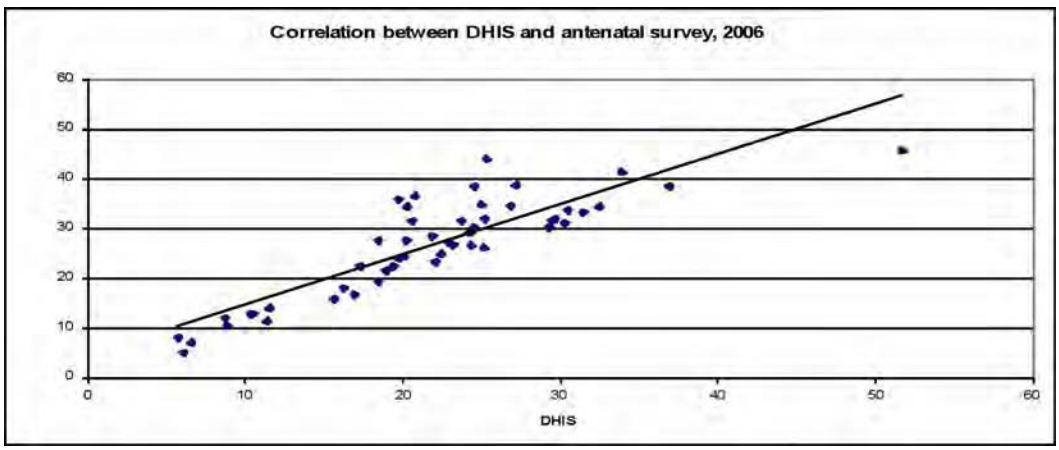
Appendices

Appendix 1

HIV Prevalence amongst antenatal clients tested - Correlation of the national antenatal sero-prevalence survey with the national District Health Information System Data.

The routine data collected from clinics and entered into the District Health Information System (DHIS) provides a picture of antenatal HIV prevalence at district level. The HIV prevalence amongst antenatal clients tested, measures the percentage of ANC clients who accept to be tested for HIV and then test positive. The sample of women included within the DHIS data compared with the national antenatal sero-prevalence survey is different in that the national survey is a representative sample and testing is anonymous and unlinked whereas the DHIS data includes only women who consent to HIV testing and have the opportunity to access their test results.

In some districts where HIV testing coverage is low, the HIV prevalence rate will not be representative of all antenatal women in the district. It is also possible that pregnant women at higher risk for HIV may be less likely to accept testing, which would lower the overall antenatal HIV prevalence rate obtained through the routine data. Despite these issues the correlation between the DHIS and survey data for 2006 is 87%, with greater correlation where the testing coverage is higher.



Appendix 2

Deprivation Indices [1]

This section provides a brief guide to aid the understanding and interpretation of the deprivation indices used in this report.

The deprivation index is a measure of relative deprivation across districts within South Africa. Just as any index, the deprivation index is a composite measure derived from a set of variables. Principal components analysis (PCA) was used to reduce a set of demographic and socio-economic variables (that are indicators of material and social deprivation) into a composite index of deprivation. The deprivation indices were calculated at the district level for use in the District Health Barometer 2006/07 using the 2005 General Household Survey Data.

Variables included for calculating the deprivation index are [2]:

1. The proportion of the area's population that are children below the age of 5
2. The proportion of the area's population that are black Africans
3. The proportion of the area's population that are from a household that is headed by a female
4. The proportion of the area's population whose household heads have no schooling
5. The proportion of area's adults between 25 and 59 classified as both not working and looking for work or not working and not looking
6. The proportion of the area's population that live in traditional dwelling, informal shack or tent
7. The proportion of the area's population that have no piped water in their house or on site
8. The proportion of the area's population that have a pit or bucket toilet or no form of toilet
9. The proportion of the area's population that do not have access to electricity or solar power for lighting, heating or cooking

Rationale for the use of proportion of black Africans

Deprivation indices are generated from variables that are indicators of material and/or social deprivation. Most of the variables included in this project are indicators of social and/or material deprivation (McIntyre and Okorafor 2003). However, the "proportion of the district that is black African" is included for contextual reasons. This variable has been included because of South Africa's history of apartheid. Apartheid policies created unequal opportunities for different racial groups. This resulted in large disparities in socio-economic status along racial lines. Analysis of a range of South African household surveys suggests that race (Africans, and to a lesser extent coloureds) is one of the critical indicators of socio-economic disadvantage (McIntyre et al 2006).

