Assessment of a possible post-MDG Rural Transport Indicator

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Report Summary

Evidence on Demand was requested to support DFID in work on what the post MDG framework might look like. This brief report was prepared to consider the data availability and measurability of indicators for a proposed target to halve the number of people without ready access to rural transport services, and the cost of achieving such a target. The report concluded that the target will be met through a combination of improved transport services and investment in rural roads.

Assessment of a possible post-MDG rural transport indicator

Proposed post-MDG target

Everybody has access to telecoms and electricity and the number of people without ready access to transport services is halved.

Proposed indicator

Number of rural people living more than 30 minutes' walk from affordable, reliable transport services.

Comments on proposed indictor

The indicator is considered appropriate as it combines the proximity of transport infrastructure with the availability of affordable and reliable transport services.

For most people, affordable transport services will be on rural roads and the following discussion is based mainly on road based transport services although other forms of transport are mentioned.

By opting for 30 minutes' walk away from transport services, the proposed indicator is a step forward from the World Bank's Rural Access Indicator (RAI: percentage of the population two kilometres from an 'all weather' road) as, by using time rather than distance it avoids the problems of topography. In flat terrain, 30 minutes' walk and two kilometres may represent similar levels of access. However, in hilly terrain travelling two kilometres can take much longer. Also an 'all weather' road implies that public transport could operate without recording whether there are any transport services.

On the other hand the RAI has already been introduced and has been measured in a number of countries. It has the advantage of simplicity (no adjectives to be qualified) and clearly corresponds to a public sector entity responsible for its measurement. It is an indicator which can be used to plan rural road maintenance and investment, on the basis of the greatest good for the greatest number and allows safe comparisons at all geographic scales.

The indicator, under discussion uses two adjectives to describe the transport services required: affordable and reliable.

Affordability is clearly highly relevant for a poverty-focussed indicator and this can be expressed as percentage of average household income and targeted through various policy actions.

Reliability is one important characteristic of good rural transport services, with issues relating to predictability and persistence throughout the year –hence the need for all weather roads. However, this adjective does not capture the importance of service frequency. A weekly service may be reliable, but it may not adequate. A reliable, daily service is much better than no transport services, but it is probably inadequate to meet many important development goals.

It is therefore suggested that another adjective is used in the indicator definition to convey the impression that the transport services are satisfactory, suitable, appropriate, adequate and reasonable. The suggested adjective is 'satisfactory'. This can be defined and measured from the point of view of the various stakeholders. From the users' point of view, satisfactory would encompass appropriate frequency, safety, reliability, comfort (for passengers) and capacity (for carrying goods to and from markets). Since reliability is a component of satisfactory, it is proposed the indicator is redefined as:

> *Number of rural people living more than 30 minutes' walk from satisfactory and affordable transport services.*

Both indicators fulfil all the important criteria including:

Validity: It measures something directly relevant to the post-MDG target.
Reliability. It is likely to be repeatable over time and within and between countries.
Measurability. It can be measured (as discussed in more detail below)
Data availability. Some data exists and more can be obtained (see below).
Transparency and interpretability. The basis of an indicator is likely to be understood by a wide range of people and is meaningful for the people involved.
Target relevance. It is clearly relevant to poverty reduction and post-MDG goals
Sensitivity. It will respond positively to development initiatives and would dip (correctly) in the face of negative factors (natural disasters, wars).
Actionability. It is an indicator that can be improved through appropriate policy decisions and development actions (as discussed below under costs of achieving the target).

However it should be noted that the indicator is heavily biased towards formal and public transport when increasingly inaccessible locations are using 'informal' personal services. Motorbikes have already been used in heath projects in Lesotho[1] and cheap prices combined with hire purchase have given this form of transport a significant impact, where access is difficult for larger vehicles.

While transport/accessibility planning in rural areas clearly implies managing both the provision of transport and the quality of infrastructure, the indicators cannot reflect high levels of sophistication due to the data collection problems. It should be noted that affordability in many rural parts of developing countries is close to zero so that independent of transport services availability, walking will remain the main means of transport.

