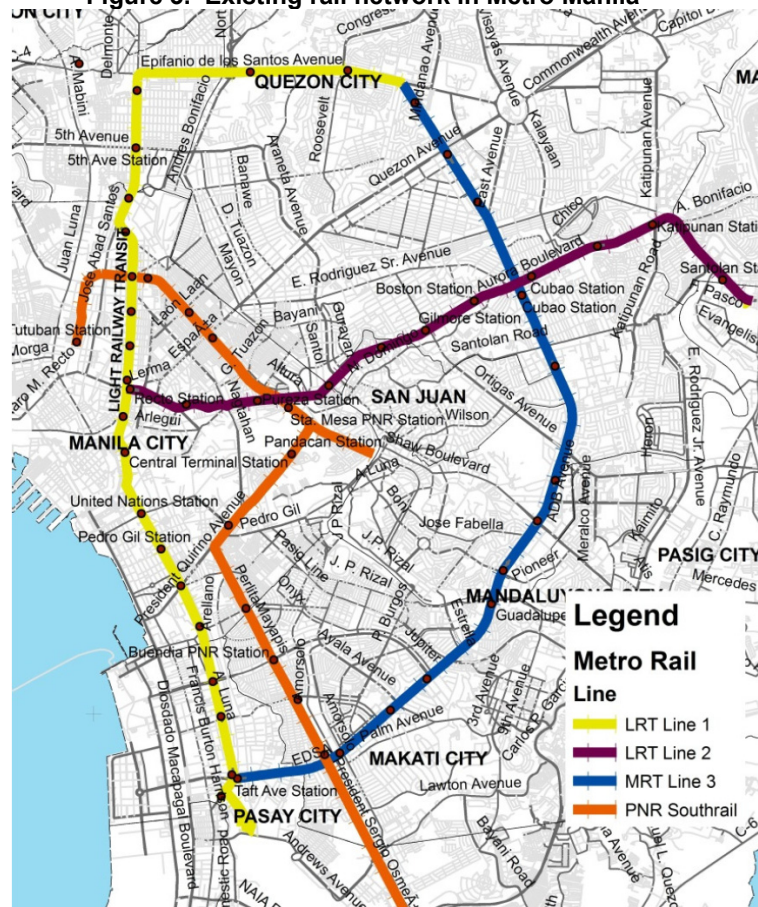
(MRT3)) and a commuter rail line (Philippine National Railways (PNR) Southrail). Figure 3 shows the alignment of these lines. Among these, MRT3 is probably the most critical rail line in Metro Manila because it follows EDSA where the major central business districts and other major landmarks of the metropolis are linked, and subsequently has the highest ridership. This 16-km urban rail line connects to the two Light Rail Transit lines, which also serve as major mass transit routes for commuters.

Figure 2. Trends in public transport share in Asian megacities



Source: Parikesit and Susantono (2012)

Figure 3. Existing rail network in Metro Manila

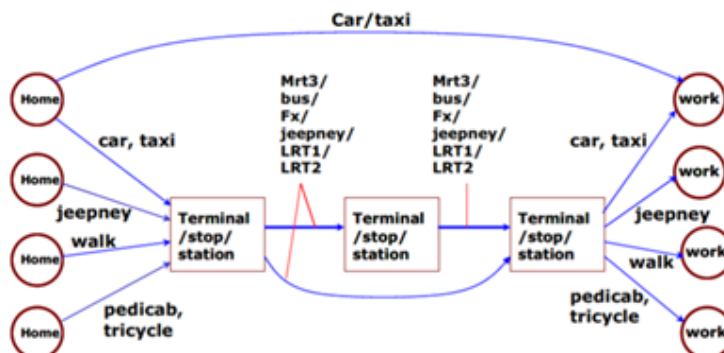


Source: DOTC (2012)

One notable characteristic of commuter patterns in the city is that most commuters use a variety of transport modes, with an average of two to three transfers. Figure 4 shows the universal

modal choice set for home-to-work trips by urban travelers in Metro Manila (Fillone 2005). It can be observed that using public transport modes generally requires multiple transfers.

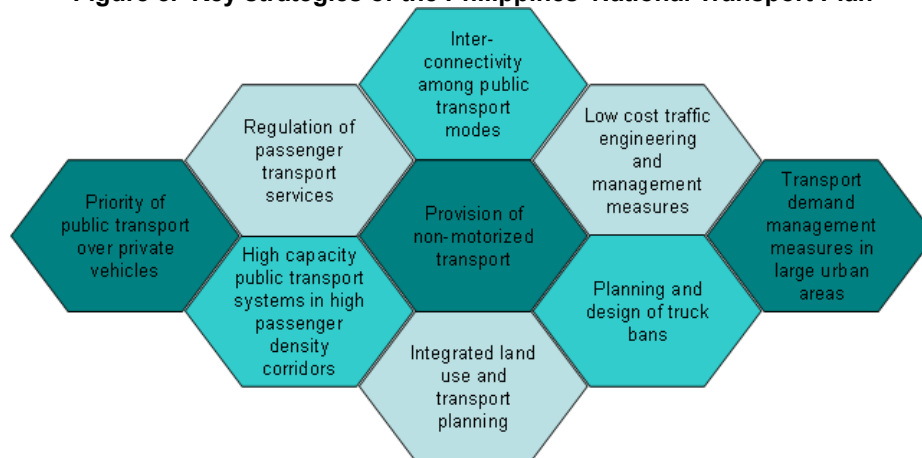
Figure 4. Multi-modal transport in Metro Manila



Source: Fillone (2005)

The country's unsustainable transport systems are associated with lost man-hours, additional fuel consumption, health costs and lost investment opportunities – estimated to account for 140 billion Philippine pesos (\$3.13 billion in Metro Manila alone, or roughly 2 per cent of the country's GDP in 2008 (NCTS, 2011). In response to these issues, the Government of the Philippines has developed a National Transport Plan. It is one of the country's initiatives to promote inclusive growth, which refers to sustained growth that creates jobs, draws the majority into the economic and social mainstream, and continuously reduces mass poverty while factoring population, geographical differences, and social complexity. The NTP envisions "a safe, secure, efficient, viable, competitive, dependable, integrated, environmentally sustainable, and Philippine transportation system (NEDA, 2010)." Its key strategies are outlined in figure 5.

Figure 5. Key strategies of the Philippines' National Transport Plan



Source: NEDA (2010)

Urban transport is one of the seven key policy areas identified under the National Transport Plan (NTP). The NTP aims to address the undesirable side effects of transportation such as traffic congestion, traffic accidents and environmental deterioration. To achieve this, the Government launched the National Environmentally Sustainable Transport (EST) Strategy (NCTS 2011), which was also used as an input to the NTP. The EST Strategy has three main goals, outlined below:

1. Reduction of the annual growth rate of energy consumption and associated greenhouse gas and air pollutant emissions from the urban transport sector;
2. Enhancement of sustainable mobility through the development of a viable market and shift to low emissions transport of goods and services

3. Formulation of strategies based on the 12 thematic areas of the Aichi statement¹²

The Government therefore established a clear vision for the development of a sustainable transport system, which includes Metro Manila. However, key policy reforms are also necessary to achieve this vision. In particular, as in the case of other developing megacities, “modal keep” rather than “modal shift” is becoming a pressing issue for the authorities in Metro Manila (Morichi and Acharya, 2012). There is a risk that the substantial modal share of public transport will decrease as people grow increasingly dissatisfied with poor public transport and as private modes become more affordable with higher incomes.

2. Fare policies and their impact on urban transport in Metro Manila

2.1 Salient features of fare policies in Metro Manila

The National Government has an explicit fare policy for public transport. In the case of Metro Manila, there is a difference in the fare setting objectives of the different modes of public transport, as shown in Table 1.

Table 1. Fare setting objectives for rail and road-based Public Transport

Public transport mode	Fare-Setting Objectives		Consequences	
	Social Acceptability	Financial Viability	Impact on fares	Fiscal burden
Rail based	√		Artificially low fares	High subsidy
Road based	√	√	Profitable fare	No subsidy

Source: DOTC (2012)

The Land Transportation and Franchise Regulatory Board (LTFRB), a government agency, is tasked to regulate fares for public land transportation provided by motorized vehicles. It ensures both financial viability and social acceptability for road-based public transport services, which are supplied by the private sector without government subsidies on investment and operating costs. Fares are set such that private operators earn a reasonable return on their investments. Fare adjustment may be discussed upon operators' request following changes in diesel prices or inflation, subject to public consultations to ensure that fares stay within socially acceptable limits (DOTC, 2012).

Meanwhile, rail-based public transport LRT1, LRT2, MRT3 and PNR are owned and/or operated by the government. Fare setting for rail-based public transport is largely based on social acceptability. The government has maintained the policy of keeping rail fares low to make it affordable to the masses and boost ridership, by subsidizing fares amid inflation and increasing operational costs. There is no compulsion under the current government policy to even recover investment and/or operating costs. As a result, ridership went beyond capacity in 2005 and has been increasing ever since.

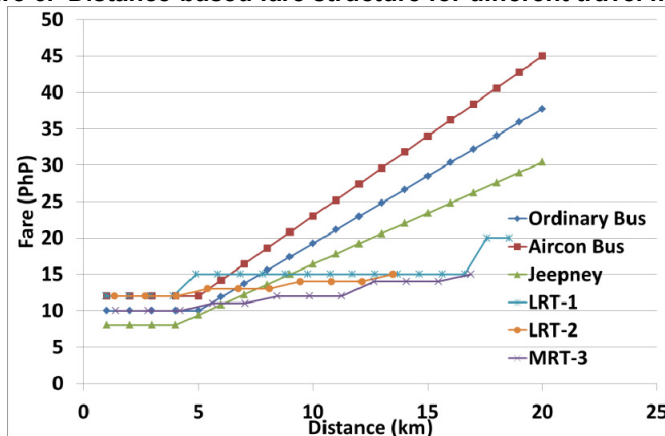
The Government implements a distance-based fare structure for every mode. However, fares for road-based modes rise more steeply with respect to distance compared to fares for rail-based modes. Fares are also computed on a per-ride basis rather than on a per-journey basis, wherein passengers have to pay a base fare every time they transfer to another vehicle. For instance, a 4-km trip with two jeepney rides costs twice as much as the same journey with just one jeepney ride. The road-based fare structure is strongly differentiated with respect to distance through its base and

¹² The Aichi Statement in 2005 established a regional forum for the promotion of environmentally sustainable transport in Asia. Its twelve (12) thematic areas are: (1) public health; (2) roadside air quality monitoring and assessment; (3) traffic noise management; (4) vehicle emission control, standards, and inspection and maintenance; (5) cleaner fuel; (6) public transport planning and transport demand management; (7) non-motorized transport; (8) environment and people friendly urban transport infrastructures; (9) social equity and gender perspectives; (10) road safety and maintenance; (11) knowledge base, awareness, and public participation; and (12) land use planning (4) vehicle emission control, standards, and inspection and maintenance; (5) cleaner fuels; (6) public transport planning and travel demand management; (7) non-motorized transport; (8) environment and people friendly infrastructure development; (9) social equity and gender perspectives; (10) road safety and maintenance; (11) knowledge base, awareness, and public participation; and, (12) land use planning.

incremental fares, while that of urban rail lines is weakly differentiated and almost resembles a flat fare structure.

As a result of these policies, fare levels for road-based transport modes (i.e. ordinary and air-conditioned buses, jeepneys) are much higher than rail-based transport modes (LRT1, LRT2 and MRT3) for trips beyond 5 km. Figure 6 shows how the fare varies according to distance for each mode for one ride without transfers.

Figure 6. Distance-based fare structure for different travel modes



Sources: LTFRB and MRT3 Metrostar Express (2012)

Table 2 shows that the fare difference between road-based transport modes with respect to distance traveled has increased from 2004 to 2012, while that of urban rail lines stayed the same. As a result, long-distance travel by road-based modes have become more disproportionately expensive than rail-based modes, and it has become significantly cheaper to travel by rail than by other public transport modes that are not subsidized and whose fares are set mostly based on profitability.

