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International Benchmarking of Lesotho's Infrastructure Performance

Željko Bogetic

Abstract: This note provides a preliminary benchmarking of infrastructure performance in Lesotho in four major sectors—electricity, water and sanitation, information and communication technology, and road transportation—against the relevant group of comparator countries using a new World Bank international data base with objective and perception-based indicators of infrastructure performance from over 200 countries. The results of the benchmarking are revealing of several major, comparative deficiencies in infrastructure performance in Lesotho: (i) extremely low access to electricity and its affordability; (ii) poor coverage, quality, and the cost of local (non-cellular) telephony; and (iii) poor quality of roads. Infrastructure service delivery in electricity, telephony, and roads is well below what would be expected, on average, for a country in Lesotho's income group. In these sectors, Lesotho also compares unfavorably with many other geographical country groups. Unless addressed, such infrastructure shortfalls are likely to adversely affect the welfare of Lesotho's poor, and the cost competitiveness and growth prospects of a range of economic sectors (e.g., tourism, trade) that depend critically on a stable and competitive supply of basic infrastructure service. They could also affect the speed and quality of Lesotho's regional economic integration within the SACU sub-region with attendant consequences for the long-term growth of regional trade and real output. By contrast, Lesotho's performance is solid in the access to improved water and sanitation, in the aggregate and in both rural and urban areas. Finally, this benchmarking, combined with more in-depth, sector analyses, could provide policymakers in Lesotho a useful guide to the areas of infrastructure performance requiring attention.

JEL classification: H54, H, R, O, O57

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By

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Introduction

Infrastructure bottlenecks are known to constrain economic growth, competitiveness, and poverty reduction. In recent years, emerging bottlenecks in many countries have forced infrastructure back onto the priority development agenda, especially in Sub-Saharan Africa. The link between infrastructure and growth has of course been well recognized in the development literature (e.g., Aschauer 1989; World Development Report 1994). But during the 1990s, underinvestments in infrastructure in Sub-Saharan Africa and Latin America have led to lower economic growth (Esfahani and Ramirez 2003; and Easterly and Servén 2002), raising questions about the adequacy of infrastructure investments and infrastructure performance. More broadly, infrastructure affects human welfare directly and indirectly via access to and quality of basic services such as water and sanitation, though the impact can differ widely across regions, communities or income groups. Last but not least, infrastructure is associated with child health, human capital accumulation, and the achievement of the Millennium Development Goals (MDGs) (Leipziger et al. 2003).

In Lesotho, poor infrastructure has been documented to constrain economic growth and social welfare. For example, poor roads network has constrained the development of tourism. The absence of good roads has prevented rural population from accessing markets, schools, and clinics. Even in the capital Maseru where roads are adequate, the neglect of the rail at Maseru Station, for example, has stifled the development of the sandstone quarrying and other manufacturing sectors (World Bank, 2005a). Also, in a recent survey, many firms report that infrastructure deficiencies in electricity, telecom, and transport have adversely affected the overall investment climate (World Bank 2005b). What is often lacking in this picture is a broader sense of comparative performance of Lesotho's infrastructure that would help focus the attention of policymakers on those infrastructure sectors and performance dimensions requiring most urgent attention. This short paper aims to fill this gap. To this end, the paper builds in large part on the similar comparative exercises for South Africa and the SACU countries (Bogetic and Fedderke 2005 a,b).

The purpose of this note is, therefore, to systematically benchmark Lesotho's infrastructure performance in four major sectors—electricity, water and sanitation, information and communication technology, and roads transportation—against the relevant group of comparator countries using a new international data base with objective and perception-based indicators of infrastructure performance from over 200 countries.

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How does Lesotho's performance compare against its relevant country groups, especially low-income countries? What do outcome indicators tell us about the relative strengths and weaknesses of Lesotho's infrastructure vis-à-vis various income and geographical comparator groups of countries? Where are the largest deviations—positive and negative—from the benchmark group and other comparators? What is Lesotho's comparative performance in rural and urban areas? And how does one interpret some of these comparisons within Lesotho's country-specific context in order for it to be useful for policy purposes? The answers to these questions are likely to provide important building blocks towards a more complete assessment of the state of infrastructure in Lesotho, its performance, and any need for reform.