1. What is the availability and quality of data to support this indicator and how can this be improved?

A requirement for two complementary data sets

The indicator would be based on two measurements or data sets, which may both become integrated into national data-collections systems.

The first is a measurement of the number of people living within thirty minutes' walk of a road or transport system. In most cases this will be rural roads, but it could be rural waterways (for example in Madagascar), rural stations (for example the Trans-Gabonaise in Gabon) or rural air services (for example in Papua New Guinea).

[1] www.**riders**.org/ *Riders for health*

The second is determining the existence of 'satisfactory and affordable' (or 'affordable and reliable') transport services.

In the medium to long-term, it would be quite feasible to introduce into national data collection systems (eg, national census surveys), one question that would provide national data for the indicator. For example, a question could be included that asked: 'How long does it take to walk to the nearest public transport service?' This would become a straightforward means of estimating the indicator and progress towards the target.

Data on people living 30 minutes' walk from transport infrastructure

Most developing countries have tried to estimate the World Bank's Rural Access Indicator (RAI). This is the percentage of the population living within two kilometres of an 'all weather' road. These existing datasets with the numbers of people living within two kilometres of a road can be used in the initial computation of the new indicator, with adjustments made for non-existent or unsatisfactory transport services and the time influences of topography.

The easiest way of estimating this indicator is by using a GIS. A two kilometre contour is created on both sides of all 'all weather' roads. The RAI is then the percentage of the rural population living within these contours. The difficulties encountered have generally related to lack of accurate and high resolution GIS population data associated with individual villages as opposed to administrative areas (districts, wards, counties, etc.). However, these problems are being quite rapidly solved as national GIS and better census granularity become available. Already many developing countries have appropriate GIS population layers, and it is anticipated that most countries will have the necessary information available within two years.

Data on satisfactory (or reliable) and affordable transport services

The proposed indicator quite correctly includes both proximity of infrastructure and also the existence of 'satisfactory and affordable' (or 'affordable and reliable') transport services. To date, there is very little information available within countries on which rural roads (or waterways) have satisfactory/reliable and affordable transport services. There is good data on rural rail and air services, but these represent a very small minority of situations.

Rural transport services have been neglected in most countries. Very little attention has been given to the existence (or non-existence) of transport services on the smaller roads (district roads, feeder roads, community roads). It is transport services on these roads which are particularly important to rural communities and improving these transport services will contribute greatly to the achievement of this post-MDG target.

The transport services departments or agencies are not involved in planning or promotion of public transport. Most regulatory authorities concerned with road transport have inadequate financial and human resources even to actively regulate and monitor transport services throughout the country. They therefore tend to concentrate on urban and inter-urban transport and the fiscal and administrative functions relating to this. There is little or no planning or monitoring of rural transport, and a 'blind eye' is generally turned to the widespread lack of regulatory compliance of rural transport vehicles when regulations exist.

Despite the lack of existing institutional data, there is an on-going DFID-funded project, arranged through the African Community Access Programme (AFCAP). This is in the process of developing indicators for rural transport services[2]. These will measure the actual

[2] www.ruraltransport.info/RTSi

prices of rural transport services as well as their adequacy (including reliability). The indicators are being developed with a built-in methodology for obtaining them using modest, local resources.

After just six months of research, this rural transport services indicator development project has yielded valuable road-based data-sets in Tanzania and Kenya that may be able to be used to develop the road-based transport services indicator required for the proposed post-MDG target.

Significantly, the research team report that the transport authorities (ministries and agencies) in the countries where initial research has been undertaken appear convinced of the value to them, of developing such indicators and wish to integrate such transport services indicators into their planning, monitoring and evaluation processes.

