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Productivity changes in Benin Zone hospitals: a non-parametric Malmquist approach

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Abstract

Background: To date no study in Benin has attempted to determine whether there has been productivity growth in the hospital sector as a result of the various health sector reforms undertaken in the recent past. The objective of this study was to assess the changes in productivity of zone hospitals in Benin over five years (2003-2007) with a view to analysing source of the change.

Methods: Malmquist data envelopment analysis method was used to analyze productivity among a sample of 23 zonal public hospitals in the Republic of Benin over a period of five years, i.e. 2003 to 2007. Health inputs and utilization data was collected from records of sampled hospitals through physical visits by one of the authors.

Results: Ten (43.5 per cent) out of 23 hospitals experienced productivity growth given that they had Malmquist Productivity Indexes greater than one. In contrast, the Malmquist Productivity Indices for 13 (56.5 per cent) hospitals were less than one, signifying productivity decline over time. None of the hospitals had Malmquist Productivity Index of exactly one, which would have signified stagnation. The average Malmquist total factor productivity (MTFP) score for the entire sample was 0.951 (STDEV=0.085); which signifies that on average hospitals experienced productivity decline between periods t and $t+1$ of 4.9 per cent. Whereas the relative efficiency of hospitals being assessed increased 26 per cent, technical change (innovation) regressed by 24.3 per cent.

Conclusion: Empirical results show evidence of a decrease in productivity among zonal public hospitals in Benin between 2003 and 2007. The decrease was largely due to technical regress. Such MTFP analyses may be useful for monitoring the effects of health sector reforms on hospital efficiency and productivity in the WHO African Region.

Introduction

The Republic of Benin has a surface area of 112622 square kilometres and is situated on the West African coast of Africa. It has a population of 8,439,000 people; 46% of whom live in urban areas [1]. The human development index for Benin is 0.435, which gives the country a rank of 134 out of 169 countries with data (UNDP 2010). The multidimensional poverty index value of 0.412 for Benin, ranks 134 among 169 developing countries for which the index has been calculated [2]. The average life expectancy is 57 years. As shown in Appendix 1, the health indicators for Benin are higher than the WHO African Region averages [3].

The per capita total expenditure on health at average exchange rate was US$26 in Benin [4], which was two times lower than that of the Region, and US$8 lower than the US$34 per capita recommended by the WHO Commission for Macroeconomics and Health [5]. Approximately 50.2 percent of total expenditure on health came from government sources. Private spending on health constituted 49.8 per cent of the total health expenditure; with about 94.9 per cent of it coming from household out-of-pocket expenditures. Such high out-of-pockets expenditures constitute a barrier to health service utilization.

The country has a total health workforce of 10275 (1.485 density per 1000); disaggregated data by public and private sector is not available. The workforce consists of 311 physicians (0.045 density per 1000); 5789 nurses (0.84 density per 1000); 12 dentists (0.002 density per 1000); 11 pharmacists (0.002 density per 1000); 178 public and environmental health workers (0.03 density per 1000); 88 community health workers (0.01 density per 1000); 477 laboratory technicians (0.07 density per 1000); 128 other health workers (0.02 density per 1000); and 3281 health management and support workers (0.47 density per 1000) [6]. The overall health workforce density of Benin is lower than the Regional average health workforce density of 2.626 per 1000. Benin is one of the 57 countries in the world experiencing health workforce crisis. This implies that there is great need in Benin to utilize efficiently the available health workforce.

The Benin health system consists of three levels. Firstly, the central level, organized around the ministry of health headquarters, whose mandate is to develop policies and norms and standards, mobilize resources, and oversee the overall management of the system. Secondly, the intermediate level includes six regional directorates of public health, whose mission is to translate national health policy into action and provide supervisory support to the peripheral level. Finally, the peripheral level is organized in 34 operational public health zones. Each zone covers a population of 100,000 to 200,000 inhabitants. Each zone has a hospital, health centres and village health posts/units. There is approximately a total of 491 public health centres; 34 zone public hospitals; 5 Department/provincial hospitals; 5 specialized public hospitals; 34 religious missions clinics; and 1409 private-for-profit clinics [7].

A recent study used DEA to measure the technical and scale efficiency of zone public hospitals in Benin [8]. However, to date no study in Benin has addressed the following questions: What is the trend of productivity over the years? What percentage of the observed productivity changes are due to technical efficiency change and technological change?