The next section discusses the data, their caveats, and the choice of the comparator groups of countries. The following sections discuss preliminary assessments of infrastructure performance in electricity, water and sanitation, information and communications technology, and roads transportation. The concluding section contains summary remarks.

The benchmarking database

The data used for comparing Lesotho's infrastructure performance comes from the World Bank research data base that was recently developed with a specific objective to be used for this type of benchmarking exercise (Eustache and Goicoechea, 2005). The database pulls together the latest available observations from a number of well documented, specialized data sources that contain more detailed data with longitudinal information. The data base aims to measure *sector performance* by focusing on sector *outcomes—access, affordability/pricing, and quality* (technical or perceived). It also provides information on sector institutional reform. Data covers 207 countries (although coverage varies by sector and indicator)¹ with a limited number of variables² measuring sector outcomes.

For the purpose of benchmarking Lesotho, we compare its available indicators of infrastructure performance with all the world geographical comparator groups--Sub-Saharan Africa, OECD, South Asia, East Asia & Pacific, Middle East & North Africa, Latin America & the Caribbean, Europe and Central Asia, and the world—and four groups of countries clustered by the level of income per capita—low income, middle income, upper middle income, and OECD countries. Therefore, both region and income level are used as comparator criteria. The main benchmarking group on which much of the discussion is focused is low-income country group to which Lesotho belongs. Because of the strong association between infrastructure and income level, this is economically the most meaningful group comparator. This is supplemented by relevant comparisons with other income groups and major world regions to provide a wider geographical comparison of Lesotho's infrastructure performance. Finally, where comparative rural/urban indicators are available, we benchmark Lesotho's infrastructure performance for both rural and urban areas.

As with any comparative indicators summarizing performance in a vast number of different countries, interpretation must be made carefully and with caution. Some of the variations between the indicators may reflect other factors that may make single indicator comparison less revealing, or even misleading. The database itself has its limitations detailed in the cited World Bank analysis by Estache and Goicoechea.³ In addition, where appropriate, we explain or qualify how specific circumstances in

¹ The percentage of available country observations from the total number of countries (207) varies by indicators from close to 90% for measures of access to roads, 85-95% for ICT access and pricing measures, 75-85% for access to water, and 60% for access to electricity. The quality indicators generally show lower degrees of completeness than those of access.

² The numbers of indicators in each sector are as follows: 7 in energy, 4 in water & sanitation, 12 in ICT, and 12 in transport.

³ For example, the database reports the latest information available between 1997 and 2002, corresponding to arithmetic averages of available data. In some cases, more recent within country information may be available that is not yet reflected

Lesotho may affect a specific indicator comparison. Nevertheless, since the indicators presented here are widely accepted and fairly unambiguous representations of major dimensions of sector performance, we believe that the benchmarking and comparisons are sufficiently meaningful that could prove indicative in further analytical and policy-oriented studies of Lesotho's infrastructure performance. Another caveat is that available data indicators for Lesotho are more limited than, for example, in the case of South Africa. As a result, the comparative exercise for Lesotho is inevitably more limited in scope, focusing more on *access*. Indicator availability for Lesotho is as follows: two indicators for electricity (access and prices), two for water and sanitation (both on access), eight for ICT, and four on roads transport. Nevertheless, since access indicators that are critical for poverty reduction are available for all four sectors, some broad comparisons and conclusions can be reached with appropriate caveats.

Energy – electricity

In the electricity sector, the database contains only two indicators: one on access to the electricity network and another on the average end-user prices. The overall picture is very unfavorable (Table 1). On access, Lesotho's performance is among the worst in the world, even compared with its own income group of countries (low-income), the Sub-Saharan African region, or SACU countries. On affordability, it also ranks very low with some of the highest prices in the world. The two indicators combined suggest that the electricity services in Lesotho serve only a small, privileged segment of the population and the economy that can afford the high service prices. The scope for improvements in electrification, access to the poor, competition, and affordability is substantial.