2. How measurable are the indicators and what will be the approach?

As noted above, the proposed indicator is measurable and the ability to measure progress will increase with time. There will be three inter-related options.

a) A question on walking time to the nearest satisfactory and affordable transport service can be included in national surveys (e.g. census) to provide direct assessment of this indicator. This is a long-term option as it takes time for such questions to become an integral part of national databases.
b) The issue of the proximity to the road can be measured using GIS techniques with population layers and two kilometre contours from the road. Many national agencies already have this capability and other countries are in the process of developing them.
c) The issue of 'satisfactory and affordable' (or 'affordable and reliable') transport services can be measured using the methodology being developed by the DFID-AFCAP funded, Rural Transport Services Indicator Development Project.

The on-going Rural Transport Services Indicator Development work is due to propose key rural transport services indicator statistics by April 2013. These will take into account the issue of price and affordability, as well as operational information relating to frequency, reliability, capacity and comfort. Such information has not been available. A methodology and manual for obtaining these statistics will be published as an output.

Collection of the data related to transport service indicators can be arranged by the appropriate national ministry departments and/or associated agencies. In the medium term, it will 'main-streamed', with the authorities collecting and using the indicator data as part of their standard planning, monitoring and evaluation procedures.

In the short term, national baseline data for the indicator can be collected from surveys of appropriate stratified samples of rural roads. Baseline national indicator estimates (based on the stratified samples) should be available in cooperating countries within twelve months of the introduction of the agreed indicator. More comprehensive datasets will be developed over time. Within a decade it is quite feasible that half the rural roads in countries interested in these techniques will have transport services indicator statistics.

In order to monitor progress, surveys to collect indicator statistics will have to be repeated at intervals. It will probably be feasible to develop two levels of data collection: one for a detailed rural transport services situation report baseline and a much quicker less comprehensive survey as an annual update.

This quicker and less comprehensive survey would provide an alternative short-term and low cost option for calculating the proposed indicator. Very rapid surveys (even questionnaires to local officials) could be arranged to collect very basic data about whether or not there are satisfactory and affordable transport services on each rural road in the area. Naturally, the various definitions would have to be agreed before the surveys. This data obtained could then be entered as a GIS layer to show the existing road map with all roads with satisfactory services and all roads without such services. Using the two-kilometre road contours (adjusted if necessary), together with population data, the indicator could be calculated. The difference between the two maps (roads with and without satisfactory and affordable transport services) would provide part of the target for interventions related to improving transport services on existing roads. The area beyond the two kilometres would be part of the target for possible new roads.

3. Cost of achieving the target

The target of halving the number of people without ready access to transport services could be achieved in three main ways:

- Improving proximity to a road suitable for rural transport services
- Improving the adequacy of transport services along a road or waterway
- Improving transport services affordability.

These three ways will first be discussed briefly. Some approximate figures relating to the possible costs will then be considered.

This document will concentrate on roads and land-based transport services. While there are areas in many countries in which water-transport, along rivers, canals, lakes and shores is very important, most rural communities make use of transport services operating on roads. For communities associated with waterways, facilitating better access to transport services can be achieved in comparable ways to land transport, including infrastructure (jetties, dredging), regulation and financial incentives.

Approach

In the limited time available, it was not possible to undertake detailed research or develop rigorous maps and models. The aim here is to provide some approximate figures to give some indicative estimates of the cost of achieving the target. Some of the figures have been taken from World Bank documents relating to 44 countries in Sub-Saharan Africa. Others have been based on the country of Tanzania that has recently benefited from some DFID-funded studies relating to rural roads and rural transport. These provide some indication of what would be the costs, in relation to Gross Domestic Product (GDP), for one of the target countries. No country can be considered ‘typical’ in terms of rural access and transport services, as each country is different in terms of geography, the road network, the transport services and the socio-economic context. However, Tanzania is not exceptional and it ranked near mid-way in transport investment needs in a list of 44 Sub-Saharan African countries (Carruthers et al, 2009). Tanzania can therefore be used to illustrate possible investments. No attempt is made here to extrapolate from Tanzanian figures to a global figure. However, if the various assumptions and estimations made here are acceptable, it should be possible to calculate global estimates based on appropriate percentages of GDPs.