Including this variable in the index **does not suggest** that if an individual is a black African, then the individual is by default socially or materially deprived. What is true of South Africa is that areas with higher proportions of black Africans are more likely to be deprived. This is also confirmed by the GHS 2005 data. A separate deprivation index was generated without using the variable P_African (proportion of the area's population that are black Africans). The correlation coefficient for pair-wise correlation between P_African and this second deprivation index is **0.71**.

Black Africans in South Africa are a historically disadvantaged group, socially and economically. This is therefore a valid reason for considering the variable P_African as an indicator of deprivation.

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1 From the technical report prepared for HST: Okorafor OA. Deprivation Indices by Health Districts in South Africa. Technical Report. Health Economics Unit, University of Cape Town, 2007.

2 For a more detailed discussion on the process for selecting the variables, see McIntyre and Okorafor (2003). For the 2005 Deprivation index, only two of the GHS 2005 variables are generated exactly as in the McIntyre and Okorafor paper (proportion of children and black Africans). The rest of the variables are generated using the proportions of households within the district and not the proportions of the individual members of the population.

Calculating the deprivation index

The composite index (in this case: deprivation index) is derived from the component produced by the PCA. The deprivation index is calculated for each sub-place by summing up the product of the z-score and scoring coefficient for each variable.

The formula for calculating the deprivation index can then be written as:

$$D = 0.12328 \times \left(\frac{P\_Child_1 - P\_Child}{SP\_Child} \right) + ... + 0.15520 \times \left(\frac{P\_Noclenergy_1 - P\_Noclenergy}{SnP\_Noclenergy} \right)$$

Where D is the deprivation index; the numbers are the scoring coefficients for the respective variables; and the expressions in brackets are the standardised deviations of each variable from the overall mean of the variable for each sub-place.

P_child_1 is the proportion of the first district's population that are children below 5 years of age. P_Child (bar) is the mean value of the variable P_Child (for all districts). The expression: SP_Child is the sample standard deviation of the variable P_Child. So, the product of the z-score and standardised deviation for all variables for a sub-place (z-score x scoring coefficient) are summed up to give the deprivation index for a sub-place.

Table 3: Scoring coefficients

Variable Name	Scoring Coefficients
P_Child	0.12328
P_African	0.12890
P_Femhead	0.15475
P_Head_noeduc	0.13571
P_Unemp	0.15036
P_Shacktrad	0.10195
P_Nopwaternear	0.15364
P_Pitbuck_none	0.11293
P_Noclenergy	0.15520

Normalising the deprivation index

The deprivation index scores produced by PCA ranges from negative values to positive values. Higher values represent higher levels of deprivation, and lower values represent lower levels of deprivation[3]. For example if the deprivation index scores range from -3.564 to +3.687, then the district with -3.564 is the least deprived district. By the same token, the district with +3.687 is the most deprived.

[3] Higher values reflect higher levels of deprivation because of the way the variables have been measured. For any district, if the proportion of the population with no access to "good" toilet facilities is high, it is an indication of higher levels of deprivation. The same can be applied to all variables included in the PCA.

Interpreting negative and positive values can be quite involving, so the deprivation index was normalised. This means that the indices were moved to the positive number scale. This is achieved by adding a value to all the indices such that the district that is least deprived has a deprivation index of 1. Based on the results of the PCA operation, the district with the lowest deprivation index score had a value of **-1.776767**. A value of **2.776767** was therefore added to all deprivation index scores. Consequently, the sub-place with a deprivation index score of 1 is the least deprived. **Districts with higher values are relatively more deprived than sub-places with lower values.** Table 4 shows the original deprivation index scores for select districts in the Eastern Cape and the normalised deprivation indices.

Table 4: Deprivation index scores and normalised index scores

Province	District	Deprivation Index (A)	Normalised Index (B)	B - A
E Cape	Cacadu DM	-0.4186364	2.35813	2.776767
E Cape	Amatole DM	0.7092063	3.485973	2.776767
E Cape	Chris Hani DM	1.268289	4.045056	2.776767

Interpretation of the normalised deprivation index

Higher values of the deprivation index means that the district experiences higher levels of deprivation. For example, Alfred Nzo DM has a deprivation index value of 4.592, while Cacadu DM has an index value of 2.358. This means that Alfred Nzo DM is more deprived than Cacadu DM. The value of the deprivation index for any district is generated relative to all other districts. Therefore one can rank local municipalities and district municipalities according to their deprivation index scores.

