Budget Planning Assistance for North West Province

TB and HIV/AIDS/STD Programmes

Final Report

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Martin Hensher
EU Consultant in Health Economics
Health Financing & Economics Directorate
Department of Health
Private Bag X828
Pretoria 0001

Tel: 012 312 0672
email: henshm@hltrsa2.pwv.gov.za

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1. Objectives

1.1 The Directorate: Health Financing & Economics offered in early 1999 to make available to the North West Province Department of Health and Developmental Social Welfare technical assistance in the areas of financial management and planning. A number of desirable projects were identified by the provincial authorities, including the need for assistance with costing and budget planning for five priority programmes – HIV/AIDS/STD, Tuberculosis, Mental Health, Mother & Child Health, and Emergency Medical Services.

1.2 The objectives agreed for this programme costing work was as follows:

- To estimate (as far as possible) the total costs of each programme
- Based on this analysis, to make recommendations for the planning of relevant programme budgets for the financial year 2000/01

1.3 This paper and presentation present the final results of this exercise for the TB and HIV/AIDS/STD programmes. They summarise some of the difficulties encountered in attempting this work, set out the results of those analyses that proved to be possible, make a number of recommendations for budget planning, and also suggest certain areas for further development of information gathering and analysis. The disk copy of the spreadsheets and data used in the analysis will be provided for the use of the Provincial Health Department. The results presented in this final report differ slightly from those presented on 26th July in Mmabatho, due to limited amounts of new or updated data which have become available since then.

2. Approach & Methods

2.1 Detailed discussions were held with both the Programme Managers for the two programmes, who provided substantial amounts of information, and who explained very clearly both the situation in North West Province and their current and planned activities. Valuable input was also received from members of the National TB Control Programme and the Pharmaceutical Programmes and Planning Directorate in Pretoria,

2.2 The general approach adopted had two components. First, the aim was to develop an overall estimate of the total costs of each of the programmes, in as comprehensive a manner as possible, and to attempt to identify any likely future trends in these costs. It was clear from the outset that this part of the work would be an illustrative estimate only, and it was also accepted that the objective of the exercise was *not* to produce a total "programme budget" that would be used in future. The second objective was to identify any key issues which should be reflected in the budget planning process for 2000/01, and it was accepted that these recommendations would primarily (but not exclusively) apply to the "head office" budgets of the programme managers and their immediate activities. It should be noted that, at all times, the analysis includes only those costs which will represent a direct financial cost to the North West Province Health

Department. As such, it may not be directly comparable with other existing studies, which are likely to take a wider (societal) perspective of cost. It must be stressed that this exercise is not intended to be a piece of economic evaluation research, rather to serve as an aid to managerial action and financial planning for North West Province.

2.3 In order to develop estimates of the total programme costs of HIV/AIDS/STD and TB, a number of cost drivers were identified for each; data was then requested (where possible) on each of the identified cost drivers:

Table 1: Predicted Cost Drivers:

Tuberculosis	*HIV / AIDS / STDs*
Diagnostic testing of TB	HIV:
Drug treatment	Prevention activities (e.g. health
Hospitalisation	promotion, condom distribution etc.)
Expected epidemiology	Testing and counselling
Payments to mine hospitals	Expected epidemiology
Communicable Disease	AIDS-related hospitalisation and drugs
Coordinators	STD Diagnostic testing
Provincial TB Coordinator's	STD Drug treatment
activities	District HIV Coordinators
Health promotion	Provincial activities

3. Constraints and Data Availability

3.1 From the commencement of work, a number of constraints were encountered which have had an impact on the completeness of the work which could be conducted. It is, however, important to stress that the quality of cooperation received from Ann Preller, Vitalis Chipfakacha, Tiny Chababa and their teams has been exemplary – the difficulties we have encountered were in no way the responsibility of these individuals, who have all gone out of their way to cooperate. Thanks are also due to Sello Leeuw and his team for assembling data on pharmaceutical estimates.