The standard of rural roads and rural transport services is very variable. Minimum acceptable standards and aspirations vary between countries, organisations and rural communities. It is likely that what is considered satisfactory and affordable will vary between

and within countries. Affordable, has been defined as less than 20% of household income on transport requirements (which is particularly relevant for urban and peri-urban households travelling for work). Ideally, rural people should have several opportunities to travel each day. However, for people without any transport services, moving to one daily bus service is a great improvement, and this could be used as an initial minimum standard.

The proposed indictor (30 minutes' walk away from suitable transport services) will be a time-based indicator. The World Bank's Rural Access Index (RAI) that is based only on distance (two kilometres from a motorable road). In flat terrain, 30 minutes' walk and two kilometres may represent similar access. Some papers cited have produced cost estimates in relation to the RAI, and these will be used in some calculations, even though it is understood that the proposed indicators and the RAI are not the same.

Improving proximity to a road

All developing countries have on-going programmes of constructing new roads in rural areas and maintaining and/or rehabilitating existing roads. New roads allow transport services to operate closer to isolated villages, bringing new communities onto the road network or within 30 minutes' walk from the network.

It is an almost universal aspiration of rural communities to have an all-weather road connecting every village to the national road network. Such an aspiration became a national policy in India. However, for most developing countries this will not be affordable in the short term. Nevertheless, with decentralised funding and decision making, local councils, local politicians and local communities are gradually expanding the road network to connect more and more villages. Such community roads may lack careful engineering for drainage, may not be part of the recognised network and may lack transport services. They are often built with the anticipation that they will eventually be adopted and upgraded. The total length of such community roads can be high, but is often unrecorded at national level.

Many Sub-Saharan Africa countries (and countries in other regions too) are having difficulty keeping their existing classified network in a motorable condition. In many countries, there are old roads that have fallen into disrepair due to inadequate maintenance. For example, the motorable road network of Madagascar has been shrinking since the 1970s.

As a result, recent national investment policies, supported by donors and development banks, have concentrated on prioritising the maintenance and rehabilitation of existing rural roads, rather than the construction of new rural roads.

At present, the people within the catchment areas of old roads in poor condition may not have access to appropriate transport services. Rehabilitating the road will bring these catchment populations back into proximity with transport service. Therefore road rehabilitation programmes can contribute to achieving the access target.

Even annual maintenance can contribute to the achievement of the access target. One of the central premises of the roads industry is that road maintenance keeps down vehicle operating costs. Therefore, maintenance makes it more feasible for the private sector to provide good and affordable transport services.

Improving the adequacy of transport services

The private sector is generally able to ensure there are adequate transport services on national and regional roads with relatively good infrastructure and high transport demand. However, it very often fails to provide adequate transport services on the smaller rural roads,

which are often characterised by poor infrastructure and relatively low transport demand. In Zambia, there are examples of long, motorable roads with no motorised transport services at all (Hine and Rutter, 2000; Musonda, 2007). In Nepal in 2009, two-way daily traffic counts on recently constructed rural roads were often as low as 5-15 vehicles, including motorcycles (Stickland, 2009). In Bagamoyo District of Tanzania in 2012, while national and regional roads had various rural transport services including minibuses, none of the smaller roads (district and community) had any conventional transport services (eg, rural taxis or minibuses). On these smaller roads the only transport services available were motorcycle taxis (Starkey et al, 2012).

Lessons from around the world, including UK suggest that:

- Private sector transport services do not provide adequate transport services in locations of low transport demand and at times of low transport demand. Regulatory conditions and/or financial inducements are required to maintain services in rural areas and at off peak times.
- Transport services can be subject to both ascending and descending spirals.
    - If public transport frequency and quality increase, more people use the transport leading to a virtuous circle of growth and improvement.
    - If public transport becomes infrequent or unreliable, fewer people use it and a descending spiral of reduced service and lower apparent demand is started.