Quintiles for the normalised deprivation indices

Each district (including metros) was ranked according to levels of deprivation and categorised into quintiles. Districts that fall under quintile 1 (lowest quintile) are the most deprived districts. Those that fall under quintile 5 are the least deprived (best-off).

Reference

Filmer, D. and L. Pritchett (1999). "The Effect of Household Wealth on Educational Attainment: Evidence from 35 Countries." Population and Development Review 25(1): 85-120.

McIntyre D, Gilson L, Wadee H, Thiede M and Okorafor O (2006). Commercialisation and extreme inequality in health: The policy challenges in South Africa. *Journal of International Development* 18: 435-44.

McIntyre, D. and O. Okorafor (2003). Deprivation in South Africa and its potential relevance to resource allocation issues, Health Economics Unit, University of Cape Town. Report prepared for National Treasury, South Africa.

Tabachnick, B. G. and L. S. Fidell (2001). Using Multivariate Statistics, Allyn and Bacon.

Appendix 3

Further notes on Methodology

District health financing indicators

Provincial expenditure was coded according to the programmes and sub-programmes published by National Treasury (see Table 1). This coding was cleaned and made consistent across the provinces.

- All expenditure was then allocated (coded) to districts using primarily information in the 'Responsibility_lowest_level' and other 'Responsibility' fields.
- The DHIS facilities file was used to code all entries linked to individual health facilities. Expenditure which could not be allocated to a specific district was subsequently allocated to all of the districts within the relevant province in proportion to the total population share of each district.
- Expenditure that was allocated to a region including 2 districts was similarly allocated to each district within that region according to population share.
- Finally, expenditure for cross-boundary districts was combined and included as one item in the province that the district is located in, according to the new demarcation boundaries[1].

Table : Budget programme structure for provincial health expenditure

Programmes		**Sub-programmes**	
PR1	Administration		
PR2	District Health Services	Non-hospital PHC	District Management
			Community Health Clinic Services
			Community Health Centres
			Community Based Services
			Other Community Services
		HIV/AIDS	
		Nutrition	
		District Hospitals	
		Coroner Services	
		Others	
PR3	Emergency Medical Service		
PR4	Provincial Hospital Services		
PR5	Central Hospital Services		
PR6	Health Sciences and Training		
PR7	Health Care Support Services		
PR8	Health Facilities Management		
	Other		

[1] This means that for the purposes of analysis of per capita expenditure at district level, some expenditure which is originally recorded in one province may be shown under a different province.

Appendix 4: Indicator Definitions and Sources

Group	Type	Level	Indicator	Definition	Numerator	Denominator	Data Source
Demographic and socio-economic			Population				SSA_DM_Mid-year estimates 20 Mar 2006.xls and ZA_PopEst_July2006_SubDis.xls (DHIS) Available from http://www.hst.org.za/indicators/Population/
			Population under 1 year				SSA_DM_Mid-year estimates 20 Mar 2006.xls and ZA_PopEst_July2006_SubDis.xls (DHIS) Available from http://www.hst.org.za/indicators/Population/
			Area				Municipal Demarcation Board http://www.demarcation.org.za
			Population Density	Number of people per square km.	Number of people	Area (km)	Calculated
			Access to piped water	Census 2001: The percentage of the total number of households of a district that has access to piped water which includes: Piped water inside dwelling, Piped water inside yard, Piped water on community stand: less than 200m from dwelling, Piped water on community stand: greater than 200m from dwelling. GHS: Number of households with access to 'piped (tap) water in dwelling', 'piped (tap) water on site or in yard' or 'public tap' as a percentage of total households.			StatsSA Census 2001, http://www.statssa.gov.za/publications/populationstats.asp GHS 2005 http://www.statssa.gov.za
			Deprivation index	The deprivation index is a composite index of deprivation using StatsSA Census and household survey, recalculated to a district level. The index shows that the sociodemographic variables that have the greatest influence of deprivation in the SA context are: Lack of access to piped water, race, living in a shack or traditional dwelling, lack of access to electricity or solar power, living in a female headed household, being a child under 5 years, living in a household whose head has no schooling and being unemployed.			Health Economics Unit, UCT - based on data from StatsSA Census 2001, GHS 2005