Access: Lesotho's access to electricity network is one of the lowest in the world with only 6% of the population having access (the latest data for Lesotho and other groups are for 2002). This is extremely low, even in comparison to low-income (Lesotho's income group) countries (31%) and less than of the average access rate in Sub-Saharan Africa as a whole (15%). It is also lower than averages in other world regions. Most recent sector data for Lesotho suggest that access has doubled, reaching 11% in 2005 in part due to the World Bank financed Lesotho Utilities Sector Reform; nevertheless, the overall comparative picture has not changed, and much more progress needs to be made to reach the 35% access targeted for 2015 (de Barros, 2005). Other studies also recognize that electricity is an important constraint on economic activity. This suggests that even for the segment of the economy that does enjoy access to electricity, the quality of service is low. For example, over a third of companies surveyed in a recent investment climate survey report electricity deficiencies as major constraint (World Bank 2005 b). Within SACU, Lesotho's access to electricity is by far the lowest (Bogetić and Fedderke 2005 b). Unfortunately, no comparative data exist for access to electricity in rural and urban areas, which would probably show even more dramatic shortfalls in access in rural areas of Lesotho.

in the database. Also, efforts to weight the raw data by population could help enhance the quality of the cross-country comparisons.

Table 1: Benchmarking Lesotho's Performance in Electricity

<u>Energy</u>	Lesotho	Benchmark Low Income	SSA	Middle East and North Africa	South Asia	East Asia Pacific	Latin America & Caribbea	Europe & Central Asia	Middle Income	Lower Middle Income	Upper Middle Income	World
Access to Electricity Network (% of Population)	6	31	15	88	31	54	79	99	85	82	87	60
Electricity Average End-User Prices (US cents/kWh) - (Residential/Non-Residential)	8/3	6/6	6/5	5/5	10/8	6/6	8/7	8/7	9/7	9/6

Note: Data used is from the latest observation available between 1997 and 2003.

Source: A "Research" Database of Infrastructure Economic Performance, Antonio Estache and Ana Goicoechea, World Bank Infrastructure Network, Office of the Vice President, June 2005.

Affordability – pricing: Residential average end-user prices (US cents/kwh) are one of the most expensive at 8 cents, which is above the low-income country group and Sub-Saharan Africa averages at 6 cents. On the other hand, non-residential prices are one of the lowest at 3 cents compared to 6 and 5 cents for low-income countries and Sub-Saharan Africa. These level comparisons must of course be taken with caution. Such information needs to be complemented with data on costs to assess the adequacy of pricing and ascertain any possible cross-subsidization.

Water and sanitation

Overall, in the water sector, Lesotho's performance seems better compared with relevant comparators due to its natural endowments and the benefits of the Lesotho Highlands Water Project (LHWP). However, this should not be interpreted as if all is well in the water sector in Lesotho. Water is abundant in Lesotho, but its temporal and spatial availability is not well suited to meet the needs of the economy. Water is plentiful in the mountains from where it is exported through the LHWP to water-scarce South Africa. Moreover, the quality of infrastructure to harness water to meet Lesotho's domestic water needs (that is not captured in the two available indicators) has been deemed inadequate (World Bank 2005 a). In sanitation, access appears broadly similar to the low-income group benchmark (Table 2). Moreover, sanitation coverage has expanded significantly over the past two decades and more recent data indicate that the national sanitation coverage has, in fact, risen to 53%, well above the benchmark average (World Bank 2002).

Access: Not surprisingly, Lesotho performs better than comparable groups when it comes to access to improved **water** sources. Around 76% of the population has access compared to around 65% for low income and SSA. Lesotho's overall performance compares favorably to South Asia and East Asia & Pacific regions. Moreover, the urban/rural divide is much narrower than in other regions, with 74% of **rural** population having access to improved water sources compared to 56% in low-income countries and 54% in SSA. About 88% of **urban** population has access to improved water sources, which is higher than averages in low-income and Sub-Saharan African countries (83%).