Table 2. Distance-based fare structure for different travel modes in 2004 and 2012

Transport Mode	Base Fare (first 4-5 kms or first 3-4 stations)		Incremental Fare (per additional km or station thereafter)	
	2004	2012	2004	2012
Ordinary Bus	6.00	10.00	1.25	1.85
Aircon Bus	9.00	12.00	1.50	2.20
Jeepney	5.50	8.00	1.00	1.40
Vans (FX)	10.00	15.00	5.00	5.00
LRT1	12.00	12.00	3.00	3.00
LRT2	12.00	12.00	1.00	1.00
MRT3	9.50	10.00	0.50	0.50*

*rounded off to the nearest peso for operational efficiency

Sources: LTFRB and MRT3 Metrostar Express (2004, 2012)

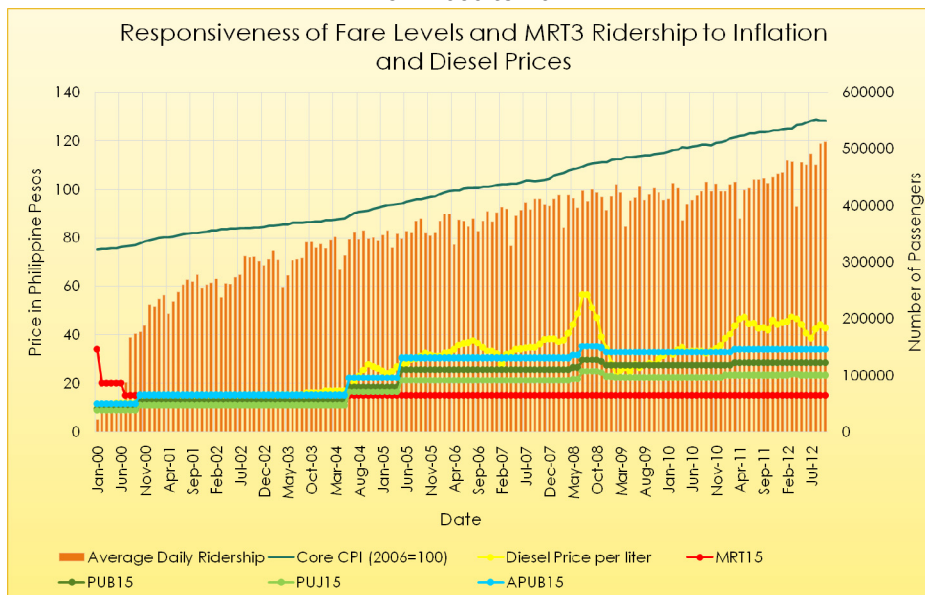
2.2 Consequences of the government's fare policies

a) Fall in real fares for rail transit with increase in ridership

The government is a competitor that can artificially lower its fares because it can rely on subsidies, as well as a fare and route capacity regulator of other public transport modes. This has resulted to a huge discrepancy in fare levels throughout the years. Figure 7 shows the difference in road-based and rail-based fare setting with respect to inflation and diesel prices, as well as the resulting MRT3 ridership. MRT3 fares were drastically reduced in 2000, and its ridership subsequently increased. By 2005, MRT3 has exceeded its capacity of 400,000 passengers daily, and has

continuously done so until now.

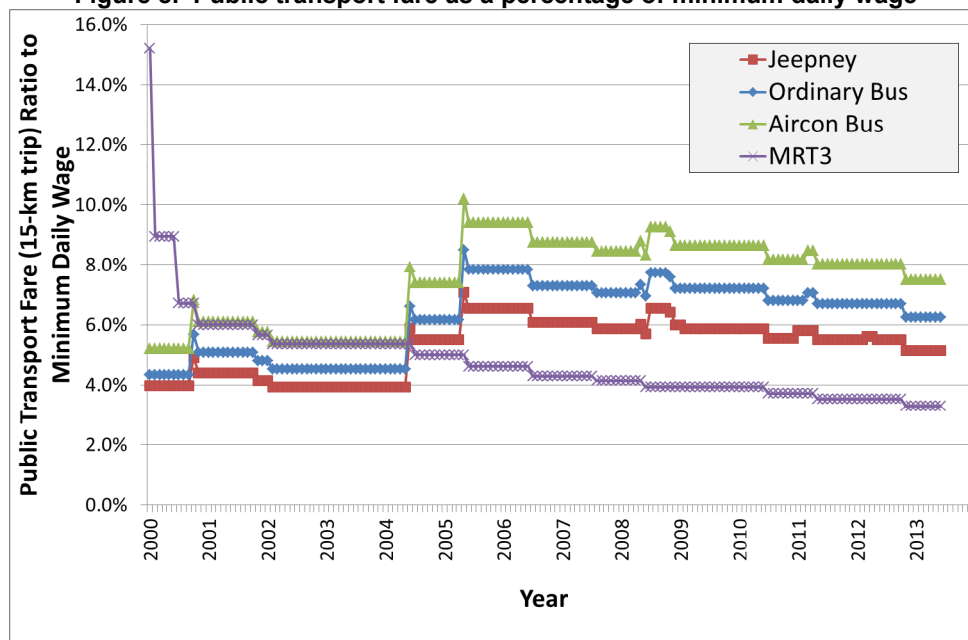
Figure 7. Trend of fare levels, MRT3 ridership, inflation and diesel prices from 2000 to 2012



*15 stands for 15-km trips; PUJ – Public Utility Jeepney, PUB – Ordinary Public Utility Bus, APUB – Air-conditioned Public Utility Bus, MRT – Metro Rail Transit Line 3

Sources: LTFRB, DOTC-Metrostar, World Bank, National Statistics Office, www.alternat1ve.com

Figure 8. Public transport fare as a percentage of minimum daily wage



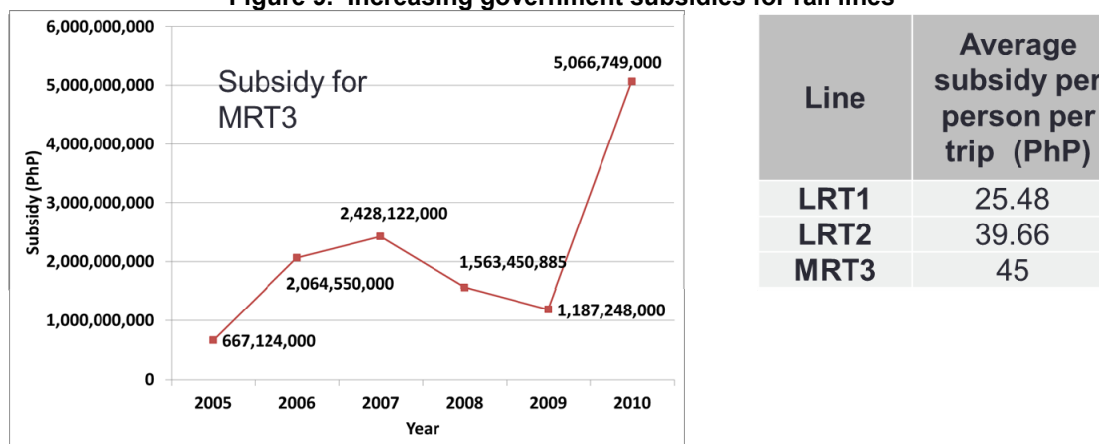
Sources: Department of Labor and Employment, LTFRB, MRT3 Metrostar Express

Moreover, minimum daily wage has been adjusted several times in the past decade or so to account for inflation and other factors. It can be seen in Figure 8 that travel by MRT3 has become relatively cheaper for minimum-wage workers for a 15-km direct trip, while that of other modes have become relatively more expensive.

b) Growing fiscal burden due to mounting subsidy bill

In order to meet the shortfall in operating expenses, the government subsidizes much of the urban rail lines' expenses, which include daily operating expenses such as overhead, power supply and salaries, as well as repair and maintenance costs of infrastructure and vehicles, and payment of existing debts. Figure 9 shows the rapid increase in government subsidies spent on MRT3 alone, while the table on the right side shows the subsidy per passenger for each rail line. In 2012, LRT1 and LRT2 had a combined deficit of Php4.704 Billion, while MRT3 had a shortage of Php7.250 Billion, which had to be taken from the government coffers. The average passenger cost for LRT1 and LRT2 passengers was Php34.74, while they paid an average of Php14.28, which means that the government subsidized 59% of the cost. Meanwhile, MRT3 passengers had an average cost of Php53.96 and an average fare of Php12.48, implying that 77% of passenger cost is subsidized.

Figure 9. Increasing government subsidies for rail lines

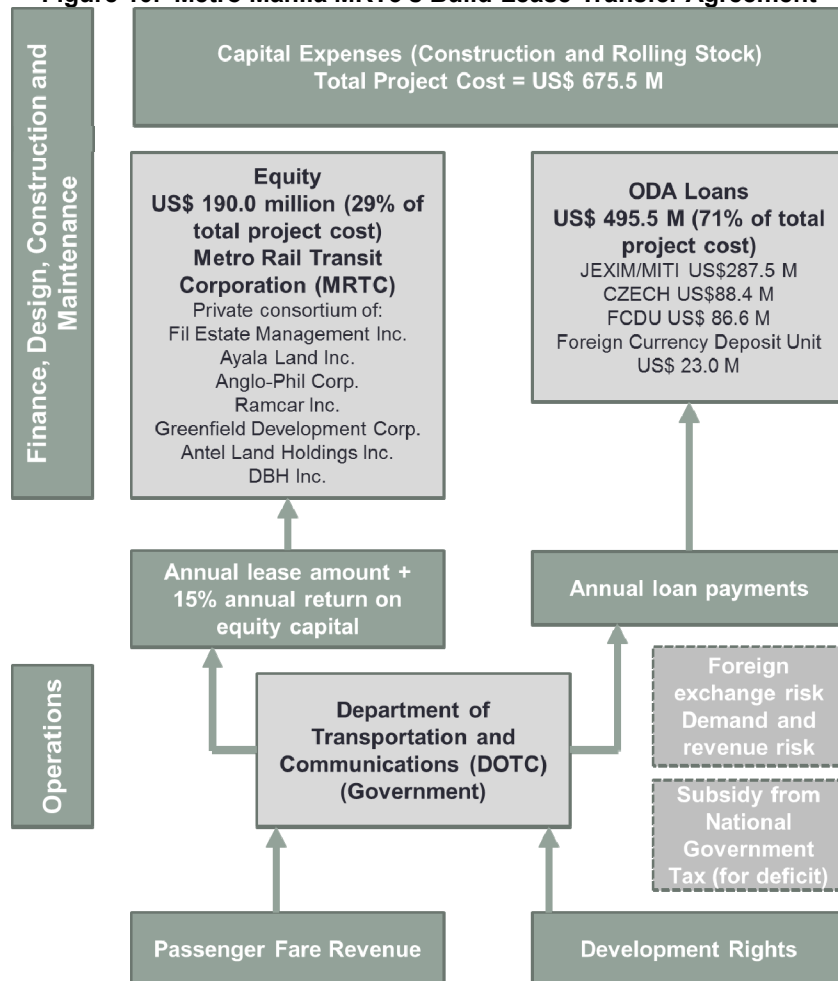


Source: MRT3 Metrostar Express, as reported by GMA News (2010).

The implications of the growing fiscal burden are particularly severe in the case of MRT3, which was built using a Build-Lease-Transfer (BLT) agreement. The structure of the agreement is shown in Figure 10. Increasing operating losses due to low revenues and delays in providing subsidy funding from the national government have since prevented the government from regularly meeting its financial obligations under the concession contract.

De Langen, Alzate and Talens (2004) note that the MRT3 contract appears to be quite one-sided in its allocation of project risk, because the market risk with respect to passenger fare revenue is taken completely by the government.

The relatively high subsidy cost for MRT3 is due to debt servicing and the risk which the Government agreed to take on under the terms of the BLT contract, as seen in Figure 10. Certainly, the experience from the MRT3 project undermines the potential to use public-private partnerships to finance further transport infrastructure in the city. However, regardless of the source of investment, the fact remains that as long as the current rail-transit price structure is maintained, the Government will continue to face a huge fiscal burden to subsidize the difference between passenger fare revenues and actual costs.

Figure 10. Metro Manila MRT3's Build-Lease-Transfer Agreement

Source: De Langen, Alzate and Talens (2004)

This is in contrast with the financing arrangements for the two other urban lines LRT1 and LRT2, which are operated by the Light Rail Transit Authority (LRTA), a government-owned-and-controlled corporation. The subsidy issue in this context is straightforward – the government is merely providing the deficit between the costs (e.g. depreciation expenses, amortization expenses for its operating/organization costs, interest expenses, rehabilitation and yen loan repayment) and the farebox and non-rail revenues in the form of government subsidies (LRTA, 2007; Sanshu Engineering Consultants, 2009).

c) Equity dimensions of the governments' fare policies

As mentioned above, the National Transport Plan promotes a “users pay” culture but the huge subsidies for rail-based transport run contrary to this principle. The government has also expressed alarm at how the subsidies have increased and proposed for a fare hike as early as 2008.

However, these proposals have been met with strong opposition from pro-poor groups and some government officials, while other groups argued that the fare increase is ‘not timely’ as it comes in the wake of significant price increases in gas, utilities, non-rail public transport and other commodities (GMA News, 2008; DOTC, 2013; Philippine Daily Inquirer, 2011, 2013).

Opposing groups also demand that the government improve the MRT3 service quality first before even considering a fare hike. They argue that commuters are already enduring long queuing and overcrowding in stations and trains on a daily basis and should not be burdened by a fare increase (Manila Bulletin, 2014). This scenario leads to a chicken-and-egg problem: fares cannot be

increased due to poor service, at the same time, service cannot be improved due to low fare revenues.