This study was meant to contribute to bridging that knowledge gap. Its specific objective was to assess the changes in productivity of zone public hospitals in Benin over five years (2003-2007) with a view to analysing changes in efficiency and changes in technology.

METHOD AND DATA

The overall goals/outcomes of any health system are to "improve health and health equity, in ways that are responsive [to clients' non-medical expectations], financially fair, and make the best, or most efficient, use of available resources" [9]. The route to achieving health outcomes is through realizing greater access and coverage for effective health services or interventions and social determinants of health. The extent to which a health system realizes its goals depends on the effectiveness (quality and safety) with which it performs the functions of leadership and governance; service delivery; health workforce development; medicines, vaccines and technologies; health information; and health financing [10,11]. A health system decision making unit (e.g. hospital, health centre, health post) utilizes scarce inputs (e.g. health workforce, medicines, vaccines, non-pharmaceutical supplies, equipment, infrastructure, information) to deliver health services to their catchments population. Given their scarcity, it is a moral, economic and public health imperative that all health systems inputs should be put into optimal use to deliver effective health services to as many people as technically feasible. In a nutshell, this means that all inputs should be used efficiently to maximize productivity of hospitals, in terms of provision of quality health services.

Malmquist Productivity Index (MPI)

The purposes of measuring productivity growth include: (a). tracing effects of technological change on hospital outputs resulting from application of new scientific and technical knowledge, tools, products and techniques in the provision of health services; (b). identifying changes in efficiency – extent to which hospitals achieve the maximum amount of health service output with current technology and a given amount of inputs over a period of time; (c). identifying real cost savings in hospital health services production; and (d) benchmarking hospital health service production processes [12].

Productivity refers to the relationship between the output of a hospital and the health system inputs that have gone into producing that output. Productivity is the ratio of a volume measure of actual hospital output to a volume measure of health system input used [13]:

$$\Pr oductivity = \frac{Actual\ hospital\ output}{Hospital\ inputs\ consumed}.$$

Productivity measurement is usually in terms of the level and trends over time in the productivity. The productivity ratio refers to the productivity at a specific point in time expressed as health service output units delivered per unit of health system input used. Productivity trend ratios are commonly converted into either output-orientated or input-orientated index measure of change in productivity. The output-orientated indices define the index as a measurement of increased outputs derived from the inputs' net growth. These indices shed light on the question: how much more output has been produced, using a given level of inputs and the present state of technology, relative to what could have been produced under a given reference technology using the same level of inputs. Input-orientated indices measure change in productivity by examining the reduction in input use, which is feasible given the need to produce a given level of output under a reference technology [14].

One can use either Fisher index [15], Tormqvist index [16] or Malmquist Index [17] to measure productivity change. Malmquist DEA has been applied a lot in Europe to measure hospital productivity [18-25]. Its application in Africa to assess hospital productivity has been rather limited [26-28].

In the current study we opted to use the input-based Malmquist productivity index because of its positive attributes, namely: (i) it requires information only on hospital inputs and outputs quantities and not their prices; (ii) it does not impose behavioural assumptions (e.g. profit maximization, cost minimization, revenue maximization) in its construction, which would be inappropriate, especially for public hospitals whose objective it to not to maximize profits but to maximize provision of quality health services; (iii) it can be calculated using non-parametric techniques, which impose properties of monotonicity and convexity, but do not impose functional structure on the production technology; (iv) it accommodates a typical hospital multiple inputs and outputs; and (v) it decomposes into constituent sources of productivity change, i.e. pure technical efficiency change, technical change and scale change [29].

In this study we were confronted with a problem of comparing the input of a hospital at two different points in time $(t, t+1)$ in terms of the maximum factor by which the input in $t+1$ period could be reduced such that the hospital could still produce the health service output levels observed for the other time period t.

Suppose hospitals $s = 1,2,..,n$ utilize the health system input vector $x \equiv (x_1,..., x_N)$ to produce the health service output vector $y \equiv (y_1, y_2,..., y_M)$. The hospital production function can be specified as [30]: $y_1 = F^s(\hat{y}, x), \quad s = t, t+1$. It represents the maximum amount of the first health service output that hospital s can produce, using the vector of inputs x given that the vector of "other" outputs $\hat{y}$ must also be produced.