3.2 Broadly, two sets of constraints limited our ability to meet our objectives in full. The first set relate to the capacity of the Health Financing & Economics Directorate at the National Department of Health. Personnel shortages and competing demands limited the time available to spend on this project; and limited time available to spend on the ground proved to be more of a problem than had first been envisaged. Lessons will be learned from this exercise for future joint projects with provincial departments.

3.3 The second set relate to the capacity of the North West Health Department's systems. Provincial staff were hard-pressed and in short supply, so again there were limits on the time that could be devoted to this work. More importantly, data on various key variables proved to be difficult to obtain. In some cases, data simply did not exist; in others it was only patchily available across different districts and periods; and in others, features of the data made its interpretation

problematic. Some of the more important data problems will be discussed in the recommendations of this paper, as they are likely to impede good operational management in the future.

4. Estimated Total Programme Costs – Tuberculosis Control

Methods and Data Available

4.1 The overall costs of providing TB care in North West Province during the year 1998/99 (and a forecast model of future drug costs) were estimated by combining data from multiple sources. Table 2 outlines the factors included, the data sources used, and the approach taken. More detail on methods and source data is provided in Appendix I.

Table 2: TB Cost Model Sources

Cost Factor	*Data Source*	*Comments*
1. Total workload: • Current	TB case finding reports	High estimate: All registered cases Low estimate: Excludes "transferred in" cases
• Predicted	Fourie & Weyer MRC model	High estimate: Scenario 2 Low estimate: Scenario 3
2. TB Drug Costs	SA Drug Action Programme Costs based on National TB Control Programme protocols and tender prices	Provided by Dr. Wilbert Bannenberg, NDOH / WHO Local data available only on quantities ordered, not usage
3. DOTS delivery costs	Study in KZN: Floyd, Wilkinson & Gilks, 1997	Clinic staff and infrastructure costs, and supervision of treatment supporters etc. – not drugs.
4. Sputum testing	March 1999 district test statistics - annualized Costs - Study in KZN: Floyd, Wilkinson & Gilks, 1997	Low estimate: no. of cases bacteriologically confirmed x3 High estimate: district statistics factored up to 12 months
5. Hospitalisation in public hospitals	No local data Estimates for MDR patients only (Floyd *et al*)	**!! This is a critical absence – the total programme cost is clearly an underestimate as a result !!**
6. Payments to Anglogold Health	7 months invoices scaled up to full year	
7. District CDCs	No data	Partially included in supervision costs under item 3
8. Provincial Head Office	Actual expenditure 1998/99 from Finance Dept.	

4.2 Cost Factors

4.2.1 **Total Workload** – Comprehensive data was available from provincial Case Finding Reports, providing information on total numbers and treatment indicators for 1998 as below. The proportions shown below were used as the assumptions in all modeling.

	Cases	%
Cases registered	14858	
TB cases (not transferred in)	10822	
Pulmonary TB	9473	86.3%
New Cases	7578	80%
Re-treatment cases	1895	20%
Bacteriologically investigated	8820	81.5
Cure rate		70%
Retreatment rate		20%
Deaths		7%
MDR treatment		3%

A question exists as to whether total cases registered, or only those not "transferred in" should be counted in the costing. While "transferred in" cases are excluded from monitoring of success rates, they should probably be included in the costing if they are receiving treatment within North West Province (as they are therefore consuming resources). Both totals have been used to provide low and high estimates of 1998 workload.

The epidemiological model of Fourie and Weyer has been used for the forecasting of drug costs over future years. Their Scenario 2 provides a close approximation to the total number of registered cases in the Province in 1998, and is used to illustrate the likely effects of not achieving significant improvements in TB control in the next few years. Their Scenario 3 lies closer to the 1998 value of total cases when "transfers in" are excluded, and is used to illustrate the effects on drug costs of achieving a sufficient improvement in TB control to start to contain the growth of the epidemic.