Moreover, many pro-poor groups reiterate that most of the present subsidy go to debt servicing rather than to operation and maintenance costs, and believe that debts should not be passed on to commuters as it is the government's function to provide good urban rail services (Bayan, 2013). Despite DOTC's claims that the fare hike would bring better train services (DOTC, 2013), its opponents state that this would not necessarily go to service improvement but to guaranteeing profits to private investors (Bayan, 2013).

This also raises an important issue of inter-modal equity, that is, equity between modes. Non-rail users (either urban rail is not in their choice set or they are not able to ride because of lack of capacity, i.e. latent demand) pay more to use a lower-quality public transport mode like jeepney or bus. Prices of basic commodities, including fares for different modes of transport, have increased in the past 14 years and wages have also been adjusted for the rising cost of living. Given that urban rail fares have remained the same throughout this period, it has actually become relatively cheaper to use the rail over time with all these factors considered.

Moreover, taxes are taken from the national government so non-Metro Manila residents also subsidize the city's rail commuters. This is countered by arguments that provincial projects are also subsidized by Metro Manila dwellers and that Metro Manila taxpayers contribute the most to the economy.

Another issue that should be considered in assessing the appropriateness of the current fare policy is cross-subsidy between passengers. For instance, it costs more to transport long-distance passengers than short-distance ones, and if this is not accounted for in the fare structure, cross-subsidy occurs. There may also be a cross-subsidy issue according to the time of day if peak pricing is not present, with peak riders being subsidized more due to higher operation and maintenance costs. Costs also generally increase with higher ridership (e.g. more frequent breakdowns), and low fares do not compensate for these. While there has been no published studies specific to MRT3 that investigate on this matter, there should be an effort made to ensure that cross-subsidies do not occur or are justified on equity or efficiency grounds.

While some argue that fare rates should not be raised in order to increase access for the poor, there may be a latent demand of rail users – those who are discouraged to use rail because of lack of capacity especially in the middle stations during the peak period (Mijares et al, 2013). This then becomes a matter of spatial equity because while rail transit may be in the choice set of the poor, they cannot access it because of constraints. Given the political climate in the Philippines, there is a need for more research into the equity dimensions of the Government's fare policies.

3. Policy implications

3.1 Reform of the current fare policy

While subsidies may be warranted for urban rail because of the high cost in providing the service to each passenger to make it reasonably affordable, fares should be set at a level at which urban rail would be fairly competitive against other transport modes. Setting fares too low may result to cost savings for the direct users but would cause negative externalities towards operators of other public transport modes. Parikesit and Susantono (2012) cite reports that indicate that low fare levels do not benefit in the long run as they are associated with non-reliable services and the need for high subsidies. Public transport is traditionally viewed as an inferior good because most people consume less of it once their incomes increase and switch to private modes. The underlying reason for this is that high-income people tend to be more sensitive to service quality than lower-income people (Notteboom, 2013). However, if urban rail is of high quality and disincentives to private transport are in place, it may serve the corresponding increase in mobility that is associated with an income increase instead of private transport. Increase in revenues through fare increase may be used to improve urban rail's quality and promote its use even for high-income earners to discourage automobile use.

Fare-setting should also consider all modes of transport in order to achieve balance in supply and demand between modes. In this regard, the Government may consider using optimal fare-setting.

Fare-setting in the Philippines is an underutilized tool in managing transport demand. This is obvious in EDSA, where buses have higher fares and slower speeds compared to MRT3. Even if the problems of congestion and waiting time uncertainty at certain MRT3 stations exist, MRT3 is still the fastest way to travel, especially from less-congested stations.

A reasonable fare increase that strikes a balance between affordability and service quality, like the one proposed by the government, should be implemented soon. In order to address the concerns of the pro-poor groups, the Government needs to show that the current fare policy that is geared towards the poor and is highly subsidized is not socially equitable since it creates a huge tax burden on all income levels and on the entire nation. While social inclusion of transportation-disadvantaged people should be addressed, this should not be done at the expense of the service quality of the public transport system and government funds.

3.2 Reform of road-based public transport systems

While this article is focused on fare policy, it is also necessary to consider other reforms which are also needed to increase the effectiveness of the public transport system as a whole. In contrast to the rail transit systems, the road-based transport systems are almost entirely privately owned and operated. In theory, the government is supposed to regulate public buses, jeepneys and other modes of public transport through the Land Transportation and Franchise Regulatory Board (LTFRB) and the Land Transportation Office (LTO) of DOTC, and the traffic management performed by the MMDA, local government units and police agencies in Metro Manila. However, the overly competitive nature of road-based public transport makes it difficult for the government to regulate them sufficiently.

For example, Morichi and Acharya (2012) noted that there are too many private operators in road-based public transport in Metro Manila. Monopoly of a route is not allowed and the government requires at least two operators per route. Operators who want to serve a certain route that it deems profitable may do so by applying for a franchise with the LTFRB, which regulates the number of issued franchises and authorizes units according to route capacity. The agency previously granted all applications for franchises but made a drastic change in 2012 by granting franchises based on the requirements indicated in demand studies. However, supply and demand are still not well-balanced in spite of these efforts, as evidenced by the proliferation of illegal public utility vehicles (PUVs).

Due to the commission-based salary, PUV drivers tend to compete for passengers and are disorganized and work for very long hours, compromising safety and level of service. It was reported that an average of 16 bus accidents happen daily in Metro Manila alone.

The problem was partially tackled under Department of Labor and Employment (DOLE) Department Order No. 118-12, or Rules and Regulations governing the employment and working conditions of drivers and conductors in the public utility bus transport industry. This directive reformed the salary structure into a fixed one which guarantees minimum wage and other benefits, but drivers are still entitled to performance-based bonuses related to higher farebox revenue. As a result, drivers still gain direct incentives from competing for passengers. In a sense, transport is no longer a social service but a competitive business, where drivers are competing for passengers instead of serving them.

While countries like Japan have successful mass transit transport systems that are provided by the private sector, it is because of proper government supervision and market maturity. The current system in the Philippines is too disorganized due to its weakly regulated free market principle, and contributes to unreliability and increasing motorization. However, whenever a proposal to reform the bus system is suggested, legalities favoring the transport operators govern the societal good. Refusal to change the status quo is a huge hindrance in developing sustainable urban transport systems.

It can be argued that the consolidation of bus companies with monopoly on each route is likely to make them less competitive. Meanwhile, routes can be rationalized, and capacity (vehicle supply and service frequency) could be adequate for the demand. Synchronization of schedules between feeder and trunk modes to reduce waiting and transfer time and integrating the fares through a contactless payment system are also desirable.

3.3 Restricting the number of private cars and internalizing the cost of private vehicles

Even with a high-quality mass public transport system in place, it may be unrealistic to expect major reductions in road congestion in developing cities without car-restraint policies such as car ownership costs that internalize the associated negative externalities. Car ownership is more directly correlated with user costs and parking fees. As such, a combination of the two policies can be effective in achieving the desired modal shift. Vehicle retirement policy and proper implementation of emissions testing can also be considered to address the environmental aspect.

Such policies are probably more effective than the current policy of private vehicle restraint in the form of a “color coding scheme” wherein car use is prohibited once a week depending on the plate number. Fillone, Montalbo and Tiglao (2005) found that majority of these car users just opt to use another car on banned days, and that a number of people still use private modes by riding with a family member on a different car, hitching with neighbors or friends, leaving home early or delaying travel. This indicates the strong preference of perennial car users towards private modes. Moreover, the scheme may have been a factor in increasing car ownership as travelers who prefer using their own car to work merely buy another car that is banned on a different day.

4. Conclusions

A key aspect of an efficient transport system is good integration between modes in terms of fare and schedule, as well as the policies implemented by various authorities. This is where Metro Manila seems to be lacking, with differing philosophies for the public transport system – road-based public transport is provided by the private sector, while rail-based public transport is government-owned or operated. In addition to fare policy reform, there has to be changes in how road-based public transport is provided.

In this regard, market segmentation of public transport can be done to maintain a certain level of quality for people who are willing to pay for it. The Government can explore how to differentiate public transport services through fare levels and service quality, and provide more choices for people from various walks of life. Rail transport can be priced higher than road-based public transport in order to attract a substantial share of car users, eliminate the need for huge subsidies, and maintain acceptable service quality.

Moreover, more investments are needed in new and modern modes of mass transit systems, and the Government must look at ways to overcome the legal and political barriers that hinder the swift implementation of mass transit projects. For instance, the capacity expansion project of MRT3 to increase supply by more than 50% has been pending since 2007 due to various issues such as alleged bribery. Meanwhile, feasibility studies on a Bus Rapid Transit (BRT) system connecting the two major financial districts, Makati CBD and Bonifacio Global City in Taguig, have been completed but the project has not been approved due to concerns about the impact on public utility vehicle drivers who might lose their jobs.

With the current Government’s policies regarding public transport, the goal of achieving sustainable transport in Metro Manila is expected to take some time. Comprehensive changes in the different aspects of the city’s transport system are needed, including how transport projects and land-use patterns are planned out, how fares are set across different modes, and greater clarity about the roles of the different government agencies and other stakeholders in the transport system. The Urban Land Institute (2013) also pointed out the importance of a “champion” for the development of Metro Manila – a single city authority with powers over its commuter catchment area for strategic planning, transport, environmental protection, and self-financing. Perhaps such a central authority is needed to translate the Government’s vision for sustainable transport into reality.

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A case study on establishing and running a community bus service in rural Sri Lanka

Ranjith de Silva¹³

Abstract

In 1998, a pilot project was implemented in Sri Lanka to assess the feasibility and capacity of a village community to manage its own community bus service. Sixteen years after its inauguration, the bus service is still in operation, despite the fact that the project implementing agency withdrew its support about six years after the service was established. The current article describes the rural transport challenges which led to the idea for the project, the challenges faced by the community and project team in creating and running the service, and the lessons learned from the past sixteen years. One of the indirect impacts of the project was the improvement of a rural access road, which resulted in a number of other changes in the transport situation of the villages. The article also briefly describes a number of similar rural transport projects which drew on the experience of this project.

Keywords: community-based systems, rural transportation planning

1. Background: The wider context of rural transport in Sri Lanka

With the liberalization of the economy of Sri Lanka in 1977, the private sector was allowed to invest in the transport industry, ending the monopoly of state-owned transport Central Transport Board (CTB). While private operators were not interested in operating services where they could not earn a profit, the CTB maintained skeleton services in remote rural areas as a heavily subsidized transport service. At the same time, the government introduced a system via the National Transport Commission (NTC), which governed the private transport services, that pays a subsidy to the private sector to extend their services to identified “low-income” bus routes formerly operated by CTB.

This failed, however, to attract the private sector, which was more interested in the urban bus service market. It was also evident that the conditions of rural roads prevented the bus owners (including the CTB) to start operations due to high vehicle operating cost (VOC). Historically, Sri Lankan rural communities looked to the government to provide and maintain roads, but state policy prioritizes highways and other bitumen paved roads for motorized traffic, to the detriment of the 70% of Sri Lanka's road which link villages to the main transport infrastructure. Furthermore, the government, particularly local government, had neither the financial resources nor the technical capacity to improve the standard of rural roads.

As routes in more isolated areas became “uneconomical”, bus services were discontinued and roads were further neglected. The lack of low cost and efficient goods transport services from villages to market centers became a critical issue faced by the rural farmer population. In the absence of such services, farmers were compelled to use public transport services (buses) to reach markets, spending long hours and travelling very early to avoid heavy passenger traffic, as well as facing more product wastage.

The decrease in bus services also affected access to education and medical facilities. Normally in rural Sri Lanka, travel to medical and educational facilities comprises a significant proportion of a rural household's travel needs. Since most schools in the villages have inadequate facilities or are limited to primary classes, students who wish to attend schools with better facilities must travel about 10-20 kilometres daily to the towns. They usually have to walk 2-3 kilometres before they reach a bus route. At the same time, villagers seeking medicines must travel to privately-owned dispensaries located at least 3-5 kilometres from the village. Many villages do not have access at all to such dispensaries and the nearest medical facilities are in the towns, at least 5-7 kilometres away.