In terms of access to improved **sanitation**, however, Lesotho has 37% access rate, as reported in the database, which is similar to SSA but just under low-income countries; note that more recent data cited above (World Bank 2002) indicate that coverage has climbed to 53%. Other regions, however, are far more advanced in this area with Middle East and North Africa at 77%, East Asia Pacific 60% and Latin America and Caribbean at 77% access rates. Both **rural** (32%) and **urban** (61%) access rates for Lesotho are better than in low-income countries and the Sub-Saharan Africa region as a whole (30% and 60%, respectively). Most recent World Bank sector data indicate that in the capital Maseru, the coverage of 65%

is high in the regional perspective. This comparatively solid performance in sanitation reflects success of Lesotho's policies in addressing the sanitation needs at national, rural, and urban levels (World Bank 2002). The Bank's sector data indicate that where the problem lies in the broad area of sanitation seems to be in the treatment of waste water, and wastewater collection for treatment in urban areas, which is more of an environmental issue.

Table 2: Benchmarking Lesotho's Performance in Water and Sanitation

<u>Water</u>	Lesotho	Benchmark Low Income	SSA	Middle East and North Africa	South Asia	East Asia Pacific	Latin America & Caribbea n	Europe & Central Asia	Middle Income	Lower Middle Income	Upper Middle Income	World
Access to Improved Water Sources (% of population)	76	65	64	85	72	75	90	87	89	85	93	80
Access to Improved Sanitation (% of population)	37	41	37	77	48	60	77	78	79	72	86	64

Note: Data used is from the latest observation available between 1997 and 2003.

Source: A "Research" Database of Infrastructure Economic Performance, Antonio Estache and Ana Goicoechea, World Bank Infrastructure Network, Office of the Vice President, June 2005.

Information and Communications Technology (ICT)

The overall picture on ICT performance is mixed in terms of access but unfavorable in terms of the cost of local telephony and the quality of service (Table 3). Cellular telephony seems to act as a substitute for poor mainline density. Therefore, there is scope to improve the mainline density and introduce competition in the local provision of telephone services with attendant benefits of lower costs. The fault rate of calls is very high, reflecting the poor quality of service.

Access: The picture with regards to teledensity is mixed with Lesotho underperforming its income group in *mainline teledensity* but outperforming in *cellular teledensity*. Mainline teledensity is only half the level of the lowest of all regions and income groups – low-income countries and Sub-Saharan Africa. Cellular penetration is higher than in the low-income group and South Asia but lower than in all other income groups and regions. Most recent sector data for Lesotho suggest that telephone density in Lesotho has also increased significantly from the 14,000 subscribers in 2000 to 240,000 in 2005. Aggregate telephone density increased from 1% to 10% between 2000 and 2005, with a high ratio of mobile to fixed-line subscriptions (200,000 mobile subscribers and 40,000 fixed-line subscriptions) (de Barros, 2005).

Affordability – pricing: Surprisingly, Lesotho has one of the highest *local call* costs with a 3-minute call costing 22 US cents. This is twice the cost in low-income, SSA and upper-middle income countries and four times the cost in South Asia and East Asia Pacific. However both cost of *international phone call* to the US and *cellular local* call are cheaper than in most other regions.

Table 3: Benchmarking Lesotho's Performance in Information and Communications Technology