4.2.2 **TB Drug Costs** - Data was provided on estimated TB drug needs and ordering for 1999/00. Unfortunately, this data could not be costed, and it is currently not possible to provide data on actual drug usage in North West (nor indeed in other provinces). Fortunately, the South African Drug Action Programme has recently undertaken a costing of the TB drug regimes prescribed by the National TB Control Programme. These costings were combined with local workload data to estimate "ideal" drug costs for TB therapy.

4.2.3 **DOTS Delivery Costs** - Local data was not available on which to base an estimate of staff time and infrastructure delivery of DOTS via the clinic system. Therefore, estimates from a 1996 study in KwaZulu Natal (Floyd *et al*) were uplifted for inflation and applied to local workload figures. In 1998 prices, their study estimated that TB patients' ambulatory visits to health facilities cost R402 on average for a full course of DOTS; they also estimated that the costs of supervising one course of DOTS (e.g. tracking, advice for treatment supporters etc.) costs another R191, and management R28. No account is taken in our analysis of costs borne by patients or their supporters.

4.2.4 **Sputum Testing** - Local data on TB diagnostic testing was available in the form of monthly sputum turn-around time reports. The March 1999 report was adjusted to estimate tests from those districts where no data was available, and scaled up to a full year. As this produced what seemed to be quite a high figure

(nearly 54,000 smear tests per year), a lower estimate was also used – the case finding total of 8,820 patients bacteriologically investigated, multiplied by an average of three smears (to reflect pre- and post- treatment smears and tests on persons who proved not to be infected). Local cost estimates were not avaiable, so Floyd *et al's* estimate of R7.50 (1998 prices) was substituted.

4.2.5 **Hospitalisation in Public Hospitals** – In the time available, no local data on the number and length of TB hospitalisations could be obtained. Instead, it was assumed that all patients with Multiple Drug Resistant TB would be hospitalised, at a cost of R8218 per episode (Floyd *et al*). It is known that other patients are hospitalised for TB in North West Province, so it is essential to note that this will lead to an underestimate of total hospital costs for TB care.

4.2.6 **Payments to Anglogold Health Services** - During 1998/99, Anglogold Health Services continued to bill the province for TB hospitalisation in its facilities. Invoices were used to estimate the costs of this practice. It is known that this arrangement is under review, and the "low" cost estimate therefore excludes this element (it is argued that the cost of moving to fund or provide drugs only would be captured by the drug cost model).

4.2.7 **District Communicable Disease Coordinators** – CDCs are recognised as being an essential part of the TB control effort. However, their costs could not be split out of the district expenditure data available to us. Nevertheless, some of their supervisory and management activities are captured in the delivery cost estimate (4.2.3).

4.2.8 **Provincial Office** – The costs of the Provincial Coordinator's activities were available from expenditure reports.

4.3 Summary Programme Costs

4.3.1 Using the approach and data described above, it was possible to generate a "low" and "high" estimate, shown in Table 3. The "low" estimate reflects the use only of cases who were not "transferred in" to the Province, while the "high" estimate includes all registered cases within the Province. The estimates are in 1998/99 financial year prices. Appendix I.4 provides more details of the methods used, and detailed model outputs.

Table 3: Estimated Total Progamme Costs - TB Control 1998/99

Component	Low Estimate	High Estimate
DOTS delivery (incl. Supervision)	5,882,733	7,962,462
DOTS drugs	9,823,403	14,492,303
Sputum testing	198,450	403,500
Hospitalisation (MDR only)	2,629,760	3,541,958
Anglogold Health	0	488,659
Head Office	177,000	177,000
Total	18,711,346	27,065,882