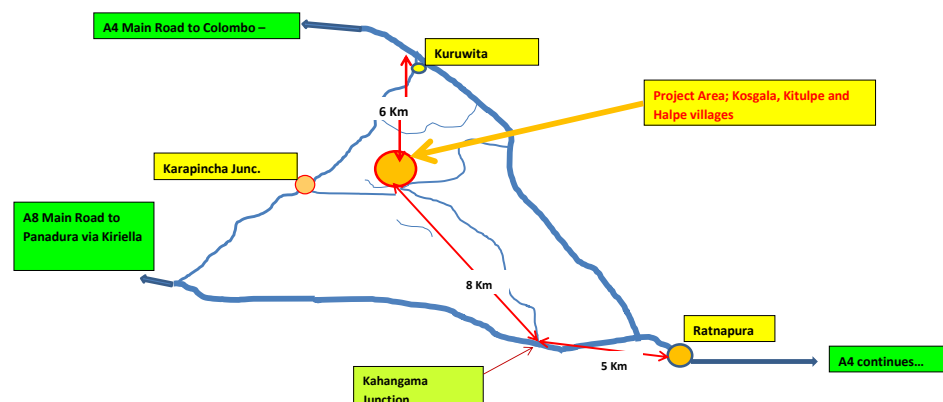
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Against this backdrop, the Lanka Forum on Rural Transport Development (LFRTD), a national network of state transport organizations, transport professionals, rural transport promoters, non-government organizations (NGOs) and individuals, came up with the idea that a rural community may manage its own transport service if it is given the required resources and training. The LFRTD decided to pilot test this concept in the Kithulpe Grama Niladhari division of the Kuruwita Divisional Secretary division, Ratnapura District, roughly 100 km south-east of Colombo. The main source of livelihood within the Grama Niladhari division was agriculture, mainly rice production and rubber and tea plantations. Many people were wage labourers in either agriculture or gem mining. Ratnapura is famous for its gem industry and at least one member of each household is engaged in gem mining. Private sector enterprises and garment factories in and around the area were the other sources of employment.

2. Transport needs at the start of the project

The target population for the bus service was the villagers from the adjoining villages of Kosgala, Kitulpe and Halpe (Figure 1). The total population of the three villages during the feasibility study carried out in October 1996 was 3,500 persons belonging to 740 families. Besides these people, another 150 families from nearby villages were expected to benefit from the bus service.

Figure 1. Road map of target area (not drawn to scale)



Source: Author's own illustration.

In 1996, only a limited number of vehicles were running on the road that passes through the village. There was a CTB bus service to the village of Kosgala but that service was irregular and often unavailable. The villagers said this CTB bus service was started in 1973 but gradually deteriorated in the early 80s and was abandoned later. There were two bus services available in 1996 that could be accessed by walking about 4-6 km, but these buses were usually overcrowded with passengers.

The community is situated about 13 km away from the Ratnapura town at one end and about 6 km from the Kuruwita sub-urban area (a small town on the Colombo-Ratnapura main road) at the other end. The villagers accessed the towns of Ratnapura and Kuruwita for most of their needs, such as health care, secondary education, the market, and other services (see Table 1). Further details are provided below.

2.1 Agricultural Produce

Nearly 95% of the families living in the three villages in 1996 were dependent on agriculture and gem mining. The major crops were rubber, tea, minor export crops (spices) and rice (paddy rice). The nearest markets for rubber and minor export crops were located in Ratnapura and Kuruwita. Products were transported to the markets either by bus or bicycle.

2.2 Consumer goods

Consumer goods were available at the village store but were quite expensive compared to the

goods in nearby towns due to the high transportation costs. Shopkeepers hired three-wheelers to transport the goods.

2.3 Education

The children who attended schools (secondary or higher education) in Ratnapura town had to walk long distances to get to the nearest bus route early in the morning. They also returned late after school and spent a lot of time waiting for transportation in the absence of regular transport services.

2.4 Health

The nearest hospital to the village was also located in Ratnapura town. Villagers had to walk far to get to the nearest bus route. The buses were also overcrowded and it was difficult for a sick person to travel in those conditions.

Table 1. Distance to basic services from Kosgala village

Service	Location	Distance
Primary education	Village	20minutes by bus, 1 hour walk
Secondary education	Ratnapura and Kuruwita Town	Ratnapura, 13 km; Kuruwita, 6 km
Primary health care	Available in one of the village houses	Within the village
Hospital	Ratnapura or Kiriella	Kiriella, 40 minutes by vehicle; Ratnapura, three wheeler price 600 Indian rupees (Rs) (\$8.00) in Year 2000
Post office	Village	Thirty (30) minute walk
Communication Centre	Ratnapura town	Ratnapura, 13 km, 10 minutes by bus
DS office /other relevant government offices	Kuruwita	Kuruwita 6 km
Market for consumer goods	Kuruwita sathi pola (weekly market)	Kuruwita 6 km
Market for produce	Kuruwita town	Kuruwita 6 km
Police	Kuruwita town	Kuruwita 6 km

Source: LFRTD (1996)

3. Project design

The goal of the project was “To assess the sustainability and ability of rural communities to manage their own transport services based on their own accessibility needs” (Banda, 1996).

3.1 Selection of the community and feasibility study

In 1996, the LFRTD selected Kosgala as the project location for several reasons. First, the Kosgala community was suffering from severe transport difficulties due to the unavailability of a regular bus service and poor road conditions. Second, the LFRTD and its project partner, the Intermediate Technology Development Group (ITDG, now called Practical Action), believed that the project management of such a new enterprise was beyond the normal village community-based organization (CBO) activities since it required a different set of skills and a strong CBO. With the presence of the SANASA Society (Thrift and Credit Cooperative Society), the Kosgala community appeared to have the capacity to manage such an enterprise. A feasibility study was conducted and the conclusion was that the project could be implemented in Kosgala.

Following the feasibility study, LFRTD, with the assistance of key members of the CBO, identified the issues related to the project implementation. It was suggested that the condition of the road section within the village be improved in order to accommodate a bus. According to the directors of the company who were responsible for the management of the bus service, the SANASA Society in the area was given the responsibility to undertake the road surface improvements which involved widening the road from 8 feet to 10 feet. This task was completed before the start of the bus service. As described in Section 4 below, the improvement of the road led to a number of indirect impacts which were both good and bad for the community bus service.

3.2 Institutional arrangement between the stakeholders

ITDG, as the principal partner of LFRTD, provided the initial social mobilization of the community. From conceptualization, it took almost three years to mobilize the community through various programmes, such as *shramadana* (free labour) for road construction. ITDG played a key role in mobilizing the community by stationing a full time social mobiliser in the village before the project and by assigning a part time project manager and a communication office for about one year after the project commenced.

The social mobiliser based in the village was able to iron out some of the conflicts of interest between some sections of the community. The village leadership also had the capability to get everyone together, especially for the *shramadana* campaigns organized for the road construction. The project benefited from the presence of a social mobiliser, particularly in facilitating interactions among villagers as well as in conducting collective exercises. Later on, RTP Ltd. and the Pradeshiya Sabha (local authority) also became stakeholders of the project by making contributions.

3.3 Project Budget and costs

ITDG agreed to donate 900,000 Sri Lanka rupees (SL Rs) (about US\$16,700 at the rate of \$1=L54.00 Sri Lanka rupees (SL Rs) as at March 1996) as part of the capital to purchase the brand new bus (Lanka Ashok Leyland¹⁴). This was about 60% of the capital requirement. It also provided project management with engineering and social inputs. The full cost of the bus was 1,400,000 SL Rs (\$25,925). The balance was raised from the following:

- a. 500,000 SL Rs (\$9,260) was borrowed from the Peoples' Bank through a commercial bank loan, repayable over a period of 5 years.
- b. 250,000 SL Rs (\$4,630) was raised from a loan from the SANASA Cooperative Credit Society on more flexible terms of repayment than the commercial bank loan.
- c. Locally raised funds by the community through a Lottery and other contributions.

The community inputs in cash and in kind were very high, especially during the widening/construction/repair of sections of the access road, which was around 46% of the estimated cost of the road project. The total labour contribution was 9,700 man-days. The CBO (later formed into the bus company) managed to raise 40% of the balance required for the capital and working capital was obtained from soft loans from the SANASA Society and from a lottery conducted in the area.

The registration fee, insurance premium costs, etc., were also covered by the collected funds. LFRTD managed to get the bus driver trained on basic bus maintenance by the Lanka Ashok Leyland free of charge through negotiations made between its member the NTC.

In addition, ITDG shouldered the salary of the social mobiliser that was assigned to the village for 2 years, provided technical inputs in the access road improvements and carried out basic accounts and bookkeeping trainings to the officials of the bus company.

3.4 The Bus Company

To make it easier for the community to access credit from commercial banks to purchase the bus, LFRTD pioneered in setting up the CBO to the status of a Company by Guarantee registered

¹⁴ This is the brand name of the bus.

with the Registrar of Companies of Sri Lanka. The Company was named Rural Transport Promoters Limited by Guarantee (RTP Ltd). The company directors (ten in number) were elected annually by the community at the annual general meeting as a pre-requisite set by the Registrar of Companies. The annual general meeting consisted of 100 representatives from 6 community organizations (e.g. Village Development Organisation, Thrift Societies, Welfare Associations, etc.) in the village.

The widespread community representation in the company provided transparency, while the submission of ratified audited statement of accounts to the LFRTD and the Registrar of Companies assured the correct use of funds.

4. Challenges in implementing the project

4.1 Burden of the initial loan

The project had financial difficulties in the early stages mainly due to the burden of substantial loan repayment (payback) installments. However, the bus managed to reach the breakeven point by the end of the second year and gradually started to earn profits from the third year onwards. Notably, the company was able to earn more regular profits after it sold the first bus in 2008, paid all the outstanding debts and invested the balance on purchasing a new (second-hand) bus with much lower operational costs.

The company also began hiring out the bus to outside parties for pleasure trips and pilgrimage during weekends and on public holidays in order to earn extra income. In recent years, this has become a major source of income for the bus.

4.2 Poor infrastructure led to route diversion

Due to the dilapidated condition of the access road running through the village, the community bus did not operate for ten (10) months on its normal route in 1998 (Gunetilleke and Jayaweera, 2002). The bus took an alternate route from Ratnapura through Kuruwita to terminate at Halpe. This resulted in increased income due to the higher number of passengers on the alternate route.

4.3 Competition from a new CTB Bus

A CTB bus introduced in the same route in 2011 became a major competitor to the community bus. According to Chandra Kanthi, secretary of the bus company, the average number of passengers in 2011 was about 600 per day but declined to around 480 per day since the introduction of the CTB bus. No daily records on the number of passengers are kept by the company but it can be calculated from the ticket counterfoils. However, the decrease in the number of passengers has been offset by the increased income from hiring out the bus for pleasure and pilgrimage trips and also by a bus fare increase instituted in 2012 by the NTC.

4.4 Difficulties in running the service

The community found it difficult to run the company economically and socially. In particular, it was a challenge to submit the required audited statement of accounts and reports to the registrar of companies, since these cost money and require the service of an expensive company secretary. The company stopped submitting reports about 7 or 8 years ago. When consulted in May 2014 for this case study, the Secretary of RTP Ltd. suggested a move away from company status to a more manageable village level society or association.

4.5 Emergence of village factions

Banda et al., who carried out an evaluation in 1999, three years after the commencement of the bus service, say that at the time of the evaluation, two factions emerged in the village to take control over the bus service management (Banda, 1999). LFRTD intervened at this point to negotiate between the two parties and settle the matter.

4.6 Decline of community “ownership”

In the early years of the project, the community had a sense of ownership towards the bus service, referring to it as “Ape Bus eka” (our own bus). However, according to the present Secretary of RTP Ltd., that sense of ownership gradually declined as the bus service continued. For example, the community members did not take part in routine road maintenance work with enthusiasm and leadership, as they did during the initial period of road construction. Only five (5) active members are looking after the interests of the company now, with the rest having moved out of the village or are simply no longer interested in the bus company.

5. Impact of the project

Although the project was evaluated several times over the past sixteen years, no comparative survey on the impact of the project has been done continuously over time. However, the overall impacts of the project based on a number of post-project evaluations are summarized in Table 2 below.

5.1 Direct impact of the community bus service

a) Access to education and healthcare

The community was able to operate the bus service on a timetable that catered towards its travel needs. The school children attending secondary and higher schools in Ratnapura take the bus that leaves the village at 7.10 a.m. to reach their schools on time. The return bus takes the teachers to the primary school in the village. Earlier, school attendance was very poor due to the non-availability of transport.

Passengers, especially women and school children, felt safe with the journey, assured by the quality of service, particularly the punctuality, daily schedule and good attitude and behavior of both the conductor and driver (CEPA, 2009). Furthermore, because the bus timetable was adjusted to correspond with the community's needs, patients and other villagers could travel more easily when going to the hospital or clinics.

b) Economic benefits for commuters

The reduction of transport expenses for the villagers was an important impact of the community bus service. Transport expenses were reduced in two ways. First, travel route became shorter. Before the project, villagers had to take two buses and walk about 2 to 3 km to reach the nearest town. With the project, there is one bus straight from the village to the town. Second, travel time was reduced. The surplus time was used for production and leisure, which improved the quality of life of the people.

The punctual and continuous bus service provided community members who are formally employed outside the village assured transport service to and from work. The schedule of the bus was convenient for the employed community members going to work since they can take the bus close to their place of residence. The impact was also felt on the return journey from work.

5.2 Indirect impact of the project

a) Impacts of the access road

As noted above, a section of the road which ran through the village was improved by the communities in the three villages at the start of the project. One of the impacts of the road improvement was to increase the number of vehicles on the road, which then reduced transport costs. The improved road also received the attention of the Pradeshiya Sabha, the lowest level of local government in Sri Lanka, which then agreed to pave the community-constructed road.