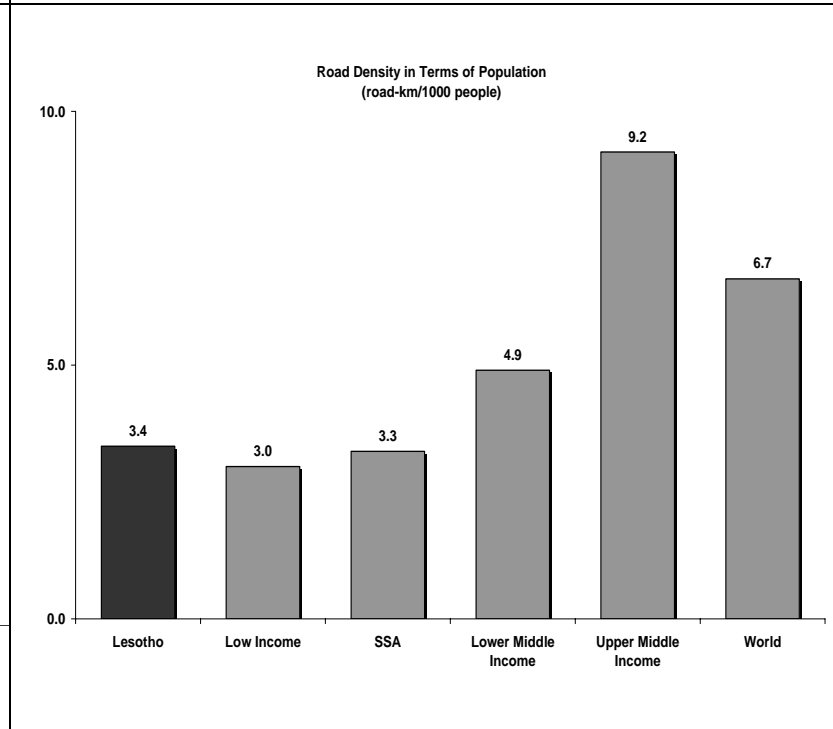
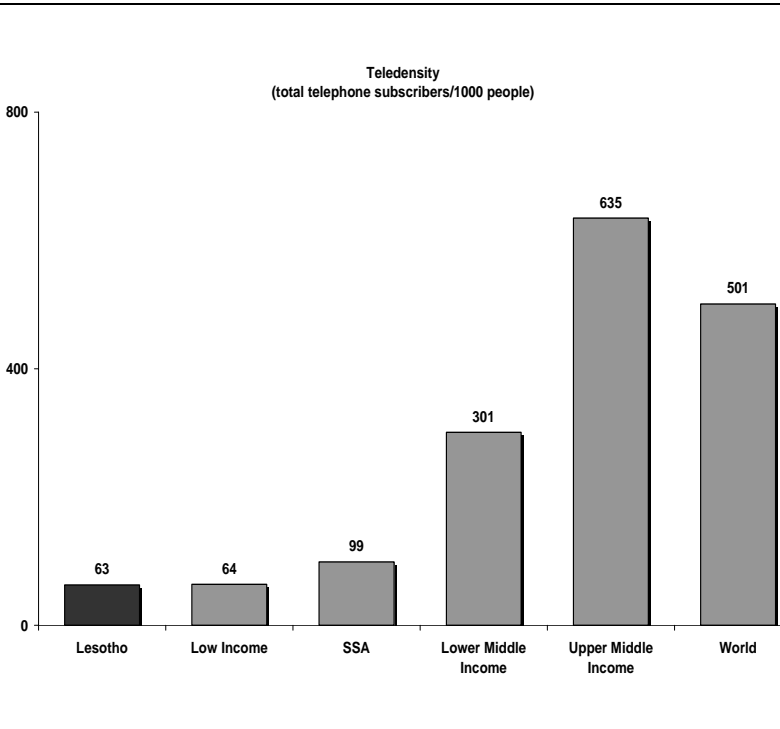
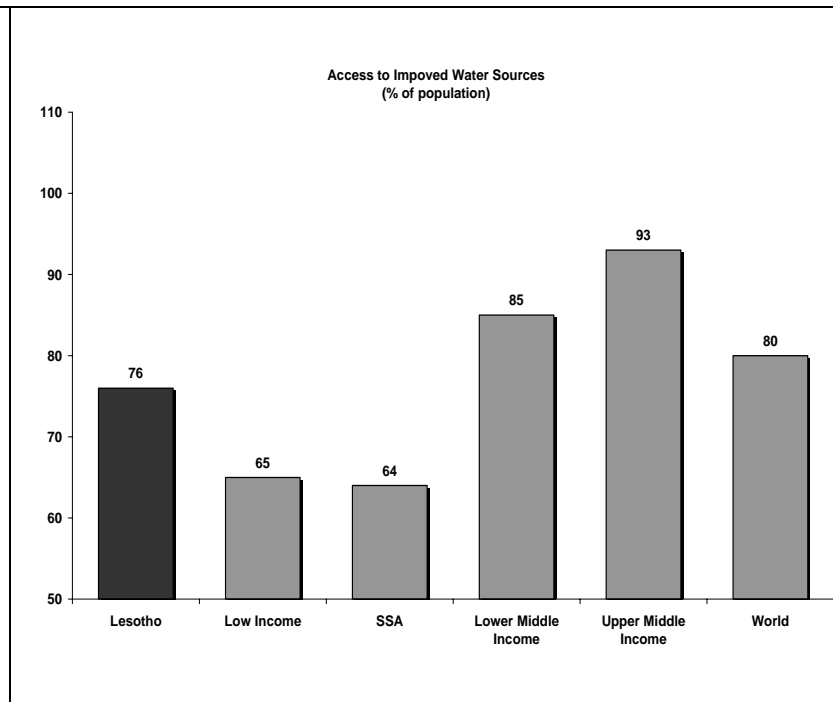
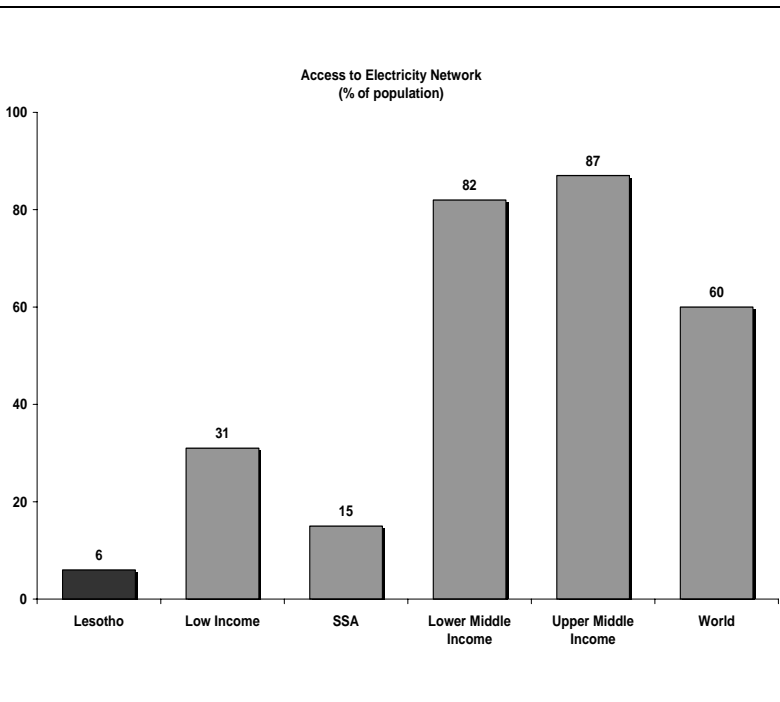
<u>ICT</u>	Lesotho	Benchmark Low Income	SSA	Middle East and North Africa	South Asia	East Asia Pacific	Latin America & Caribbea n	Europe & Central Asia	Middle Income	Lower Middle Income	Upper Middle Income	World
Teledensity (total telephone subscribers/1000 people)	63	64	99	292	72	172	433	547	468	301	635	501
Mainlines Teledensity (mainlines subscribers/1000 people)	16	29	31	129	35	76	192	224	193	126	261	213
Cellular Teledensity (cellular subscribers/1000 people)	47	37	73	167	37	96	249	325	280	179	381	296
Cost of Local Phone Call (US cents/3 minutes)	22	8	10	6	4	5	7	7	7	6	9	9
Cost of Phone Call to the US (US cents/3 minutes)	231	504	497	281	336	450	325	326	309	314	305	335
Cost of Cellular Local Call (US cents/3 off-peak minutes)	26	40	42	52	17	42	57	40	49	44	54	49
Phone Faults (reported faults/100 mainlines)	75	64	57	23	97	39	24	34	25	33	18	37
Unmet Demand (% of main telephone lines in operation)	73	47	50	26	24	13	17	8	12	20	4	21