Following the footsteps of Shepard [31], Fare and Grosskopf [32] defines the input distance function as: $D_i^t(y^t, x^t) = \sup\{\lambda > 0 : (x^t/\lambda) \in L^t(y^t)\}$. In order to define the input based Malmquist productivity index, two mixed period distance functions are required, namely $D_i^{t+1}(y^t, x^t)$ and $D_i^t(y^{t+1}, x^{t+1})$. Using the period t benchmark technology, Fare and Grosskopf [32] employed the two distance functions to define the input based Malmquist index $M_{ic}(y^t, x^t, y^{t+1}, x^{t+1})$ as:

$$M_i^{t+1}(y^{t+1}, x^{t+1}, y^t, x^t) = \left[\frac{D_i^t(y^{t+1}, x^{t+1})}{D_i^t(y^t, x^t)} \times \frac{D_i^{t+1}(y^{t+1}, x^{t+1})}{D_i^{t+1}(y^t, x^t)}\right]^{1/2}$$
.

Ray and Desli [33] decomposed the abovementioned input based Malmquist productivity index as follows:

$$M_{ic}(y^t, x^t, y^{t+1}, x^{t+1}) = TE\Delta(y^t, x^t, y^{t+1}, x^{t+1}) \times T\Delta(y^t, x^t, y^{t+1}, x^{t+1}) \times S\Delta(y^t, x^t, y^{t+1}, x^{t+1})$$

Where:

technical efficiency change

$$TE\Delta(y^t, x^t, y^{t+1}, x^{t+1}) = \left[\frac{D_i^{t+1}(y^{t+1}, x^{t+1})}{D_i^t(y^t, x^t)}\right]$$

technical change

$$T\Delta(y^t, x^t, y^{t+1}, x^{t+1}) = \left[\frac{D_i^t(y^{t+1}, x^{t+1})}{D_i^{t+1}(y^{t+1}, x^{t+1})} \times \frac{D_i^t(y^t, x^t)}{D_i^{t+1}(y^t, t^t)}\right]^{1/2}$$

"scale change factor" $S\Delta(y^t, x^t, y^{t+1}, x^{t+1}) =$

$$\left\{\left[\frac{D_{ic}^t(y^{t+1}, x^{t+1})}{D_i^t(y^{t+1}, x^{t+1})} \div \frac{D_{ic}^t(y^t, x^t)}{D_i^t(y^t, x^t)}\right] \times \left[\frac{D_{ic}^{t+1}(y^{t+1}, x^{t+1})}{D_i^{t+1}(y^{t+1}, x^{t+1})} \div \frac{D_{ic}^{t+1}(y^t, x^t)}{D_i^{t+1}(y^t, x^t)}\right]\right\}^{1/2}$$

The subscript 'c' on an input distance function implies that it is defined relative to a constant returns to scale technology; and 'i' refers to input based Malmquist index. $TE\Delta(y^t, x^t, y^{t+1}, x^{t+1})$ measures the contribution to productivity change of a change in pure technical efficiency between periods t and $t+1$; $T\Delta(y^t, x^t, y^{t+1}, x^{t+1})$ measures the contribution to productivity change of technical change (shift in technology) between periods t and $t+1$ along a ray through a particular hospital's period $t+1$ data; and $S\Delta(y^t, x^t, y^{t+1}, x^{t+1})$ is the change in scale efficiency and scale technology between times t and $t+1$. The latter provides a measure of the contribution of scale economies to hospital productivity change.

According to Grifell-Tatje and Lovell [29], $M_{ic}(y^t, x^t, y^{t+1}, x^{t+1})$ attains a value greater than, equal to, or less than one depending on whether a hospital in question experienced productivity growth, stagnation, or productivity decline between periods t and $t+1$, from the perspective of period t technology. $TE\Delta(y^t, x^t, y^{t+1}, x^{t+1})$ is greater than, equal to, or less than unity depending on whether the relative efficiency of the hospital being assessed increased, remained the same, or decreased between periods t and $t+1$. $T\Delta(y^t, x^t, y^{t+1}, x^{t+1})$ attains a value greater than, equal to, or less than one depending on whether the hospital being appraised had technical progress, stagnation or technical regress. $S\Delta(y^t, x^t, y^{t+1}, x^{t+1})$ attains a value greater than, equal to, or less than one depending on whether a change in a specific hospital's scale of production contributes positively, not at all, or negatively to productivity change.