Since the bus runs on a fixed schedule and transporting goods in bulk is difficult, some traders within and outside the villages use other modes of transport. The bus was used to transport only small amounts of outgoing agricultural produce and incoming consumer goods, but certainly at a

much lower cost than hiring vehicles.

When the road surface was improved and became motorable, people in the village started buying new motor vehicles. The number of three-wheelers and motorbikes increased. There are about 20 three-wheelers in the village now and the number of motorbikes has increased from about 60 in 2006 to about 120 in 2009. The increase in the ownership and use of three and two wheelers in the village is thought to have reduced the income of the bus.

A section of the paved road, about 750 meters, is still in a badly dilapidated condition due to illicit gem mining carried out in the area. Government authorities have not made an effort to stop the activity and people believe that it is due to political influence. In the near future, the existing road may disappear.

Table 2. Impacts comparison of baseline and post intervention data

	Before the project	After the project
	1. Access to education	
1.1	Retaining teachers in the village primary school was a problem because transport from Ratnapura was not available.	The teachers can use the community bus for the afternoon trip at least, if not for the morning trip. There is a delay of about 20 minutes in the morning as the bus has to return from Ratnapura around 7.30 am.
1.2	The school children could not participate in extracurricular activities in school and were unable to attend private extra classes due to lack of transportation back to the village in the late hours of the day.	Children are using the bus to go for additional classes after school or during weekends and to come back home after they finish extracurricular activities such as sports in the afternoons.
1.3	The children who attended schools (secondary/higher education) in Ratnapura town had to walk long distances to get to the nearest bus route early in the morning. They also arrive home late after school and had to spend a tiring time walking home in the absence of regular transport services.	Students attending schools in Ratnapura have a regular bus service at their door steps that run on the timetable that caters to their needs.
	2. Access to healthcare	
2.1	The ante-natal and post-natal clinics were held by the midwife in the house of a community member. However, for emergencies and to visit a doctor, people had to go to Ratnapura and pay a lot for transportation.	For regular visits to the hospital and clinics, and to visit patients, people have the convenience of the community bus. The bus timetable had been prepared to meet their preferred travel times.
2.2	The cost of hired transport was very high due to the dilapidated condition of the road.	With the road improvements and the community bus, the cost of hired transport considerably went down.
	3. Meeting economic and other needs	
3.1	<p>Kosgala villagers used the irregular CTB bus or walked about 45 minutes to reach the Karapincha-Ratnapura bus route.</p> <p>Kitulpe villagers walked to Karapincha (30 minutes) and took the bus to Kuruwita and then to Ratnapura. Both Kuruwita and Ratnapura buses were frequent.</p> <p>Halpe villagers took the bus to Kuruwita and then to Ratnapura.</p> <p>Communities in all the three villages had to bear the high cost of transport as a result of changing buses and walk substantial distances.</p>	<p>There is a significant change in the travel needs and patterns of the communities in the three villages of Kosgala, Kitulpe and Halpe due to the substantially reduced transport costs.</p> <p>The time spent walking to take the bus as well as the extra time spent by taking two buses is saved. This surplus time is used instead for production and leisure, which has led to the improvement in the quality of life of the people.</p>

	Before the project	After the project
3.2	The nearest markets for agricultural produce of the village such as rubber and minor export crops were located in Ratnapura (13 Km) and Kuruwita (6 Km). The people transported them either by bus or bicycle.	Travel with agricultural produce has been made much easier with the community bus service to Ratnapura town that fetched farmers much better prices than in Kuruwita town. Farmers can also hire vehicles now to transport their produce as the condition of the road has been improved and the transport costs have gone down.
3.3	Consumer goods were available at the village stores but were quite expensive when compared to goods in the nearby towns. This was due to the high transport costs, since the shop keepers had to hire transportation (three-wheelers).	Moving of goods and services in to the village has become easier since the bus service is easily accessible. The grocery shops and boutiques in Kitulpe and Kosgala have almost all the essential consumer goods sold at competitive prices. The bus service has helped shop keepers save on the cost and time spent on transportation.

Sources: Banda (1999); Gunatilleke and Jayaweera (2002)

6. Lessons learned from the community bus service project

6.1 Lessons Learned

a) The idea that 'rural transport service is unprofitable' is misleading.

Private bus owners are not interested in operating bus services in the rural areas because of the small number of passengers (due to low density population) and a low profit margin. The NTC pays a subsidy to buses operating in these unprofitable routes but only the government-owned CTB is interested and only because of political pressure.

However, this project was able to challenge the idea that rural transport service is unprofitable. The main reason for the commitment of the community was their transportation needs. Most need-based projects, with proper and appropriate management, do have success stories. The replication of this pilot project has to be based on the lessons learned so that certain conflicts of interest among parties, both inside and outside the community, can be avoided. Community mobilization and trainings on management and basic financial management are also necessary.

b) The commitment of the community changes.

In the beginning, the enthusiasm of the entire community was high. The community participated in the road development work by contributing free labour and providing other required resources free of charge. The concept of shramadana or donation of labour has existed in the culture of Sri Lanka for thousands of years. When there is a common need and good leadership, people get together to donate time and labour. Before 1977¹⁵, the sharing of labour, animals and equipment was a prominent cultural concept in the agriculture sector in rural Sri Lanka.

However, the attitude of the community towards the bus service changed as the project reached its 16th year of operation. The "our bus" attitude towards the bus service gradually decreased. This change in attitude is normal given the span of 16 years. Nevertheless, the commitment of the five enthusiastic members teaming up to take the bus service forward is commendable.

c) Good quality infrastructure is necessary.

An important factor explaining the success of this project, which was not initially planned, was the renovation of the road. Bus services operated on dilapidated roads will have high vehicle operating costs.

In 2002, two and a half years after the commencement of the bus service, the CBO (later the bus company) felt that the footpath connecting the adjoining villages Halpe and Kitulpe also had to be

¹⁵ Free labour-sharing by farmers in each of their agricultural plots, in the rural agriculture sector in Sri Lanka was quite eminent. Since 1977, with the introduction of liberal economic policies by the government, labour gradually became a source of income for the people and nothing was available for free even for sharing.

widened and given an improved surface in order to extend the bus service to Halpe (an endpoint). They felt that it will benefit the community in Halpe and also add to the income of the bus service. As a member of the LFRTD, the ITDG did the road improvements using their own technology and methodology for community participation. ITDG provided the technical assistance and the community, together with the support of the SANASA Society, contributed land, labour and local materials. The technology to improve the road surface was left in the hands of government authorities.

d) The company structure and the community's capacity to maintain it need to be rethought.

It is obvious that, on their own, poor communities are unable to make big capital investments. Donations and/or a system developed by financial institutions and NGOs are needed. In the case of this project, the main reason for setting up the company was to enable the community to access credit from commercial banks for the purchase of the bus. However, the requirements were difficult to deal with and manage and this later became a burden on the community.

For example, at the start of the project, RTP Ltd. signed an agreement with LFRTD that RTP Ltd. will provide regular feedback on the bus service and, more importantly, that it will obtain written consent from LFRTD in case the company wants to sell the bus. However, these records were not retained by either LFRTD or the RTP Ltd. In addition, the Secretary of the bus company had only four financial statements (1998/1999, Jan-Dec 2000, 2008/2009, and 20012/2013) available as at 11 May 2014. The bus company also has no record of the number of passengers on daily basis. One has to count all the passenger ticket counterfoils if data on this is needed.

According to the present members of the company, it is difficult for a community-run initiative to maintain the status of a registered enterprise under the Registrar General. Money and skills are needed to comply with the requirements for the audited annual reports and annual statements of account. Hence, considerable thought should be given on an alternative system that is manageable for a village community.

e) There is a gap between the company and the community.

The decision-making authority was and still is in the hands of the Committee or the Board of Directors. The Board makes decisions as and when required, such as the replacement of the bus, and the provision is made under the constitution or the company by-laws. In the past, the members (the community) were not adequately informed and this may explain the gradual loss of interest of members and the current situation.

The CEPA (2009) further added that "over the past 5 years the relationship gap between the existing committee and the community seems to have widened. The committee over the years seems to have become more involved and concerned with keeping the project alive rather than making a conscious effort to involve the community at large with the management of the bus. In conjunction, the community also seemed to have become less involved given the time constraints caused by the nature of their main occupation, agriculture" (p 20).

However, all reports, including financial reports, are circulated to members during the annual general meetings where the conduct of the Committee (the Board of Directors) can also be questioned. The current members of the committee acting as company directors have remained in their positions for several years because no new faces were introduced to the company. These current members are also all from Kithulpe. Over the years, the representatives from Kosgala dropped out of the Committee due to various reasons and disputes.

f) Strong social inputs are needed.

For future community bus service projects, community mobilization and an assessment of the location and road access of the villages are needed before selecting an appropriate project site. Social mobilization will help the community understand the different concepts and responsibilities, and thus minimize disputes. Figure 3 shows the process developed from the LFRTD project experience.

This was later adopted by another Practical Action¹⁶ project in Orissa, India.

It is desirable for a strong local NGO or CBO to stay with the community and give advice and guidance. The LFRTD has not kept in touch with the bus company. From 2004, there were only two instances. One was in 2008 when the bus company asked for permission from LFRTD to sell the bus, and second, in 2009 for a project evaluation carried out at the request of LFRTD. The interest of LFRTD gradually dropped and the bus company and the community had no guidance and support in resolving their social and management problems.

Figure 3. Community participation cycle (based on LFRTD project experience)



Source: Practical Action South Asia

7. Conclusion

The main benefit of community managed systems is that they cater to the communities own needs. The voice of the community is heard and overall management takes a sense of ownership. It is not profit-oriented like a private enterprise. Nevertheless, the commitment of the community will gradually decay if the system loses the attention and active participation of the community.

The continuation of the current project is attributed to the personal commitment of the Board. An evaluation report conducted by CEPA in 2009 stated that “the perceived personal responsibility of the company directors has several implications. It is this sense of responsibility or the feeling that if the community bus project failed at some point then it is their almost personal failure, that has mainly brought this project this far. The wealth of experience that they have accumulated over the years by managing the project has undoubtedly helped them overcome some of the difficult phases and make the project a success. But it was evident from the discussion with the directors that this has put an unnecessary strain on them. It has also meant that a gap has been created between the committee and the community” (p 20).

Despite many setbacks, the bus is still in service and managed by the remaining five energetic and courageous members. It also earns a profit and the present board is thinking of replacing this bus with a better one. Similar projects that have since been implemented in Orissa, India, as well as in other parts of Sri Lanka and Nepal, suggest that it is possible to successfully manage such a transport initiative in a simpler way than by maintaining a very small registered company like RTP Ltd. that impose a burden on the village community. Moreover, communities that engage in these initiatives need the backing of local and community based NGOs and/or the State.

¹⁶ The Practical Action (PA) South Asia Office in Sri Lanka (formerly ITDG) is a founding member of the LFRTD and also a key stakeholder of this project. They had active transport programmes in Sri Lanka, Kenya, Sudan, Zimbabwe, Nepal and India. PA was involved in the community-managed transport service project throughout the entire duration and was very keen to learn how a rural community can manage its own transport service. Having analyzed the key lessons learned from the community bus project, they introduced the “community managed” transport service concept to two locations in Sri Lanka and two other locations in Orissa, India. Practical Action Nepal replicated this management concept in the Gravity Ropeway projects in rural Nepal.

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Saving lives through rural ambulance services: Experiences from Karnataka and Tamil Nadu states, India

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Abstract

Transportation of trauma cases is an integral component of health care provision. Ambulance services to transport pregnant women, children and those that require emergency medical attention remains a challenge in India even after 50 years of public health care provision. The transport component is known to contribute to accelerating the achievement of various Millennium Development Goals, including those relating to reducing maternal and infant mortalities. It was in this context that the National Rural Health Mission (NRHM) in India funded a nationwide initiative to support rural ambulance service - the "Dial 108 service". This was largely adopted from a not-for-profit organization, the Emergency Medical Research Institute (EMRI), which has initiated 108 services early on. This case study analyzes the experiences of the states of Karnataka and Tamil Nadu in the context of the NRHM initiative. The analysis provides insights on factors contributing to efficiency, cost-effectiveness and likely impact. The case study demonstrates the usefulness of the public-private partnership model in converging technology, management, skill-building, funds and political will, and offers useful suggestions for setting up low-cost emergency medical transportation services for the rural population, which can also serve urban areas, both in India and in other countries.

Keywords: public health, emergency response services

1. Introduction

As an emerging economy, India shows potential for growth. It has a stable democracy, educated and skilled young population, and a rapidly growing infrastructure. On the other hand, although life expectancy has gone up by 7.9 years since 1990, raising the quality of life for the majority remains a challenge (Nagaraj, 2010; The Times of India or TOI, 2014). For example, India will miss the target of reducing maternal deaths (maternal mortality ratio or MMR) to 109 per 100,000 deliveries by 2013. The national MMR is likely to remain at 139 in 2015 (Live Mint, 2014).