Note: Data used is from the latest observation available between 1997 and 2003.

Source: A "Research" Database of Infrastructure Economic Performance, Antonio Estache and Ana Goicoechea, World Bank Infrastructure Network, Office of the Vice President, June 2005.

Quality – technical: Reported faults per 100 telephone mainlines are very high in Lesotho at 75%, much higher than low income (64) and SSA (57) but lower much lower than the South Asia where 97% faults are reported. Unmet demand is also very high with around 73% of people registered for connection not being connected.

Figures 1-4: Selected Comparisons of Infrastructure Performance in Lesotho



Roads transport

On the surface, indicators of access to roads suggest average performance for a low-income country, but the indicators may suggest a somewhat rosier picture due to the small size of the country and its population. Moreover, the main comparative quality indicator—the percentage of paved roads—shows poor performance compared with all comparator groups of countries (Table 4).

Access: Road density in terms of population (road-kilometers per 1,000 people) is slightly higher than the low-income country average and similar to SSA, but is only half the world average; it is about average for a Sub-Saharan African country. Road density in terms of population is also higher than in low-income and Sub-Saharan African countries, but far behind all other regions and income groups with a world average being *four times higher*. These values should be put in perspective, however, as both ratios are positively affected by the small size of the country and its population.

Table 4: Benchmarking Lesotho’s Performance in Roads Transport

<u>Transport</u>	Lesotho	Benchmark Low Income	SSA	Middle East and North Africa	South Asia	East Asia Pacific	Latin America & Caribbea n	Europe & Central Asia	Middle Income	Lower Middle Income	Upper Middle Income	World
Road Density in Terms of Population (road-km/1000 people)	3.4	3.0	3.3	4.8	2.4	4.2	5.7	8.6	7.0	4.9	9.2	6.7
Road Density in Terms of Land (road-km/1000 sq km)	195.7	181	155.7	608.9	544.6	276.4	712.7	580.3	702	327.7	1076.4	840.6
Travel Time to Work in Main Cities (minutes/one-way work trip)	15	33	34	25	27	36	29	29	29	40	29	31
Paved Roads (% of total roads)	18	30	25	56	38	32	36	76	52	47	57	50

Note: Data used is from the latest observation available between 1997 and 2003.

Source: A "Research" Database of Infrastructure Economic Performance, Antonio Estache and Ana Goicoechea, World Bank Infrastructure Network, Office of the Vice President, June 2005.

Quality – technical: Only 18% of all roads are paved in Lesotho, which compares poorly to all other regions and income groups. Low-income countries have 30% paved roads, Sub-Saharan Africa 25%, Middle East and North Africa 56%, and upper middle-income countries have 57% of all roads paved. Admittedly, however, the percentage of paved roads is an imperfect correlate indicator of road quality, for at least two sets of reasons. First, the need for paved roads is heavily influenced by climatic and environmental conditions, which vary significantly by country and world region; hence the same value of this indicator in two climatically different countries may reflect different underlying quality of roads after adjusting for climatic differences; for example, other things being equal, a country with semi-arid climate and vast territory such as South Africa may need a lower percentage of paved roads than a country with a much more rainy climate (Bogetic and Fedderke 2005a). Second, from the engineering perspective, a more appropriate quality indicator is road conditions based on surveying or, preferably, mechanical techniques; unfortunately, such indicators are not widely/publicly available for large numbers of countries that would facilitate a more nuanced comparison. In the United Kingdom, for example, routine survey-based assessments of road conditions were only introduced in 1999 (see the U.K. Department of Transport website cited in the references). As a result, our preliminary benchmarking for performance of roads transport should certainly be supplemented by more detailed comparative road indicators of quality and quantity of service as they become available. Meanwhile, the basic indicators presented here do suggest the need for a deeper look at the adequacy of the road network to service the needs of a growing, low-income country, including large segments of the rural population.

Quality – perceptions: Despite low levels of paved roads, average time to work in main cities is only 15 minutes, one of the fastest times and at least half the amount taken in low income, Sub-Saharan Africa, East Asia Pacific, and upper-middle income countries; this, however, may reflect the small size of the country and the spatial concentration of the population around the main cities.