Group	``Type	Level	Indicator	Definition	Numerator	Denominator	Data Source
			Socio-economic quintiles	The socio-economic quintiles are derived from the deprivation index. It is a simple stratification of districts based on their respective deprivation index scores. Quintile 1 comprises of districts that are the most deprived and those that fall under quintile 5 are the least deprived.			StatsSA Census 2001, GHS 2005.
			Poverty rate (% households spending <R800 pm)	Percentage of households who report total household expenditure of less than R800 per month in the month prior to the survey.	Number of households with total household expenditure <R800/month.	Total number of households.	GHS 2005.
Finance	Input		**Non-Hosp PHC expenditure per capita**	Total amount spent on non-hospital PHC health services per person without medical aid coverage.	Provincial expenditure on the following sub-programmes of District Health Services expenditure (district management, community health clinics, community health centres, community based services and other community services) plus nett local government expenditure on PHC.	Uninsured population (total population less medical aid coverage x population).	Calculated from BAS, NW financial data, Treasury data on LG expenditure-enditure, DHIS population and StatsSA GHS medical aid coverage.
	Input		**% PR2 expenditure on District Management**	Percentage of total district health services spent on district management.			BAS, NW financial data.
	Input	District hospitals	**% PR2 expenditure on District Hospitals**	Percentage of total district health services spent on district hospitals.			BAS, NW financial data.
	Input		**Medical aid coverage**	Percentage of population who have medical aid.			GHS 2005.
	Input	District hospitals	**Cost per patient day equivalent**	Average cost per patient per day seen in a hospital (expressed as Rands per patient day equivalent).	Total expenditure on health per hospital.	Patient day equivalents (Inpatient days + 1/2 Day patients + 1/3 outpatient and ER visits).	BAS, NW financial data, DHIS (PDE).
	Input		**Private health facilities (hospitals)**				Wilbury and Claymore database 2007.
	Input		**Private facilities beds**				Wilbury and Claymore database 2007.
	Input		**Public health facilities -** number of facilities by type				DHIS.
	Input		**Useable beds public sector**				DHIS.

Group	``Type	Level	Indicator	Definition	Numerator	Denominator	Data Source
	Process		**Nurse clinical workload**	Number of patients seen by a professional nurse in PHC clinics per nurse clinical work day.	PHC total headcount.	Professional nurse clinical work days.	DHIS NDoH4.
	Process	District hospitals	**Bed utilisation rate (BUR)**	Measure of the occupancy of the beds available for use.	(Inpatient days + 1/2 Day patients) x 100.	Useable beds x days in period.	DHIS NDoH5 (data for district hospitals only).
	Process	District hospitals	**Average length of stay (ALOS)**	Average duration of patient stay in a health facility (in days).	Inpatient days + 1/2 Day patients.	Discharges + Deaths + Transfers out + Day patients.	DHIS NDoH5 (data for district hospitals only).
	Process		**Clinic supervision rate**	Percentage of primary level facilities which are visited by a supervisor at least once per month.	Number of clinics and CHCs visited at least once.	Total number of clinics and CHCs.	DHIS NDoH5.
	Output		**Immunisation coverage < 1 year**	Percentage of all children in the target area under one year who complete their primary course of immunisation during the month (annualised). A Primary Course includes BCG, OPV 1,2 & 3, DTP-Hib 1,2 & 3, HepB 1,2 & 3, and 1st measles.	Children fully immunised under 1 year.	Target population under 1 year.	DHIS NDoH4.
	Output		**Immunisation drop out rate (DTP1-3)**	The percentage of children who dropped out between the first and third dose of DTP vaccine.	Drop outs between 1st and 3rd DTP-Hib Dose.	DTP-Hib 1st Dose.	DHIS NDoH4.
	Output	District hospitals	**Caesarean section rate**	The number of Caesarean section deliveries expressed as a percentage of all deliveries.	Caesarean sections in facility.	Deliveries in facility.	DHIS NDoH5 (data for district hospitals only).
	Output		**Male condom distribution rate**	The number of male condoms, distributed (to patients at the facility or through other channels) per male 15 years and older.	Condoms distributed at PHC facilities.	Male population 15 years and older.	DHIS NDoH4.
	Output		**Utilisation rate**	Average number of visits per person to PHC health facilities per year (public sector).	PHC total headcount.	Total catchment population.	DHIS NDoH4.
PMTCT	Output		**Proportion ANC clients tested for HIV**	The proportion of women coming for their first antenatal visit that are tested for HIV.	Antenatal clients tested for HIV.	Total antenatal clients at first booking visit.	DHIS NDoH4).
	Outcome		**HIV prevalence among ANC clients tested**	The percentage of antenatal clients who accept to be tested for HIV, and then tested positive.	Antenatal clients tested HIV positive - new cases.	Antenatal clients tested for HIV.	DHIS NDoH4 and antenatal seroprevalence survey.