In developing countries, informal sector operators and their associations adopt practices that result in infrequent overcrowded services, rather than the frequent comfortable services that users prefer (Hine and Rutter, 2000). The common practice of queuing for a full (or overfull) load, rather than departing by time increases the total waiting and travel time, and discourages people from traveling. Farmers may not grow for the market because of the problems of transport, so reducing the transport market.

In developing countries, many transport services operators are individuals working on very meagre margins. With cash-flow limitations, they need to make a profit on each and every trip. Formal businesses can work with an ‘average profit’, and accept formal timetables that may result in some profitable and some unprofitable trips. With appropriate planning, investment and regulation, it is possible to change operator practices and develop more frequent and appropriate rural transport services.

Where the private sector is not spontaneously providing appropriate services, various interventions may be required to ‘prime the pump’ to stimulate a virtuous spiral. These may include:

a) Consolidation of existing dispersed loads
b) Investment in better or more appropriate vehicles (which may include midi and minibuses, passenger trucks, motorcycles and three-wheelers)
c) Regulatory mechanisms (profitable route licenses conditional on some rural services)
d) Carefully targeted and regulated financial inducements or subsidies.

Although the use of the word subsidy can be an anathema, road infrastructure is hugely subsidised. As will be illustrated here, only a small marginal extra cost may need to be added to existing construction and maintenance costs to ensure that transport services operate on all roads. This would to make the roads much more valuable to rural people may well lead to highly positive rates of economic and social returns.

Load consolidation

Interventions to stimulate services where they do not exist require participatory processes at a local level. Such interventions depend on sustainable local solutions being found, and this is best done through the involvement of local stakeholders such as local NGOs or development projects. In some circumstances local institutions with a need for transport services (such as school, clinic or local council) can be prime movers. Sometimes a local trader can be asked to take initiatives. Local politicians and/or faith groups may be involved (with some risks attached). The premise is that in any area there will be some demand for transport services from farmers, schools, stores, village authorities and people travelling for healthcare. This demand must be consolidated so that all the stakeholders are able to travel at the same time to justify the transport services. Initially it might be a weekly, twice-weekly or daily schedule. Working capital may be needed to start the service, but once established it should be self-sustaining.

Suitable vehicles

Many rural vehicles are old, dilapidated, uncomfortable and expensive to run. Fleet renewal can be important, but operators with newer vehicles tend to move them onto the more lucrative regional and national routes. Most rural public transport involves both passengers and freight, because that is what many rural people want and because the cost of transport operations can be spread between passenger fares and freight charges. National regulations generally outlaw mixed passenger and freight transport and this is very reasonable on national and urban roads. However it is often highly appropriate on remote rural roads. On poor rural roads, buses may have the clearance to get through, but are generally too large to justify more than daily services to markets. Mini- and midi-buses are excellent on relatively smooth roads, but cannot cope with bad roads. In some countries passenger trucks are an acknowledged and licensed form of transport (eg Colombia, Fiji, Papua New Guinea, Timor Leste and Zanzibar). Many rural areas could benefit from such transport types, if those responsible for regulations could be shown the advantages, and the safety concerns are addressed. The rapid spread of motorcycle taxis and three-wheelers illustrates that rapid change is possible and rural people prefer sub-optimal transport to lack of transport.

Regulatory mechanisms

One means of ensuring rural transport services is to impose regulatory conditions on the more profitable national and regional routes. For example, in order to operate for three days on a profitable route, a vehicle has to spend one day serving a less profitable rural route. Such systems can involve the regulatory authorities or self-regulation by transport associations. In the formal sector, regulatory mechanisms can be used to ensure services are provided on days and times of low transport demand.