Data

The sample consisted of 30 hospitals. However, complete inputs and outputs data was available for only 23 of those hospitals; i.e. 68% of the 34 total number of zone hospitals in Benin. Thus, the final analysis was based on the latter group of hospitals.

One of the researchers visited all the hospitals in the sample. At each of the hospitals he met with the medical officer in charge, explained the purpose of the study, and was given access to the relevant inputs and outputs records. He complemented the hard data from the hospital records to interactive interviews with the people in charge of different hospital departments. The inputs and outputs data were collected for 2003, 2004, 2005, 2006 and 2007.

The DEA was estimated with five inputs: total number of doctor/physician hours; total number of nurse and midwives hours; total number of hours of laboratory, x-ray, anaesthetists, paramedics and assistants; non-salary running costs; and number of beds (a proxy of capital inputs). There were two outputs: (i) outpatients visits; and (ii) number of hospital admissions.

The study reported in this paper used the DEA software developed by Coelli [34] the distance functions that compose the Malmquist index and its components.

Results and Discussion

Productivity growth

In the application of the Malmquist productivity index to analyze the differences in productivity over time, the year 2003 has been taken as the technology reference. Table 1 portrays the Malmquist productivity index summary of annual geometric means. In the last row (last column), we see that, on average, zone hospitals total factor productivity decreased by 5.3 per cent over the five-year period. That productivity decline was largely attributed to technical regress. The annual mean efficiency change resulted from both pure efficiency improvement of 9.2 per cent and a positive scale efficiency change of 14.7 per cent. Whereas the relative efficiency of hospitals being assessed increased 25.3 per cent, technical change (innovation) regressed by 24.4 per cent per annum. The change in annual averages of Malmquist Total Factor Productivity (MTFP) index were highest in 2005 (MTFP=1.069) and lowest in 2004 (MTFP=0.793).

It is prudent now to examine the magnitude and sources of productivity change within each hospital.

Table 1: Malmquist index summary of annual means

year	Efficiency change (A=CxD)	Technical change (B)	Pure Efficiency Change (C)	Scale Efficiency change (D=A/C)	Malmquist Index or Total factor productivity change (E=AxB)
2	0.83	0.955	1.021	0.813	0.793
3	1.714	0.624	1.266	1.353	1.069
4	1.111	0.909	0.968	1.147	1.011
5	1.558	0.602	1.137	1.37	0.938
MEAN	**1.253**	**0.756**	**1.092**	**1.147**	**0.947**

Table 2 provides a summary of the average annual values of the Malmquist productivity index and its components for individual hospitals.

Ten (43.5 per cent) out of 23 hospitals experienced productivity growth given that they had Malmquist Productivity Indexes greater than one. HZ Bembereke, HZ Kandi, HZ ST Jean de Dieu Tanguiéta, CHD Natitingou, HZ Abomey Calavi, CHD Borgou, HZ St Jean de Boko, HZ Sourou Sero, HZ ST Martin De Papane, HZ Sakete hospitals experienced total factor productivity growth of 0.5%, 3.7%, 0.7%, 0.9%, 1.1%, 3.8%, 1.1%, 3.8%, 4.3% and 1.1% respectively. In all ten hospitals productivity growth was entirely due to improvement in relative technical efficiency of hospitals.

In contrast, the Malmquist Productivity Indices for 13 (56.5 per cent) hospitals were less than one, signifying productivity decline over time. More specifically, the 13 hospitals registered total factor productivity decline ranging from 1.5% in HZ Banikora hospital and 26.3% in HZ Bassila. In all the thirteen hospitals, productivity decline was totally due to technical regress, i.e. lack of innovation. None of the hospitals had Malmquist Productivity Index of exactly one, which would have signified stagnation.

The average Malmquist total factor productivity (TFP) score for the entire sample was 0.951 (STDEV=0.085); which signifies that on average hospitals experienced productivity decline between periods t and $t+1$ of 4.9 per cent.