4.3.2 The same method is combined with the Fourie and Weyer epidemiological model to estimate likely costs in the year 2000/01 in Table 4. In this case, the "low" scenario indicates a situation in which cure rates have been improved to 85% for new cases and 75% for retreatment cases across the province, and in which (as per the epidemiological model), effective control is slowing the rate of growth of transmission. Under the "high" estimate, however, cure rates remain unchanged from their actual 1998 levels, and the uncontrolled growth rate of the Fourie and Weyer Scenario 2 applies. The discrepancy between the "low" and "high" estimates is explained primarily by the impact of the assumption that MDR cases will grow if control and cure rates do not improve (and, to a lesser extent, by growth in total caseload) – and a small increase in MDR cases has a very significant impact on treatment costs.

Table 4: Estimated Total Progamme Costs - TB Control 2000/01

Component	Low Estimate	High Estimate
DOTS delivery (incl. Supervision)	7,032,295	10,390,946
DOTS drugs	6,899,874	17,881,993
Sputum testing	225,000	487,500
Hospitalisation (MDR only)	1,298,774	4,165,683
Anglogold Health	0	0
Head Office	177,000	177,000
Total	15,632,943	33,103,121

4.4 Discussion of Cost Estimates

4.4.1 Every effort has been made to ensure that the cost estimates for TB control developed here are as plausible as possible, but the first comment that must be made is that they are deeply imperfect. As such, they are at best an illustration of the possible magnitude of the costs of TB control in North West Province. Having said that, they are more likely to be an underestimate than an over-estimate. They assume optimal prescribing of drugs, and they do not capture all the costs of hospitalisation or laboratory testing of TB patients.

4.4.2 The estimates illustrate that, during 1998/99, TB control probably cost the Province at least R18 million – about 1.4% of total public health spending. But they also indicate that, if control efforts are not strengthened sufficiently, that sum could rise to some R33 million within the next year, consuming 2.5% of total spending. Preliminary TB caseload figures reported to the National Department of Health for the first quarter of 1999 appear to indicate continuing growth in new TB cases (3555 cases registered in this quarter). Unfortunately, if this quarter's data are indicative of a trend, they suggest that the real epidemic is fairly closely following the Fourie & Weyer Scenario 2, which would in turn suggest that the "high" estimates of the model are more likely to reflect reality. Nonetheless, even with higher estimates of new cases, improved outcomes can still have a very significant impact on MDR drug costs – namely the difference between lines A

and B on the chart of drug costs (both share the same overall caseload assumptions, but line B reflects the impact of better outcomes on multi-drug resistance).

4.4.3 This analysis confirms that two critical factors drive the costs of TB care upwards, both of which are directly related to cure rates:

- The total number of new cases
- The number of multi-drug resistant cases

Clearly, the greater the number of new cases, the greater the demand for TB care. However, the Fourie and Weyer model is based upon the fact that achieving better control (through higher cure rates and coverage) ultimately begins to control the spread of new infections – thus, successful control will ultimately constrain the growth of costs. At the same time, the extremely high cost of MDR cases (over R26,000 per course) means that a handful of patients generate massive drug costs – over 75% of the total cost of TB drugs in almost all scenarios. The drug cost model developed here incorporates the impact of improving cure rates in new and retreatment cases, and shows that achieving even small reductions in the number of individuals developing multi-drug resistance pays dividends in terms of overall cost.

4.4.4 The graph of projected drug costs makes clear the purely financial benefits of strengthening cure rates. Better cure rates would, in the best case, allow the Province to shift from line A (the likely current situation) to line D – by reducing drug resistant cases, and by beginning to stem the overall growth in new cases. The financial penalty for failing to achieve this be between R10 million and R15 a year by 2002 – in drug costs alone. Even if no real impact is made on the growth of new infections, simply slowing the growth of MDR cases could avoid the need to spend several million rand in drugs, by moving from line A to line B.