Getting road contractors to engage with transport service issues

In countries where contractors have medium-term maintenance contracts to maintain rural roads, these contracts could be linked to requirements to particular levels of rural transport services along those roads. With the on-going rural transport services indicators work (Starkey et al, 2012) such service conditions could be easily defined. The contractors would then have a contractual interest in assuring the road was in appropriate condition. Furthermore, where services were inadequate they would have a financial incentive to work with the private sector to improve the transport services to the defined levels. This would also bring the roads authorities and transport services stakeholders closer together.

Financial incentives

Where people do not have access to personal means of transport, rural transport services are a social and economic necessity for fulfilled lives and livelihoods, and arguably a 'right' for rural communities. The costs of providing appropriate financial incentives to ensure adequate services may well result in a positive rate of return with both economic and social benefits. Incentives can include low tax rates (on fuel or vehicles or operating income). They can also include direct subsidies payable to operators who conform to the regulatory requirements. In more developed markets, private operators can offer formal competitive tenders to operate subsidised routes. Comparable processes can be implemented on rural routes with inadequate or unaffordable services.

Improving transport services affordability

Interventions designed to improve the affordability of services can include:

- Reducing vehicle operating cost through improved road condition. Many rural roads require heavy duty vehicles (4x4s) for small-scale public transport (rural taxis). Such vehicles with high operating costs may charge 10 cents (USD) per passenger kilometre. If the road is upgraded to allow minibuses to operate, the fares often go down to 2 cents (USD) per passenger kilometre.
- Generally small scale transport entrepreneurs are very good at maximising their revenue per trip. However they often operate in anti-competitive associations that do not compete on the basis of fares. Associations generally accept inefficient fleet utilisation in order to allow the process of waiting for a full (or overfull) load. Evidence from Nepal and Cameroun suggests that competing associations can result in lower fares and higher standards. Working with associations to improve the efficiency of the transport resources available, should lead to downward pressure on fares.
- Stimulating a transport market, through better and cheaper services will generally lead to a growth in transport demand and a large overall market. This virtuous circle can lead to economies of scale in passenger, freight and mixed transport, with the potential for more affordable fares and tariffs.
- Financial incentives and subsidies can be used to reduce fares for all people or certain sections of society. Countries with formal sector transport companies sometimes offer subsidies to lower ticket prices for school children, the elderly and/or people with disabilities. Some countries offer special tariffs on fuel, or reductions of tax, in exchange for lower fares for passengers. Carefully targeted and administered subsidies may assist the development target of affordable access to transport services.

Financial implications of the complementary options

It is possible that half of the target could be achieved through infrastructure investments, so that more roads (including existing non-motorable roads) are brought within 30 minutes' walk of rural people. Half of the target could be achieved through initiatives to improve rural transport services (primarily investment in national and local capacity building and numerous locally-planned schemes). This would convert roads with inadequate services into roads with suitable and affordable services. As the construction and maintenance of roads are expensive, most of the costs would be for the improved infrastructure.

The proportion of the target that could be achieved through improving transport services on existing roads will depend on the agreed interpretation of 'satisfactory and affordable (or 'affordable and reliable'). The higher the agreed basic standard, the greater the potential for achieving much of the target from improving transport services on existing roads.

Cost of increasing proximity to rural roads

A recent World Bank study (Carruthers, Krishnamani and Murray, 2009) reviewed the needs for transport investment in Sub-Saharan Africa. The authors created a complex model, using several datasets including road resources and GIS data. They calculated the road network in SSA that would be required to achieve different levels of the Rural Access Index (RAI). According to Carruthers et al (2009), the average Rural Access Index (RAI) for Sub-Saharan Africa was 34% (ranging from 6% for Sudan to 67% for Lesotho). To put this in perspective, the RAI for middle-income countries averaged 94%.

Carruthers et al (2009) were looking at all types of transport infrastructure (including urban, regional, ports and railways) and proposed a balanced investment in transport infrastructure of USD 7600 million per year over ten years, which would be equivalent to 1.2% of the GDPs of the countries in Sub-Saharan Africa. Of this, USD 1600 million per year would be for rural road maintenance and some construction. The annual investment per country would average at 0.3% of GDP for rural roads (with large variations between countries due to their different needs).