Table 2: Malmquist index summary of hospital means					
Hospitals	**Efficiency change**	**Technical change**	**Pure Efficiency change**	**Scale Efficiency change**	**Malmquist index or total factor productivity change**
HZ Bembereke	1.287	0.78	1	1.287	1.005
HZ Kandi	1.435	0.723	1.067	1.345	1.037
HZ Banikoara	1.178	0.836	1.067	1.104	0.985
HZ Kouande	1.311	0.723	1.067	1.229	0.947
HZ ST Jean de Dieu Tanguiéta	1.302	0.774	1.067	1.22	1.007
CHD Natitingou	1.262	0.799	1.241	1.017	1.009
HZ Abomey Calavi	1.438	0.703	0.996	1.443	1.011
HZ Ouidah	1.123	0.786	1.059	1.061	0.883
CHD Borgou	1.314	0.79	1.07	1.228	1.038
HZ St Jean de Boko	1.438	0.703	0.996	1.443	1.011
HZ Sourou Sero	1.314	0.79	1.07	1.228	1.038
HZ ST Martin De Papane	1.294	0.806	1.365	0.948	1.043
HZ Save	1.045	0.828	1.027	1.017	0.866
HZ Dassa-Zounme	1	0.754	1	1	0.754
HZ Klouekanmey	1.088	0.834	1.042	1.044	0.908
HZ Aplahoue	1.378	0.665	1.121	1.23	0.917
HZ Bassila	1	0.737	1	1	0.737
HZ Ordre de Malte Djougou	1.201	0.756	1.075	1.118	0.907
CHD Lokossa	1.256	0.717	1.046	1.201	0.901
HZ Come	1.31	0.747	1.433	0.914	0.978
HZ Adjohoun	1.256	0.717	1.046	1.201	0.901
HZ Pobe	1.31	0.747	1.433	0.914	0.978
HZ Sakete	1.438	0.703	0.996	1.443	1.011
MEDIAN	**1.294**	**0.754**	**1.067**	**1.201**	**0.978**
MEAN	**1.260**	**0.757**	**1.099**	**1.158**	**0.951**
STDEV	**0.134**	**0.047**	**0.134**	**0.166**	**0.085**

Efficiency change and Pure Efficiency Change

HZ Dassa-Zou and HZ Bassila hospitals had efficiency change (EFFCH) score of one, meaning that their relative efficiency remained the same. All the remaining 21 hospitals registered EFFCH scores ranging from a minimum of 1.045 (4.5% increase in HZ Save hospital) to a maximum of 1.438 (43.8% increase in HZ Sakete hospital) between periods t and $t+1$. The increase in EFFCH was as follows: 0% in two hospitals; between 1% and 9% in two hospitals; 10% and 20% in three hospitals; 21% to 30% in six hospitals; 31% to 40% in six hospitals; and over 40% in 4 hospitals. The average EFFCH score for the entire sample was 1.260 (STDEV=0.134), signifying that EFFCH contributed positively to total factor productivity change by 26%.

Pure efficiency change

As portrayed in Table 2, the average pure efficiency change (PECH) was less than one in three hospitals, implying that the relative efficiency of those hospitals decreased (by 0.4%) between period t and $t+1$. PECH score was equal to one in three hospitals, meaning that their relative technical efficiency remained the same between time period t and $t+1$. In the remaining 17 hospitals, PECH score ranged from a minimum of 1.027 (i.e. increase of 2.7% in HZ Save hospital) to a maximum of 1.433 (i.e. increase of 43.3% in both HZ Come and HZ Pobe hospitals). The contribution of PECH to total factor productivity change among the 17 hospitals was distributed as follows: 1 to 10% in 12 hospitals; 11 to 20% in one hospital; 21 to 30% in one hospital; and over 30% in three hospitals. The average PECH score was 1.099 (STDEV=0.134), meaning that pure PECH contributed a 9.9% change in the total factor productivity change.

Scale efficiency change

Three hospitals (HZ Come, HZ Pobe and HZ ST Martin De Papane) had Scale efficiency change (SECH) index value of less than one, signifying that the three hospitals production scale contributed negatively to total factor productivity change. HZ Dassa-Zou and HZ Bassila hospitals had a SECH value of equal to one, meaning that their scale of production did not contribute to total factor productivity change. The remaining 18 (78.3 per cent) of hospitals had a SECH index greater than one, implying that those hospitals scale of production contributed positively to productivity change. The percentage contribution to productivity change of those 18 hospitals was distributed as follows: 1 to 10% in five hospitals; 11 to 20% in three hospitals; 21 to 30% in six hospitals; and above 30% in four hospitals. The average SECH score for the whole sample of hospitals was 1.158, implying that the scale of production on average contributed positively to productivity change by 15.8 per cent.