4.4.5 It seems clear that some growth in spending on TB care is unavoidable, given the likely epidemiological trends. However, continuing to improve cure rates and coverage of DOTS can significantly limit the scale of this growth in the next few years. Failure to continue this improvement will eat steadily into the funds available for other purposes. It is recommended that budget planning focus on the following issues:

- Strengthening management and supervision of DOTS at district levels in practical ways which will allow better cure rates and coverage, and will reduce incidence of MDR TB cases

- Making informed provision in the pharmaceuticals budget for the drugs necessary to maintain and improve cure rates

5. Estimated Total Programme Costs – HIV, AIDS and STDs

Methods and Data Available

5.1 The overall costs of HIV prevention, AIDS and STD care in North West Province during the year 1998/99 were estimated by combining data from multiple sources. Table 5 outlines the factors included, the data sources used, and the approach taken. Appendix II provides a more detailed account of methods and data used for STD care, and Appendix III for HIV / AIDS control and care.

Table 5: HIV/AIDS & STD Cost Model Sources

Cost Factor	*Data Source*	*Comments*
Provincial HIV/AIDS/STD coordination and prevention	Actual expenditure 1998/99 from Finance Dept.	Not possible to disaggregate (n.b. verified by Finance Dept.)
District HIV/AIDS coordination and prevention	Actual expenditure 1998/99 from Finance Dept.	
HIV Testing & Counselling	Extrapolation from district test statistics Costs from Kinghorn 1998	
HIV/AIDS Drug Costs	Data available on drugs for occupational prophylaxis	Not possible to estimate drug use on AIDS related care
AIDS Related Hospitalisation	Extrapolation from Gauteng forecast model in Kinghorn & Steinberg 1998 Local data	See appendix for details **Illustrative estimate only!**
STD Diagnostic Tests	No data on costs	No analysis possible
STD Clinic Visits	Provincial Preliminary Report STDs in NWP Clinic visit cost from Floyd *et al* 1997	Extrapolated to full year from partial data
STD Drug Costs	NWP STD Protocols Drug costs from NDoH	Model of "ideal" costs of protocol for syndromic management of STDs

5.2.1 **Provincial Prevention and Coordination Activities** – Actual expenditure data was readily available for 1998/99, although only at an aggregated level.

5.2.2 **District Prevention and Coordination Activities** – ditto

5.2.3 **HIV Testing and Counselling** – Returns from five districts giving details of HIV tests performed for at least one month were available. These were scaled up to reflect the whole province for one year, with a low estimate based upon the frequency of tests *per capita* in the district with the lowest test rate, and a high estimate based upon the average rate in the five districts (which were felt mainly to be above average for the province). Estimated 1998 costs for testing and primary counselling were adapted from Kinghorn (1998) – test (ELISA or Capillus Rapid) R18, plus counselling time R26.

5.2.4 **HIV/AIDS Drug Costs** – It proved impossible to use the available local data on pharmaceutical quantities ordered to provide estimates of the drug costs used by

AIDS related care, primarily because there are few drugs in use in the South African public sector which are used only for AIDS related conditions. However, the costs of drugs provided in hospital will be captured to a degree in the hospitalisation cost estimate (see 5.2.5 below). The quantities of drugs ordered for prophylaxis in occupational exposure to HIV (AZT, 3TC) were provided by the pharmacy team, and unit costs applied as per state tender prices.

5.2.5 **AIDS Related Hospitalisation** - It was not possible to obtain local data on the extent of AIDS related hospitalisation, and time and resources did not permit any direct data collection. Therefore, the model of AIDS bed needs for Gauteng Province from Kinghorn and Steinberg (1998) has been adapted. AIDS bed needs per capita were deduced from the model, calculated for the NWP population, and then adjusted upwards to reflect the differential in estimated adult HIV prevalence (Gauteng 9.9%, NWP 12.5% in 1998). Actual expenditure on all hospital cost centres in the Province were then extracted, and psychiatric hospitals (Bophelong, Witrand and Mafikeng Psychiatric) excluded. It was then assumed that 75% of remaining expenditure goes on inpatient (as opposed to outpatient) care. This figure was then applied *pro rata* to the number of beds required for AIDS related care determined above. Given the extreme uncertainty attached to this estimate (and given its overwhelming importance in the total cost estimate), "low" and "high" estimates were generated, simply be varying the central figure by 15% in either direction. It cannot be over-emphasised that this estimate is extremely tenuous! Its purpose is solely to provide an indication of the *possible* scale of expenditure on hospital care for people with AIDS.