Group	``Type	Level	Indicator	Definition	Numerator	Denominator	Data Source
PMTCT	Output		**Nevirapine uptake rate among newborn babies of HIV+ women**	The percentage of new born babies - born from HIV+ women - who received Nevirapine suspension within 72 hours after birth.	Nevirapine dose to baby born to woman with HIV.	Number of live births in facilities to women with HIV.	DHIS NDoH4.
	Output		**Nevirapine uptake rate among pregnant HIV+ women**	The proportion of HIV+ pregnant women who were dispensed with NVP - to take home and/OR those to whom NVP was administered at the facility during labour.	Nevirapine dose to woman at ANC or labour.	Antenatal client HIV positive - new.	DHIS NDoH4.
	Outcome		**Incidence of STI treated - new**	A new episode of a symptomatic Sexually Transmitted Infection (STI) treated according to the Syndromic Approach in a patient over 15 years old. One patient can have more than one new episode at a time.	Number of new episodes of STI treated.	Population over 15 years old.	DHIS NDoH4.
TB	Outcome		**TB Cure rate**	The proportion of smear positive PTB patients who completed treatment and were proven to be cured (which means that they had two negative smears on separate occasions at least 30 days apart).	The number of initially smear positive patients who converted to negative smears at two or three months after starting treatment.	Total number of new PTB smear positive cases started on treatment during the specified time.	DoH TB directorate.
	Outcome		**Smear conversion rate**	The smear conversion rate (SCR) is the percentage of new smear positive PTB cases that are smear negative after two months of anti-TB treatment and are therefore no longer infectious.	Number of new PTB cases who were +ve before starting treatment but show a -ve smear after 2 months treatment.	Total number of new smear positive cases registered during the specified time.	DoH TB directorate.
	Outcome		**Diarrhoea incidence under 5 years**	The number of new cases of children with diarrhoea per 1000 children in the catchment population.	Diarrhoea cases with and without dehydration under 5 years.	Catchment population under 5 years.	DHIS NDoH4.
	Outcome		**Not gaining weight under 5 years rate**	A child under 5 years old who has not gained weight compared to the weight recorded at least one month earlier on the 'Road to Health' chart.	Child under 5 years old not gaining weight.	Child under 5 years weighed.	DHIS NDoH4.

Group	``Type	Level	Indicator	Definition	Numerator	Denominator	Data Source
	Outcome		Delivery rate in facility	The percentage of deliveries taking place in health facilities under supervision of trained personnel in a year.	Number of deliveries in facility in a year.	All expected deliveries in target population in a year.	DHIS NDoH4.
	Impact		Stillbirth rate	The number of total births that are stillbirths (babies born dead) per 1000 births in facility.	Number of babies born dead (stillbirths) in facility.	Total number of births in facility.	DHIS NDoH4.
	Impact		Perinatal mortality rate in facility	The number of perinatal deaths per 1000 births in facility.	Stillbirth in facility + Inpatient death (early neonatal).	Total number of births in facility.	DHIS NDoH4.

For more information about HST visit
http://www.hst.org.za
email us at
webmaster@hst.org.za
or contact one of our offices in:

Durban
401 Maritime House, Salmon Grove, Victoria Embankment, Durban 4001
Postal Address:
PO Box 808, Durban 4000, South Africa
Tel: +27-31-307 2954 Fax: +27-31-304 0775

Cape Town
81 Strubens Road, Observatory 7700, South Africa
Tel: +27-21-448 3544

Johannesburg
11th Floor, Devonshire House, 49 Jorrison Street, Braamfontein 2017
Postal Address:
PO Box 31059, Braamfontein 2017, South Africa
Tel: +27-11-403 2415 Fax: +27-11-403 2447