Technical change

All the 23 hospitals had a technical change (TECHCH) score of less than one, signifying that all hospitals experienced technical regress. There was small variation in the magnitude of technical regress: 16 to 20% in five hospitals; 21 to 25% in nine hospitals; 26 to 30% in eight hospitals; and over 30% in one hospital (HZ Alplahoue). The average technical change score was 0.757 (STDEV=0.047); indicating a 24.3 per cent technical regress between periods t and $t+1$

Limitations of the study

First, DEA does not capture random noise (e.g. epidemics, natural and man-made disasters), and thus, it inadvertently attributes any deviation from frontier to inefficiency [35]. Thus, by using DEA we may have over estimated the existing magnitudes of inefficiencies.

Second, the outputs used in this study are standard outputs in health care. Improvements in these outputs may not necessarily translate into improvements in health outcomes (health-related quality of life and life expectancy). Improvements in health outcomes may be studied using impact evaluation methodologies, e.g. randomized controlled clinical/effectiveness trials.

Conclusions

This study has quantified magnitudes and sources of total factor productivity in each of 23 zone hospitals in Benin. Overall mean Malmquist total factor productivity index of zone hospitals declined by 4.9 percent between 2003 and 2007. The decline was fully explained by technical regress of 24.3 per cent. The decline in overall mean Malmquist index would have been higher if it were not for the 26 per cent increase in average technical efficiency.

In their health financing strategy for the African Region [36], the Fifty-Sixth WHO Regional Committee for Africa recommended that member countries should institutionalize efficiency and productivity monitoring within national health management information systems (NHIS). Therefore, NHIS capacities ought to be enhanced to routinely capture the input, input prices and output data which could be used to monitor economic efficiency and productivity change among hospitals and lower level facilities. Such information would be useful in any analysis of the effects of health sector reforms on hospital efficiency and productivity.

Competing interests

The authors declare that they have no competing interests.

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Appendix 1: Comparison of health indicators and health services coverage of Benin with averages for the WHO African Region		
Variable	Benin	WHO African Region average
Total expenditure on health as % of Gross domestic product	4.7	5.5
General government expenditure on health as % of total expenditure on health	50.2	47.1
Private expenditure on health as % of total expenditure on health	49.8	52.9
General government expenditure on health as% of total government expenditure	10.657	8.7
External resources for health as % of total expenditure on health	21	10.7
Out-of-Pocket expenditure as % of private expenditure on health	94.9	49.8
Private prepaid plans as % of private expenditure on health	5.1	39.6
Per capita total expenditure on health at average exchange rate (US$)	26	58
Per capita total expenditure on health (PPP int.$)	61	111
Per capita government expenditure on health at average exchange rate (US$)	13	27
Per capita government expenditure on health (PPP int.$)	31	52
Health Indicators Life expectancy (2007)	57	52
Healthy life expectancy (HALE) at birth (years) (2007)	50	45
Neonatal mortality rate (per 1000 live births)	36	40
Infant mortality rate (probability of dying between birth and age 1 per 1000 live births) 2007	78	88
Under-5 mortality rate (probability of dying by age 5 per 1000 live births)	123	145
Adult mortality rate (probability of dying between 15 and 60 years per 1000 population)	289	401
Maternal mortality ratio (per 100000 births)	840	900
Malaria mortality rate per 100000 population	146	104
Prevalence of HIV among adults =>15 years per 100000 population	1,161	4,735
Adolescent fertility rate (per 1000 girls aged 15-19)	114	117
Health services coverage Measles immunization coverage among 1 year olds (%)	61	74
Births attended by skilled health personnel (%)	78	46
Contraceptive prevalence (%)	18.6	24.1
Antenatal care coverage (%): at least 1 visit	84	73
Antenatal care coverage (%): at least 4 visits	61	45
Unmet need for family planning services (%)	27.2	24.4
Proportion of males aged 15-24 years with comprehensive correct knowledge of HIV/AIDS (%)	30	-
Proportion of females aged 15-24 years with comprehensive correct knowledge of HIV/AIDS (%)	16	23
Antiretroviral therapy cover among people with advanced HIV infection (%)	49	30
Children aged <5 years sleeping under insecticide treated bed nets (%)	20	14
Children aged <5 years who received any antimalarial treatment for fever (%)	54	36
Access to improved drinking water sources (%)	65	59
Access to improved sanitation (%)	30	33

Source: WHO [3,4].