Carruthers et al (2009) did not aim to dramatically reduce the RAI, preferring to concentrate on agricultural marketing to justify the investment in rural roads. However they provided figures that allow the estimates to be made of the costs of increasing the RAI. For example, they suggest that a network of about of 900,000 km would be needed to raise the average RAI in Sub Saharan Africa to 55% (representing a 68% reduction of people living more than 2 km from a motorable road).

The required network for a 55% RAI would require investment in possibly 400,000 kilometres of rural road (some new and some upgrading existing tracks and community roads). Taking basic rural road construction costs as USD 20,000 per kilometre (Carruthers et al 2009), 400,000 kilometres would cost about USD 8000 million over a 10 year period. A significant additional budget should be allocated to ensure such an investment were protected with adequate on-going maintenance. This could represent 0.2 % of GDP per year for all these additional roads.

For comparison, a recent DFID-funded initiative in Tanzania considered that a realistic investment strategy in rural roads in Tanzania would require USD 70 million a year (LGTP, 2012). As the GDP of Tanzania is USD 23.2 billion, this represents 0.3% of annual GDP. The proposed annual budget for rural roads is one quarter of the annual budget of the agency responsible for national and regional roads (Tanroads), which is USD 274 million or 1.2% of Tanzania's GDP (Tanroads, 2011).

Cost of lowering transport costs and fares through better roads

In the examples above, a high proportion of the investment is for maintenance. This should contribute to the lower vehicle operating cost, and so contribute to the target of affordable transport services. The costs of this have been included above and so are not repeated here.

Costs of improving rural transport services

Several possible mechanisms for improving rural transport services have been mentioned. All will require enhanced capacity within the transport services planning authorities or organisations. This could be achieved through capacity building projects and staff recruitment, with estimated costs below. With appropriate staff in place, some of the regulatory mechanisms will have no significant direct costs other than staff time. Financial incentives will not be needed on all roads. They will be targeted and may only be needed for

relatively short periods (one to five years). Some will be designed to 'prime the pump' and start the virtuous circle of increasing transport demand and supply on roads with inadequate transport services.

To provide an order of magnitude figure for possible intervention costs, figures have been taken from recent experiences in Tanzania.

Example of a subsidy calculation

Based on recent studies in Tanzania, private sector minibuses gain revenue of USD 0.7 per kilometre. They charge USDc 2-5 per kilometre and carry 10-20 people. Buses (65 seats) generally charge USDc 2-4 and have revenues of about USD1.50 per kilometre. (Starkey et al, 2012; Starkey et al, 2013). These figures are comparable to fares and incomes in other countries.

Therefore a 'subsidy' of USD 0.7 per route kilometre would allow the provision of one minibus service, or a 45% contribution to a large bus service. A return service would be twice this, and for 365 days a year, this would cost about USD 510 per kilometre of 'subsidised' road a year.

The rural road network in under Local Government in Tanzania is 58,000 km (a figure which includes 6000 km of urban roads under local government). This is in addition to the national and regional roads maintained by Tanroads. It does not include the unclassified network of community roads, which could be of similar order of magnitude to the Local Government roads.

To provide the equivalent capacity of one return minibus trip a day on 40% of all Local Government roads would cost

52,000 km x 40% x USD510 = USD 10.6 million.

However, a 100% subsidy is unlikely to be required, as there will be incomes from fares. A 50% subsidy on 40% of the rural road network would cost about USD 5.2 million per year.

To put this in context of other budgets in Tanzania, that is 7.4% of the proposed annual budget for Local Government road maintenance (USD 70m); 2.8% of the annual fuel levy income of the roads fund (USD 187 m); 2% of Tanroads annual budget and 0.02% of Tanzania's GDP.