In India, about 69% of the population lived in rural areas in 2011. According to the national census of 2011, the number of rural villages in India is 540,867. Out of these, only 22% of the rural population live within 5 kilometers from the nearest town; 28% are in a range of 5 to 10 kilometers from a town; and the majority of 50% are located 10 kilometers from the nearest town (Census, 2011). Although the number of poor people living in urban areas is growing, poverty remains a predominantly rural phenomenon.

It was in this context that the Government of India (GOI) initiated the National Health Mission (NHM). Access to quality health care was recognized as an important factor in well-being, productivity, addressing poverty and overall economic growth. The NHM therefore took on the challenge of infusing appropriate financial, technical and managerial inputs to strengthen health care delivery. A Rural Ambulance Service (RAS) was one of the key inputs, primarily to ensure timely comprehensive maternal, infant, and child care, while also providing emergency response transportation for other types of trauma and incidents requiring emergency medical care.

2. Current status of health-care in rural areas

2.1 Overview of the health-care Network in India

The GOI has established norms for the provision of primary, secondary and tertiary health care. Primary health care institutions such as Community Health Centre (CHC), Primary Health

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Centre (PHC) and Health Sub Centre (HSC) cater to the preventive, curative and health information needs of rural population.

As of March 2012, there were 148,366 HSCs, 24,049 PHCs and 4833 CHCs catering to India's rural population (Ministry of Health and Family Welfare – Government of India or MoHFW-GOI, 2012). The CHC is often the First Referral Unit (FRU) with facilities to stabilize the patients, perform general surgeries and importantly, perform C-section with obstetric and gynecological complications during pregnancy or child birth.

Referrals from CHC or PHCs are sent to secondary hospitals, which consist of District Hospitals and Sub-District Hospitals at Tehsil level (a sub-district revenue division). These secondary hospitals have specialists, better diagnostic capabilities and larger bed strength. Tertiary hospitals, which are mostly teaching hospitals, provide specialized medical care. Most specialty or super specialty hospitals are located in metropolitan cities.

In addition, there are nursing homes with 5 to 25 beds found in other cities and bigger towns. These nursing homes mostly stabilize patients and refer them to general hospitals or super-specialty hospitals.

2.2 Inter-state and rural-urban variations in health-care provision

India promotes universal access to preventive and curative care. However, large scale inter-state variations, gender (male-female differences) and intra-state (tribal, rural and urban differences) persist. In particular, there are huge variations in health infrastructure across states. The table below compares some of the parameters for rural health provision of three states in South India (two being high performing states – Kerala and Tamil Nadu, and one a medium performing state - Karnataka), Madhya Pradesh in Central India, a low performing state, and Bihar in Eastern India, another low performing state. As can be seen, in the low-performing states of Madhya Pradesh and Bihar, health care facilities cater to the needs of a larger number of villages than in the other states.

Table 1. Comparison of rural Health provision in high, medium and low performing states on Millennium Development Goals in India

State/UT	Average Rural Area [Sq. Km.] covered by		Average Radial Distance [Kms] covered by			Average Number of Villages covered by			Number of Sub centres per PHC	Number of PHCs per CHCs
	PHC	CHC	Sub Centre	PHC	CHC	Sub Centre	PHC	CHC		
India	129.66	645.21	2.59	6.42	6.42	4	27	133	6	5
Tamil Nadu	95.79	305.28	2.07	5.52	9.86	2	13	42	7	3
Karnataka	80.79	1036.8	2.59	5.07	18.16	3	13	163	4	13
Kerala	44.02	164.11	1.57	3.74	7.23	0	1	5	6	4
Madhya Pradesh	260.63	904.75	3.29	9.11	16.97	6	47	165	8	3
Bihar	49.58	1319.41	1.74	3.97	20.49	6	47	165	8	3

Source: Rural Health Statistics in India (2012)

There are also significant variations in the availability of hospital beds and health care personnel between rural and urban areas. While nearly 70% of the population lives in rural areas, there are only 143,069 government hospital beds in rural areas, compared to 369,351 in urban areas.

In other words, roughly 80% of government hospital beds cater to only 30% of the total population.

Furthermore, in 2009, 31% of the rural population travelled over 30 km for medical treatment (KPMG, 2010). Due to the long distances to health facilities, geographical access to health care is a significant barrier to institutional delivery in rural areas. This is exacerbated by shortages of health care personnel, particularly doctors and specialists, in the primary health care sector. In Karnataka, for example, 30 percent of the posts for general physicians and primary caregivers which serve the rural population are vacant in PHCs, CHCs and sub-centers. The vacancies are as high as 65 percent when it comes to specialists and super specialists. In state hospitals, 1,148 posts for specialist doctors and 2,727 posts for doctors lay vacant (The New Indian Express, 2013).

2.3 Effects of out-of-pocket spending for health on the households

There is also growing evidence of widening income inequalities along both spatial and socioeconomic dimensions. The benefits from economic growth appear to dissipate radially around towns. Between 1993 and 2005, inflation-adjusted per capita incomes grew in villages located within five kilometers of towns, while inflation-adjusted per capita income, fell in villages located at greater distances. The deepest reductions occurred in the farthest villages, which to begin with had lower per capita incomes. The poorest income groups in more remote villages suffered the largest cuts in purchasing power (Krishna and Bajpai, 2011). Within the towns, those who live in lower socioeconomic areas are equally affected by the widening inequality, often located away from hospitals and have congested and poor amenities.

Illnesses can push people into poverty if out-of-pocket spending for health costs is high. Based on the World Health Statistics (2011), India has the 42nd highest average out-of-pocket expenses among countries. Seventy-four percent (74%) of health expenses are being paid out-of-pocket while a mere 2-3 percent are borne by the insurance sector. "It is reported that 39 million Indians are pushed to poverty because of ill health every year" (Selvaraj and Karan, 2009). About 3.6 percent and 2.9 percent of households in rural and urban India, respectively, slipped into poverty owing to debt incurred in meeting medical expenses (Gupta, 2009). "Around 30% in rural India didn't go for any treatment for financial constraints in 2004 — up from 15% in 1995. Similarly, in urban areas, 20% of ailments were untreated for monetary problems in 2004 — up from 10% in 1995. Loans and sale of assets helped in financing 47% and 31% of hospital admissions in rural and urban areas, respectively" (Kounteya, 2011).

In this context, government health care provision assumes importance, particularly in assisting the poor in accessing quality health care. Various studies show that the poor utilize the government health care system. About 68% of the first quintile (Q1) of the population (the poor) used government health care institutions for institutional delivery (Chakrobarty and others, 2012). Similarly, 60 % of the poor accessed government services for preventive and curative health care.

The National Rural Health Mission (NRHM) established in 2005 and the Rashtriya Swasthya Bima Yojana (RSBY), a national health insurance scheme for people below the poverty line, are the two most important health initiatives by the central government. Several state governments, including Tamil Nadu and Karnataka, established health insurance schemes to improve medical care. However, these did not substantially improve access to and the quality of health care nor reduce out-of-pocket spending of families.

3. Impact of the national rural health mission on rural ambulance service provision

Under the NRHM, the Government of India initiated the National Ambulance Service (NAS) as one of the key interventions (MoHFW, 2014). The aim is to extend universal access to basic and advanced life support services to those living in rural areas. One of the key objectives is to reduce maternal, infant, and child mortality by transporting those who need emergency medical attention within the 'Golden Hour'²¹. Emergency Response Services (ERS) transports pregnant women, infants, children, trauma (accidents, cardiac arrest and others), and other patients, and provide referral transport (inter-facility transfer).

²¹ The Golden Hour refers to a time period lasting for one hour following traumatic injury being sustained by a casualty or medical emergency, during which there is the highest likelihood that prompt medical treatment will prevent death (American College of Surgeons, 2008).

The ministry also launched the Janani Shishu Suraksha Karyakaram (JSSK) in 2011. The initiative entitles all pregnant women delivering in public health institutions to absolutely free delivery, including caesarean section. Pregnant women are also entitled to free transport from their homes to government health facilities, between the facilities in case they are referred on account of complications, and back to their homes after delivery.

3.1 Expanding the reach of ambulance services in rural areas

Recognizing the need to provide timely medical care in hospitals, particularly to pregnant women and infants in order to bring down MMR and infant mortality ratio (IMR), NRHM supports state governments in launching and augmenting the ERS. The NRHM provides 100% financing for the capital expenditure of ambulances for 108 services. Operational cost is supported on a diminishing scale of 60 % in the first year, 40 % in the second year and 20% thereafter. For 102 services, NHM provides financing for both capital and operational costs. The classification of 108 services and 102 services are discussed further in succeeding sections.

NRHM stipulates that all state governments must ensure the universal availability of global positioning system (GPS) fitted ambulances, provide a reliable and assured free transport for pregnant women and newborns/ infants, and establish control rooms for timely response and provision of services. NRHM also requires drop-back facilities for mothers and newborn or neonate admissions. The fleet should have a prudent mix of basic level ambulances and emergency response vehicles, and more importantly, the response time for the ambulance to reach the beneficiary is not to exceed 30 minutes.

3.2 Models of rural ambulance services in India

NHM²² classifies NAS into 108 services and 102 services, according to the number dialed when calling the ambulances. The 108 services is an ERS transporting accident victims, critical care, trauma and other medical emergency patients. The 102 services is a basic patient transport system for pregnant women and children. Currently, 108 services has 7,239 ambulances (490 advanced life support and 6,749 basic life support. The 102 services has 8,122 ambulances, with the capital expenditure for 2,677 out of 8,122 ambulances borne by the states²³. NAS also includes an additional 4,769 empanelled vehicles used in some states to transport pregnant women and children, such as the Janani express in Madhya Pradesh, Odisha, Mamta Vahan in Jharkhand, Nishchay Yan Prakaalpa in West Bengal and Khushiyo ki Sawari in Uttarakhand.

States have the flexibility to establish referral systems to transport pregnant women and newborns/infants. This spawned off different models of operations in providing emergency transport or referral transport services (see Box 1). At present, India has over eighteen (18) different models of transportation for emergency, pregnant women, children and other categories of patients. These can be broadly categorized as follows:

- a. State-wide models. This is the “108 Emergency Transport Facility”, where the ambulance comes with equipment and trained staff to manage emergencies during transit.
- b. Decentralized district or block-level public-private partnership (PPP) models. The fleet includes government and contracted private vehicles, such as the Janani Express Yojana in Madhya Pradesh, and the District Health Society²⁴ manages the services.
- c. Decentralized community-based models. These are managed by community-based organizations and there is significant involvement of communities and private vehicle owners. Typically, the vehicles are not dedicated for RT. Examples are Cheeranjeevi Yojana in Gujarat, Ayushmati Scheme in West Bengal, in Khunti district of Jharkhand and in Dholpur district of Rajasthan.

²² The National Health Mission is a framework that governs the National Rural Health Mission, National Urban Health Mission, National Ambulance Services, and other related health improvement activities. Funds for NAS is provided through NRHM.

²³ Although NHM assures capital expenditure for 102 services, in some of the states capital expenditure for some or all 102 ambulances were borne by the respective states

²⁴ District Health Societies are formed under NRHM for the implementation of the plan, monitoring and reporting.

Box 1. Variety of emergency response service models in India

State-wide Emergency Response Services: Many states contracted Emergency Medicine Research Institute (EMRI) for setting up and running ERS. EMRI started as a PPP initiative in Andhra Pradesh in 2005 and took responsibility for a statewide ERS in Gujarat in 2007. In 2008, six more states, Uttarakhand, Tamil Nadu, Rajasthan, Goa, Karnataka and Assam entered into a memorandum of understanding with EMRI to launch ERS services. Currently, EMRI is running ERS in 15 states. Other players are Ziquitza Health Care Limited (ZHCL) (Rajasthan, Punjab, Kerala, Orissa and Bihar), and the Bharat Vikas Group India Ltd. (Maharashtra).

Rural Ambulance Services: Karnataka and Madhya Pradesh have deployed vehicles at PHCs and CHCs through a partnership arrangement with private providers. The Accredited Social Health Activists (ASHA) and Auxiliary Nurse Midwives (ANM) call the drivers on their mobile phones when the vehicle is required. Janani Express Yojana in Madhya Pradesh and Janani Suraksha Vahini in Karnataka are two examples of this model.

Referral Transport for Maternity Services: The United Nations Children's Fund (UNICEF) is assisting District Health Societies to develop low-cost referral transport for maternity services using existing resources. Guna in Madhya Pradesh, Dholpur in Rajasthan and Khunti in Jharkhand are good examples of decentralized models conceptualized and supported by UNICEF.

Rural Ambulance Services at subdistrict level: Deepak Foundation, with support from the district and the Government of Gujarat, has been operating an emergency transport facility across several blocks in the Vadadora district.

Decentralized community-based models: The Government of Gujarat also outsourced maternity services (normal and complicated deliveries) including referral transport to private gynecologists. The scheme is called Cheeranjeevi Yojana. The Government of West Bengal also initiated a similar model called Ayushmati Scheme. In some remote and difficult areas such as Khunti district of Jharkhand and Dholpur district of Rajasthan, similar models are in operation.