5.2.6 **STD Diagnostic Tests** – Some limited data was available on the number of syphillis tests undertaken (in the Preliminary STD Report), but no cost data could be located to provide in time to estimate unit costs.

5.2.7 **STD Clinic Visits** – The Preliminary STD Report provides figures from almost all districts for several months of 1998 on the number of clinic attenders presenting with STDs and the number of repeat visits by STD attenders. These estimates were scaled up on the basis of the number of complete months data available and the share of total population in each district reporting, to provide a high estimate of total STD clinic attendances (93494 new attenders). A low estimate was then produced by using data from Quarter 3 (the only quarter in which every district reported) of the final "Compilation of STD data 1998", giving an estimate of only 47028 new attenders. The reason why the final STD report should have provided less complete data than the preliminary report is not clear. A cost estimate for a generic clinic visit (R31.60 – Floyd *et al*, 1997) was then applied to this workload figure, in order to estimate the cost in staff time and primary care infrastructure of managing STDs. (See Appx. II)

5.2.8 **STD Drug Costs** – As with TB drugs, it was not possible to identify usage patterns for STD drugs from the local data provided (especially as most commonly used STD drugs have many other clinical applications). Instead, the drugs and dosages identified within the North West Province / EDL protocols for STD management were listed, and costs per patient were identified for each protocol using state drug tender prices (supplied by National DoH Directorate: Pharmaceutical Programmes and Planning). The proportion of STD attenders presenting with the syndrome relevant to each protocol was then used to

estimate total numbers, under the high and low estimates described in 5.2.7, and combined with the cost data to model total drug costs for STD management. An arbitrary wasteage factor of 20% was then applied to the total cost estimate to proxy unavoidable leakage of drugs. (See Appx. II)

5.3 Summary Programme Costs

5.3.1 Table 6 presents the costs estimates derived from these sources to identify the tentative estimate of the total public health system costs of HIV/AIDS and STD care in North West Province in 1998/99. Given the vulnerability of the hospitalisation cost estimates, the final row of the table presents the total estimate *without* these hospitalisation costs.

Table 6: Estimated Costs of HIV / AIDS and STD Services, 1998/99

	Low Estimate	High Estimate.
Provincial Office AIDS & STD	2,480,000	2,480,000
District HIV/AIDS/STD & Health Promotion	3,176,200	3,176,200
Testing & Counselling (clinics & OPD)	871,717	1,884,759
Occupational exposure prophylaxis (AZT & 3TC)	66,058	66,058
AIDS Related Hospitalisation	66,415,913	89,856,823
STD Diagnostic testing	n/k	n/k
STD Clinic Visits	1,535,002	3,202,711
STD Drugs	319,910	640,381
Total Costs	**74,864,799**	**101,306,932**
Excluding AIDS related hospital costs	8,448,886	11,450,109

5.3.2 An estimate of the projected costs of the same services for the year 2000/01 is provided in Table 7.

Table 7: Estimated Costs of HIV / AIDS and STD Services, 2000/01

	Low Estimate	High Estimate.
Provincial Office AIDS & STD	2,480,000	2,480,000
District HIV/AIDS/STD & Health Promotion	3,176,200	3,176,200
Testing & Counselling (clinics & OPD)	2,200,000	4,400,000
Occupational exposure prophylaxis (AZT & 3TC)	66,058	66,058
AIDS Related Hospitalisation	99,974,045	135,259,003
STD Diagnostic testing	n/k	n/k
STD Clinic Visits	3,202,711	5,627,549
STD Drugs	640,381	1,329,915
Total Costs	**111,739,396**	**152,338,725**
Excluding AIDS related hospital costs	11,765,350	17,079,722