This subsidy calculation has been based on mechanisms to ensure that there are some public transport vehicles operating on all rural roads. The numbers have not taken into account the actual transport demand, which changes with opportunities. In countries and situations with poor transport, people may travel on public transport perhaps between one and ten times a year (Hine and Rutter, 2000). Five trips per person per year can be used as an illustrative planning figure. This subsidy example 'pays for' 7000 person trips per year on each road (or 2.5 trips per person per year, with assumptions based on 20% of the rural population living along 23,200 km of rural roads, or 2840 people in a catchment population of a 10 km rural road and a capacity of 19 passenger return trips per day for 365 days).

Cost of schemes to involve road contractors in rural transport services

The private sector is engaged to build, maintain and rehabilitate rural roads. Increasing this is through performance-based contracts. The contractor has to ensure that the road quality remains above a certain level, to receive regular payments. It would be quite straightforward to include a minimum level of transport services as part of the performance-based transport.

On the more significant rural roads, this would probably not require additional costs as transport operators would be expected to provide suitable services. On smaller and remoter roads, some form of inducements might be used to encourage transport services, but probably not on all roads, all the time. The contractor is not expected to provide transport services themselves, but to organise (and if necessary pay) others to do so. This could probably be paid for by increasing existing contracts by 1-2%.

For example:

> *Periodic maintenance (re-gravelling) of a rural road is about USD 25,000 per kilometre. A full subsidy to provide one return trip for minibus a day for 365 days a year would cost about USD 500 per kilometre (see above). Making provision for one year of fully subsidised transport service would increase costs by 2%. Similar calculations could be applied to annual maintenance systems.*

Cost of enhancing the capacities of transport services authorities

Improving the capacity of transport services authorities could be funded by a small levy on road investments. For example, 1% of road infrastructure funding could be assigned to the departments, agencies or organisations responsible for planning and regulating transport services. They would then have sufficient resources to plan and implement initiatives to improve transport services. Similarly, if a small percentage of the income of local authorities were allocated to improving rural transport services, this could provide the necessary funds for local schemes, which should lead to greater economic activity (and income) within the local authority area.

In Tanzania, this could be achieved by enhancing the national regulatory authority, known as SUMATRA (Surface and Marine Transport Regulatory Authority). For example, boosting proactive planning activities in rural areas could be achieved with USD 40,000 per year in each of 21 administrative regions. This would require an annual budget increase of USD 840,000.

National and international training programmes to enhance capacity would be required. This could be achieved through national capacity building programmes.
The recent DFID project to support the rural roads programme in Tanzania cost USD 2.5 million over three years. One-donor assisted programme such as this per target country would be desirable to assist them build up their planning and regulatory capacity relating to transport services in general, including rural transport services.

Cost schemes to stimulate improved rural transport services

In each target country there will be schemes to make transport services better, safer and more affordable. These may include introducing alternative vehicles (such as small and appropriate rural passenger trucks for remote roads), alternative regulatory systems (timetables, route planning), public-private partnerships. The costs of such projects should be available from the suggested transport services sector provision (1% of rural roads costs assigned to improve rural transport services).

Conclusions

The target of halving the number of people more than 30 minutes' walk from satisfactory and affordable transport services is challenging but extremely important. It will be met through a combination of improved transport services and investment in rural roads (mainly maintenance, rehabilitation and upgrading existing unclassified roads). The suggested investment may not be sufficient to halve the number of people 30 minutes' walk from any road (the basis of the RAI) in all countries. However, the existing RAI includes a significant population of people who are close to a road that does not, at present, have suitable transport services. The introduction or improvement of transport services on significant lengths of small rural roads (including rehabilitated and upgraded roads) will contribute significantly to the meeting of the target. The envisaged economic and social benefits from this improvement in transport services are likely to provide an excellent rate of return on this investment.

Based on models for Sub-Saharan Africa with particular reference to Tanzania, the costs of achieving the target could be:

Investment in rural roads 0.3% to 0.5% of GDP.
Investment in transport services planning and initiatives 0.05% of GDP.

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