Other initiatives: Free bus passes for Scheduled Castes / Scheduled Tribes and Below Poverty Line (BPL) pregnant women in rural areas have been launched in some states, including Andhra Pradesh, Uttar Pradesh and Haryana.

Source: Adopted from Operating Perinatal Referral Transport Services in Rural India, UNICEF, 2010

3.3 Rural ambulance services in Tamil Nadu

In Tamil Nadu 1,140,000 deliveries took place in 2006. Among these, 7% of deliveries were in HSCs, another 7% in PHCs, 56% in government hospitals and the remaining 30% in private hospitals. Although 96% of the total deliveries are institutional deliveries, more than one thousand maternal deaths occurred and the MMR was 90 per 100,000 deliveries, 79% of which were attributed to direct causes. The pressure was on the health system to provide timely, quality and affordable medical care for reducing maternal and infant mortality, emergency trauma cases, surgical procedures and specialist medical attention.

The lack of ERS was the cause of the loss of thousands of lives particularly in rural areas. To remove the affordability barriers to ambulance services in the poorer section of rural and urban areas, ambulance services were launched under the Tamil Nadu Health System Development Project (TNHSP).

The TNHSP initially partnered with non-government organizations to provide ambulance services in 15 districts but later partnered with an experienced organization due to various difficulties

encountered. TNHSP signed an MoU with GVK²⁵ -Emergency Management and Research Institute (GVK-EMRI) to provide emergency services for the state.

The ERS is fully funded by the Government of Tamil Nadu. The budget for the financial year 2013-14 (1st April 2013 to 31st March 2014) was Rs. 990,233,000 with the average expenditure per ambulance per month at Rs. 116,589.70.

All the ambulances procured by TNHSP were handed over to EMRI for retrofitting with the required specifications. On September 18, 2008, the 108 service was launched in Tamil Nadu with 385 ambulances, growing to 638 ambulances at present. The EMRI had empanelled 1,806 private hospitals until 31st March 2014.

Currently, the call center is operating from a building temporarily allotted for this purpose but it is expected that a dedicated call center at the Directorate of Medical Services campus will be operational soon. Meanwhile, EMRI employs 3,315 persons, of whom 141 are EROs, 1,459 are EMT, 1,552 are drivers, 56 are operation staff and 107 are support staff. The male/female ratio is 2733/582.

GVK-EMRI is run independently. An MOU was signed between GVK-EMRI, TNHSP and Tamil Nadu Health Society (nodal agency for NRHM in Tamil Nadu) detailing various parameters. TNHSP has a team under the Deputy Director that monitors performance on a daily basis. The Project Director (with TNHSP), who is also the Mission Director (with NRHM), reviews the performance on a monthly basis and uploads the performance report to the NRHM website. A transparent, accountable and working system is also in place.

3.4 Rural ambulance services in Karnataka

The Janani Suraksha Vahini (a 102 ambulance services) precedes the Arogya Kavacha Scheme (a 108 ambulance services) in Karnataka. Janani Suraksha Vahini was part of Janani Suraksha Yojana (JSY), under which ambulances were placed in 176 Taluk hospitals for the transportation of emergency cases of pregnant women and children. The ambulances were placed in hospitals, community health centers, primary health centers and other suitable places in the area.

The Janani Express Yojana provided transportation to all expectant mothers for their institutional deliveries. Ambulances are also called for emergency situations during pre- and post-delivery periods. Moreover, eligible beneficiaries of the Deendayal Antyodaya Upchar Yojana and sick infants also benefited from the transportation facility for their casual medical treatment.

NRHM introduced emergency ambulance services in rural areas (108 services) to meet the transportation requirement for everyone during medical emergencies. EMRI was contracted to provide the 108 ambulance services. The 200 ambulances placed under the Janani Suraksha Vahini scheme were transferred to the 108 ambulance services.

a) EMRI – 108 Ambulance Services

For 108 ambulance services, the budget for the financial year 2013-14 was Rs. 9,056,760,000 and average expenditure budget per ambulance per month was Rs. 505,691.49. EMRI employs 2,726 persons, of whom 105 are EROs, 1,209 are EMTs, 1,288 are drivers, 56 are operations staff and 68 are support staff.

Currently, the 108 service in Karnataka has 517 ambulances. EMRI signed 2,295 memoranda of understanding with government hospitals and 1,128 memoranda of understanding with private hospitals to provide emergency medical care at hospitals.

An MOU was signed between GVK-EMRI and the Department of Health and Family Welfare of the Government of Karnataka. As in the case of Tamil Nadu, a performance report is uploaded to

²⁵ GVK is an Indian conglomerate with diversified interests across various sectors including energy, resources, airports, transportation, hospitality and life sciences. It runs various social initiatives under the GVK Foundation for the overall development of the society. GVK-EMRI attends to every emergency, be it a medical crisis, law and order situation or a fire disaster. This service is spread across 15 states and two union territories with over 8000 ambulances and over 37 000 employees. GVK, with its various developmental services aims to make a difference to the lives of people all over India.

the NRHM website on a monthly basis.

b) Janani Suraksha Vahini – 102 Ambulance Services

In 2012, Rs. 33,696,000 was budgeted for the ambulance drivers' salaries and mobile phone charges. A budget of Rs. 250 per referral transport under the JSSY²⁶ was allotted, or a total Rs. 5,000,000 for an estimated 20,000 referral transport for newborn children and neonates.

Many assessments for referral transportation under JSY, utilize existing ambulances available in the primary health care and secondary health care network. State governments were engaged to commit to maintaining the vehicles and utilizing existing ambulances. This fleet of ambulances has been absorbed into 108 services and the 108 services provides the referral transport for all cases.

4. Comparison of efficiency, effectiveness and impact of ambulance services in Tamil Nadu and Karnataka

4.1 Relevance

Tamil Nadu significantly extended secondary health services in its rural areas through the establishment of eighty (80) Comprehensive Emergency Maternal Obstetrics and Neonatal Centers (CEmONCs) and 108 ambulance services. These services are supplemented by secondary hospitals at the Tehsil and District levels, and by government and private hospitals that have been selected to provide emergency medical care. All these have led to improved access and quality of care for expectant mothers and infants, which constitute over 50% of referral and emergency transportation in the state.

Karnataka is utilizing government ambulances available in government hospitals and in the primary health care network. The 102 services transport pregnant women, infants and children, both emergency and referrals. Karnataka provides Comprehensive Emergency Obstetric Care (CEmOC) services through its 197 FRUs²⁷. Government and private hospitals have been chosen to provide emergency medical care. Karnataka's Janani Suraksha Vahini is considered as an innovative mechanism that effectively utilizes existing resources at hospitals and caters specifically to the rural population.

4.2 Effectiveness

It is estimated that rural women in the state of Tamil Nadu reach a comprehensive emergency obstetric and neonatal health facility within half an hour from their homes (World Bank, 2013). More than 99.5 percent of deliveries in the state now take place in medical institutions. Meanwhile, Karnataka increased institutional delivery from a mere 33.28% in 2006-07 to 97.7% in 2013-14 (The Hindu, 2013). The number of scheduled caste and scheduled tribe women availing of ambulance services and opting for institutional delivery has also risen significantly.

Table 2 shows that in Karnataka, 43% of medical emergency trips in 2012-13 and 39.5% in 2013-14 were pregnancy related, while in Tamil Nadu it was only 26% for the year 2013-14. The 108 service in Tamil Nadu transported about 27% for trauma cases in 2012-13 and 2013-14; in Karnataka, this was only 12% (2012-13 and 2013-14). Inter Facility Transfer (IFT) in Tamil Nadu increased to 37% from 33% in 2012-13. IFT in Karnataka is quite low at 5% in 2012-13 and 13% in 2013-14, but the increase is more than double.

²⁶ The Janani Shishu Suraksha Yojana (JSSY) is free and cashless assistance to pregnant women to encourage institutional delivery. This is to mitigate expenses incurred by families for transport, hospital and caesarian operation.

²⁷ Designated FRUs are CHC, Block PHCs and upgraded PHCs. First referral units have specialists, 24x7 Comprehensive Maternal and Obstetric Care, stabilize trauma patients, in-patient, basic imaging and laboratory services

Table 2. Analysis of ambulance trips in Karnataka and Tamil Nadu for 2012-13 and 2013-14

	States	Karnataka				Tamil Nadu			
	Reference Period	26 Mar 2012 to 28 Feb 2013		1 Apr 2013 to 31 Mar 2014		1 Apr 2012 to 31 Mar 2013		1 Apr 2013 to 31 Mar 2014	
	Details	No. of cases	%	No. of cases	%	No. of cases	%	No. of cases	%
A.	Total Medical Emergencies	536,676	100	603,762	100	634,364	100	790,793	100
A.1	Inter Facility Transfer of Ante Natal Mothers	10,469	1.95	34,903	5.78	160,160	25.25	115,179	14.56
A.2	IFT others	17,260	3.22	54,043	8.95	53,260	8.4	175,250	22.16
A.3	Pregnancy Related	228,199	42.52	238,461	39.5	160,160	25.25	207,492	26.24
A.4	Cardiac / Cardiovascular	23,147	4.31	29,076	4.82	31,907	5.03	44,985	5.69
A.5	Trauma (Vehicular)	50,149	9.34	57,463	9.52	147,290	23.22	174,248	22.03
A.6	Trauma (Non-vehicular)	14,590	2.72	15,869	2.63	24,883	3.92	35,466	4.48
A.7	Others ²⁸	192,862	35.94	173,947	28.81	56,704	8.94	38,173	4.83
B	Critical life saved	16,892	24.19	22,686	3.76	15,919	2.51	65,945	40.35
C	Total number of cases where victims' "vitals were not recordable"	n.a.				607	0.1	757	0.1
D	Total lives saved since start of 108 services	1 Nov 2008 to 28 Feb 2013	69,825	1 Nov 2008 to 31 Mar 2014	95,105	15 Sept 2008 to 28 Feb 2013	76,149	15 Sept 2008 to 31 Mar 2014	1,63,436

Source: Monthly reports submitted by respective 'Dial 108' services under NRHM monitoring requirements

In both states, rural areas largely utilize the 108 services. In Karnataka, rural areas account for 83.4% of ambulance dispatches. In Tamil Nadu, based on dispatches during May to July 2014, 75% were to rural areas. However, ambulance dispatches not utilized owing to delay in reaching the site or patients arranging their own transportation to reach hospitals needs to be reduced, particularly in rural areas. For example, there were 16,966 unutilized ambulance dispatches in 2013-14, 13,548 of which were rural (2.7% of total rural dispatches) and 3,418 were urban (3.5% of total urban dispatches). People, including those in rural areas, also depend on other modes of transportation and private ambulances for trauma emergencies (vehicular and non-vehicular)..

4.3 Cost Effectiveness

The table below compares the unit cost for 108 services in Karnataka and Tamil Nadu. Tamil Nadu has been more efficient in terms of expenditure compared to Karnataka. The average distance per ambulance in Karnataka and Tamil Nadu increased from 43 km and 42 km in 2012-13 to 48 km and 47 km, respectively, in 2013-14. The cost escalation is sharp in Karnataka at 16% compared to only 9% in Tamil Nadu. Tamil Nadu, which has 638 ambulances, operates at a cost 5% lower than that of Karnataka. The lower cost is attributable to the larger fleet of ambulance reducing the cost of running the call center, the handling of IFTs, and the provision of spare ambulances. Tamil Nadu has one ambulance per 204 sq. km compared to 371 sq km for Karnataka. Tamil Nadu also reports a 20% reduction in average cost per km in 2013-14.

²⁸ Other cases are accidental poisoning, acute abdomen, allergic reactions, animal attack, assault/violence, behavioural, diabetes, disasters, environmental, epilepsy, fevers/infections, fire/burns, hazmat, industrial, neonatal (up to 1 month), pediatric (1-12 years), respiratory, stroke/CVA, suicide attempt, unconscious and other conditions.

Table 3. Analysis of expenditure - Karnataka and Tamil Nadu

States	Karnataka				Tamil Nadu			
Reference period	26 Mar 2012 to 28 Feb 2013		1 Apr 2013 to 31 Mar 2014		1 Apr 2012 to 28 Feb 2013		1 Apr 2013 - 31 Mar 2014	
Total Expenditure	Rs. 591,945,000		Rs. 746,556,123		Rs. 725,156,000 *		Rs. 878,620,000	
Categories	No. of trips / cases	Unit Cost	No. of trips / cases	Unit Cost	No. of trips / cases	Unit Cost	No. of trips / cases	Unit Cost
Per trip	588,374	1006.1	653,144	1143.0	614,695	1179.7	827,526	1061.7
Per case	478,770	1236.4	620,728	1202.7	571,406	1269.1	790,793	1111.1
Per km	25,300,082	23.4	31,430,755	23.8	25,737,699	28.2	38,893,722	22.6
Average monthly expenses per ambulance	number of ambulances: 517	104,087	517	120,335	629	104,806	638	114,762
Average km per trip	43		48		42		47	

* Budget realized up to the month of February 2013

4.4 Efficiency

The utilization rate for ambulances in Karnataka in 2013 was 97.29%. Out of 517 ambulances, 13 were off the road as of 15th February 2013. Of the 13 ambulances, 12 were involved in major accidents and one required refurbishment. In 2013-14, 16 ambulances were off the road and of these 3 were involved in accidents, 7 were declared as total loss, 5 required refurbishments, and 1 required a major repair.