Large Differences from the Benchmark

Another way of identifying shortfalls in comparative performance is to look at “large” deviations between Lesotho and the benchmark group of countries. For this purpose, we define “large” as a difference of 10% and more (or less) than the benchmark. The results reported in table 5 below. Overall, Lesotho’s performance in relation to its income group is mixed with *significant shortfalls* in (i) access and affordability of electricity, (ii) mainline telephony and the cost and quality of local telephone service, (ii) the quality of roads. While the database indicator for access to improved sanitation is lower than the benchmark average, more recent data suggest a better-than-average performance. *Average performance* is noted in the overall teledensity but this seems to reflect largely the rapid growth of cellular telephony that has increasingly substituted for the poor coverage and the quality of the fixed line service. By contrast, Lesotho’s performance is *above average* in (i) the access to improved water and, based on the recent data, in sanitation, (ii) the cellular segment of ICT (both density and cost) and the cost of calls to the U.S., and the (iii) quantitative indicators of access to roads; the latter, however, must be put in perspective against the low quality of roads.

Table 5: Lesotho's Infrastructure Performance - Significant Deviation from the Benchmark

	Lesotho	Benchmark Low Income	SSA	World	Lesotho's performance vs. Benchmark
Deviation of -10% or more from Benchmark					
Energy: Access to Electricity Network (% of Population)	6	31	15	60	Underperform
Electricity Average End-User Prices (US cents/kWh) - (Residential/Non-Energy: Residential)	8 / 3	6 / 6	6 / 5	9 / 6	Underperform
ICT: Mainlines Teledensity (mainlines subscribers/1000 people)	16	29	31	213	Underperform
ICT: Cost of Local Phone Call (US cents/3 minutes)	22	8	10	9	Underperform
ICT: Phone Faults (reported faults/100 mainlines)	75	64	57	37	Underperform
Transport: Paved Roads (% of total roads)	18	30	25	50	Underperform
Water: Access to Improved Sanitation (% of population)	37	41	37	64	Underperform
Deviation of between -10% and +10% from Benchmark					
ICT: Teledensity (total telephone subscribers/1000 people)	63	64	99	501	Average
Deviation of +10% or more from Benchmark					
ICT: Cellular Teledensity (cellular subscribers/1000 people)	47	37	73	296	Outperform
ICT: Cost of Phone Call to the US (US cents/3 minutes)	231	504	497	335	Outperform
ICT: Cost of Cellular Local Call (US cents/3 off-peak minutes)	26	40	42	49	Outperform
Water: Access to Improved Water Sources (% of population)	76	65	64	80	Outperform
Transport: Road Density in Terms of Population (road-km/1000 people)	3.4	3.0	3.3	6.7	Outperform
Transport: Road Density in Terms of Land (road-km/1000 sq km)	196	181	155.7	840.6	Outperform
Transport: Travel Time to Work in Main Cities (minutes/one-way work trip)	15	33	34	31	Outperform

Conclusion

In sum, we benchmarked Lesotho’s infrastructure performance using available comparative indicators of various dimensions of performance. The indicators come from the recent World Bank research data base specifically developed for this purpose. The results are revealing of the several major, comparative deficiencies in infrastructure performance in Lesotho:

- (i) extremely low access to electricity, and affordability;
- (ii) poor coverage, quality, and cost of local (non-cellular) telephony; and
- (iii) poor quality of roads.

Infrastructure service delivery in these areas is clearly well below what would be expected on average for a country in Lesotho's income group. It is also lower than in many other world regions.

These infrastructure shortfalls are likely to adversely affect not only the welfare of the poor but also the cost competitiveness and growth prospects of a range of economic sectors (e.g., tourism, trade) that depend critically on a stable and competitive supply of basic infrastructure service. As such, they are indicative of the infrastructure sectors and performance dimensions that need improvement if Lesotho is to catch up with competitive performance of its peer group of countries. Within the SACU sub-region, Lesotho's infrastructure shortfalls are also likely to constrain its regional economic integration in several areas (e.g., Southern Africa power pool, road network) that are important for long-term economic prosperity. Finally, this simple, international comparison of Lesotho's infrastructure performance should, of course, be combined with more in-depth, sector analyses for a more complete picture of the overall infrastructure performance. Taken together, such analyses could provide policymakers in Lesotho a useful guide to the areas of infrastructure performance requiring urgent attention.

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