Tamil Nadu has replaced 10 ambulances so far and will replace 2 more. It is also utilizing its 51 spare ambulances across the district. In March 2014, out of 638 ambulances, 610 (95.5% utilization rate) were in service ferrying emergency cases to the hospitals. Out of 28 off the road, 2 were due for condemnation, 17 required refurbishment or met with major accidents, and 9 could not be operated due to manpower shortage.

In 2013-14, number of trips per ambulance is 1,309 in Tamil Nadu and 1,281 in Karnataka. The average number of trips per day is 3.5 in both Karnataka and Tamil Nadu. The average distance in km per ambulance per year is higher for Tamil Nadu at 60,962 km, than in Karnataka at 60,795 km.

The population covered by an ambulance in Tamil Nadu is about 118,261 and about 122,017 in Karnataka. With almost 50% of its population in urban areas and a higher density of population, Tamil Nadu had shorter distances between ambulances (about 20 kms), which improves the efficiency in reaching patients in rural areas. The state's extensive road network is also a contributing factor to efficiency. The radial distance covered by an ambulance, after accounting for breakdowns, is shorter for Tamil Nadu (about 8 km) compared to Karnataka (about 11 km).

In the case of Karnataka, lower density, geographical spread and connectivity pose as challenges in achieving efficiency. Efficiency can be improved by positioning ambulances at shorter distances and rationalizing the location of the FRU for stabilizing patients. While advanced life support (ALS) in ambulances is an advantage, in states where larger rural areas are covered, increasing the number of ambulances with ALS is essential.

4.5 Impact

One of the key objectives of NRHM in introducing universal ambulance service was to ensure transportation in order to improve access to medical care for pregnant women, newborns, neonates and children. While the concept of ERS is picking up, pre-hospital care, care in transit, and emergency medical attention in hospitals remains a challenge.

Table 4 below compares the changes in MMR, IMR, U5MR, and NMR in the two states. As shown, both have reduced incidence substantially on all indicators.

Table 4. Impact on Millennium Development Goals in Karnataka and Tamil Nadu

Millennium Development Goals indicators	2012			Compounded Annual Decline (CAD)			Targets for 12th Plan (2012-17) and CAD%	
	India	Tamil Nadu	Karnataka	India	Tamil Nadu	Karnataka	Tamil Nadu	Karnataka
Maternal Health								
MMR (SRS 07-09)	212	97	178	-5.8	-4.4	-5.8	44 (-9.4)	80 (-9.5)
Child Health								
U5MR (SRS 2011)	55	25	40	-7.3	-11.4	-10.1	15 (-10)	17 (-15.6)
IMR (SRS 2011)	44	22	35	-6	-10.8	-8	13 (-10)	15 (-15.6)
NMR (SRS 2011)	31	15	24	-4	-10.6	0	10 (-10)	10 (-15.6)

Notes: MMR is from 04-06 to 07-09; U5MR: Under five mortality ratio; IMR: Infant mortality ratio; NMR is from 2008 to 2011; Targets are from latest current status to 2015.

Source: Approved NRHM State Programme Implementation Plan 2013-14 for Tamil Nadu and Karnataka

4.6 Innovations

In both Tamil Nadu and Karnataka, the establishment and expansion of rural ambulance services has led to tangible improvements in various health indicators. Both states also introduced a number of innovative initiatives in improving the quality of rural ambulance services. Some of the major innovations which emerged are outlined below.

- Computerization of the Hospital Management System (HMS) and the Health Management Information System (HMIS) and integration of ERS in HMS and HMIS. To promote a holistic ERS focusing on lives saved, the system is planned to include geo-parametric information, hospital information, patient care, audit records and feedback from patients.
- Non-pneumatic anti-shock garment to arrest post-partum hemorrhage.
- Pilot baby warmers in ambulances to stabilize neonate hypothermia.
- Use of multi-para monitors instead of ventilators. Similarly, for specialized ambulances such as neo-natal ambulances and reduced vibration, EMRI collaborated with the Indian Institute of Technology, Chennai in the design of ambulances.
- Improved software for identifying the location of ambulances using GPS, allocation of vehicle, automated alerts, dynamic deployment (deploying an ambulance close to the incident spot), optimization of possibilities (depending on ambulance movements), and live tracking.
- Use of stochastic models. EMRI is working with McKinsey to optimize operations and resources using stochastic models. Google is also providing analytical expertise to ensure optimization.
- Launch of a 104 service. A 104 service provides health information to the caller and is hoped to reduce the load on 108 call centers, provide useful health information, promote prevention and a healthy life style, and allow effective ERS utilization in the long run.

5. Conclusions and recommendations

The Emergency Response Service models discussed in this article provide a foundation to prepare the health system to move to the next level of ERS. The ERS models are suitable for replication across India, as well as in other countries, since they use simplified inputs, technology and protocols that can be adapted in resource-constrained settings. Currently, four agencies are sharing the responsibility of providing outsourced emergency ambulance services in various states. This provides opportunities for learning through healthy competition, innovation and experimentation. Lessons learned must then be shared, adopted and utilized for the overall improvement of the service. This section draws some general conclusions, while a more detailed set of recommendations is given in Annex I.

The 108 service is a stripped down or simplistic version of emergency response services. To its credit, this service has substantially improved the transportation of pregnant women, infant and children in need of medical care. However, it is not decisive that it has been able to save the lives of trauma patients associated with cardiac arrest, accidents or other complications.

Furthermore, the utilization of ambulance services in rural areas remains low owing to poor health-seeking behavior, ignorance and the tendency to disregard symptoms. There is also a need for more ambulances. The number of ambulances with advanced life support equipment is not sufficient and this results to deaths on the way to hospitals and health facilities. More ambulances, life-saving equipment and training can save more lives, particularly in rural areas.

Decreasing the distance covered by ambulances can also improve the efficiency, effectiveness and impact of the ERS. Currently, Tamil Nadu follows a norm of one ambulance covering a radius of 20 km. This means that it takes 30 minutes or more to locate the spot and reach the patient. At times, ambulances have taken close to an hour or more to locate a place in the assigned area.

One of the main learnings from the experiences of Tamil Nadu and Karnataka is the importance of quality assurance (QA). In both states, a QA process has been established and functional in a decentralized setting. The process oversees a variety of issues, ranging from checking the availability of medicines, consumables and disposables to an audit mechanism that checks the quality of patient care in the hospital or the condition of a vehicle. External experts are involved in training and refresher programmes, and quality auditors randomly check that pre-hospital care per protocol has been provided to the patient. In addition, surprise audits in the field are carried out by staffs attached to headquarters. All these processes help improve the ERS over time.

EMRI ushered in professional emergency ambulance services particularly benefitting rural areas and poor and disadvantaged communities. EMRI should move in the direction of providing holistic ERS and running emergency medical centers in hospitals. What sets the 108 services managed by EMRI apart is the infusion of professionalism, use of technology, introduction of management decision systems, and continuous improvement. Having achieved the scale and capabilities in rural ambulance services, it is time to experiment with systems linking pre-hospital care with the provision of emergency medical care in hospitals.

EMRI leadership has an undivided focus, passion, service motive and backing in the form of investments, and demonstrates sincerity, commitment and purpose as the driving factors. Elements of these are required to set up and run rural ambulance services in India or elsewhere.

Finally, it must be mentioned that political will is an important ingredient for successfully setting up and running the 108 ambulance services. To reduce mortality, particularly of women, children and infants, in rural areas, financing from state governments are needed to augment the resources for rural ambulance service available through NRHM.

Annex. Recommendations for rural emergency ambulance services

A. Information and communication campaigns

1. Undertake appropriate communication campaign to discourage ineffective calls, which is about 65% of the calls landing at 108 call centers, in order to reduce load on the 108 call center.
2. Implement community outreach activities to encourage people to adopt prevention, timely intervention and healthy lifestyles in order to avoid acute emergency situations. Primary health care networks, with support from NAS, can take these messages to the communities.

B. Access to ambulance (Basic Life Support (BLS) and ALS)

1. Reduce the delay in reaching the location of patients to avoid patients adopting other means of transport. At present, this is 5%.
2. Maintain that one ambulance is available at all times by coordinating the movement of ambulances.
3. Experiment with specialized ambulances with advanced life support system to assist road accident victims, cardiac arrest and other life threatening conditions. The current one ALS per district is inadequate.

C. Algorithm-based system for decision-making

4. Develop an algorithm that learns from the type of emergency, road conditions, distance to specialty and multi-specialty hospitals, and performance of ambulance crew and medical personnel at hospitals.
5. Take into account acuity, time, distance and volume at the facility, and presence/absence of emergency medical personnel in the Patient Distribution System (PDS).
6. Use computer-aided dispatch systems to reduce dependence on the dispatch officers' decisions and thus improve efficiency and effectiveness.
7. Use of Electronic Ambulance Reporting Form (EARF), Electronic Patient Reporting Form (EPRM) and Ambulance Arrivals Board at emergency medical departments in hospitals.
8. Assign in the field medical personnel that are adequately trained in providing ALS and where required, utilize paramedics with appropriate training in the call center or at another facility to manage less critical calls.

D. Clinical protocols to improve ERS

1. Continuously improve the 108 ambulance services and care continuum (pre-hospital, emergency medical care and post emergency care in the hospital), increase the density of ambulances (1 ambulance per 50,000 people), and set up emergency medical centers in hospitals.
2. Harmonize emergency protocols at hospitals receiving patients and the protocol for pre-hospital emergency care. Since most of the patients opt for government hospitals, emergency medical centers should be established at government hospitals.
3. Reduce response time at emergency centers by setting up automatic alert systems at hospitals that are linked to PDS and computer aided dispatch modules.
4. Include trauma incidence and discharge survival rates in performance audits to correctly assess the quality of pre-hospital and emergency care at hospitals.
5. Adopt the Utstein style guidelines to consistently track and improve survival rates.
6. Include off-stretcher time as a performance indicator for the availability of emergency care at hospitals.
7. Devise protocols to improve ambulance turnarounds when emergencies build up at hospitals.
8. Adopt the practice of random audits at hospital within 24 hours of incidence to assess the quality of care provided, in order to improve the clinical governance process in ERS. Pre-hospital care should be extended to emergency care and subsequent care at the hospital (Clinical Performance Indicators).
9. Consider using an Electronic Patient Report Form to improve the care, audit and feedback processes.
10. Adopt a holistic approach to ERS by improving trauma care and life support services in ambulances.

E. Patient feedback system

1. Obtain independent feedback from a sample of persons who utilized the ambulance by asking for the patients' perception of (1) ambulance crew skills, tools used and pre-hospital care received, (2) care received at the hospital, and (3) the outcome.

F. Vehicle and navigation

1. Use a satellite navigation system as a back-up system to correctly locate villages and reach the patient in time.
2. Increase the number of ambulance with ALS (one in every block headquarters or more) and of appropriately trained medical personal to improve the survival chances of patients, particularly in trauma-related instances.
3. Experiment with the capability of the Mobile Medical Unit providing ALS, where feasible.
4. Experiment with the use of solar panels to power life-saving equipment in fully equipped ambulances with a view to progressively greening NAS in India. This can be considered for MMU as well.
5. Reduce dependence on ambulances to transport pregnant women for institutional delivery by using solar-powered vehicles. Free ambulances can then be used for patients and pregnant women with acute conditions.
6. Reduce vehicle breakdowns and repair time.
7. Reduce vehicle accidents through real-time tracking of driving-related issues, feedback, training, and performance monitoring.

G. Data for monitoring

1. Consider aggregating data by gender, age, village, time, BLS, ALS, rural and urban.
2. Compile ambulance/team specific data for use feedback, performance assessment and determining the type of training required.

H. Personnel

1. Set pay at par with industry standards to attract high quality human resource.
2. Conduct training and certification of personnel, with potential specialization in emergency medical provision and recognition.
3. Train individuals with a mix of technical, management and service motive skillsets.

I. Branding

1. Position branding towards the provision of a comprehensive ERS with identified solutions. This is essential to induce the move towards a holistic ERS and increase the demand for the service.

J. Political will

1. Garner political will for rolling out a comprehensive ERS systems, of which ambulance service is one of the components.

K. In-depth study of innovations at EMRI

1. Conduct an in-depth study of initiatives, innovations and scaling up protocols adopted at EMRI to strengthen its capability to provide holistic ERS.

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