5.3.3 Key assumptions underlying Table 7 can be summarised as follows:

	Low Estimate	High Estimate
HIV Testing & Counselling	50,000 tests in 2000/01	100,000 tests in 2000/01
AIDS Related Hospitalisation	As per Appx III model (-15%)	As per Appx III model (+15%)
STD Clinic Visits (See Appx. IV)	Desirable to ensure uptake remains at least at 1998/99 "high" estimate levels	Desirable to expand uptake of STD services by doubling number of visits (except syphillis, where aim should be to quadruple uptake)
STD Drug Costs	Ditto	Ditto

It should be noted that this projection explicitly assumes that uptake of STD services should be expanded. However, another important cost driver (leaving aside AIDS care hospitalisation) would be any expansion of HIV testing and counselling.

5.4 Discussion of Cost Estimates

5.4.1 No apology is made for the frankly speculative nature of the estimated costs of AIDS related hospitalisation. Without substantial primary data collection within the Province, a more "accurate" estimate could not be developed. The estimate presented here has been based upon the more detailed work of Kinghorn and Steinberg, and, if anything, is likely to be an under-estimate of true costs, given the more advanced stage of the epidemic in North West relative to Gauteng. The aim of the estimates is to provide a sense of the possible magnitude of the health care costs of AIDS, and it is felt that they perform this function adequately.

5.4.2 The estimates presented in Table 6 indicate that spending on HIV and STD control and prevention measures in the Province in 1998/99 was probably not more than 0.86% of total public health spending. In contrast, our estimate of inpatient AIDS care costs suggests that hospital care for AIDS patients accounted for between 5% and 6.7% of total expenditure.

5.4.3 Kinghorn & Steinberg provide a forecast of the likely growth of bed needs for AIDS care in Gauteng until 2007. Using the same adjustment method as described above, these forecasts were adapted for North West Province, and the likely costs for each year calculated. The results of this projection are shown in Charts 2 and 3. Chart 2 shows the split between non-psychiatric beds needed for AIDS related care and the remaining beds available, assuming no overall increase in bed numbers. Clearly, this type of modelling is extremely crude – it cannot capture actual responses to future events. For example, it is very unlikely, irrespective of the objective "need" for beds, that AIDS care would ever be allowed to take over the majority of hospital beds. Equally, the projected growth in costs of AIDS care is disturbing even if these results are not taken literally. They suggest that, in order to provide sufficient care for AIDS related conditions, spending on AIDS care would, by 2007, be consuming funds equivalent to some 25% of current total public health spending in the province.

5.4.4 Hospitalisation for AIDS is thus likely to be a crucial cost driver in coming years – either pushing up total spending or, more likely, soaking up resources from other areas of health care. Unlike TB control, unfortunately, improved prevention efforts today will make only a limited impact on this cost area over the next five to eight years – most of the infections which will lead to a need for health care during this time have already occurred, and cannot be reversed. Limiting the cost burden of AIDS related care over the next five years or so will therefore depend far more upon finding effective, lower cost alternatives to current patterns of hospitalisation and service use by people with AIDS.

5.4.5 One striking feature of this analysis is the apparently relatively low costs of pharmaceuticals for STD treatment, and what appears to be a fairly limited uptake of STD treatment given generally high prevalence rates amongst the South African population at large. A particular concern is an apparently massive mismatch between reported presentation and treatment of syphilis amongst clinic attenders, and prevalence rates reported during the antenatal care HIV/Syphilis survey. Some 3300 individuals received treatment for syphilis in 1998 (extrapolated from the STD report), less than 0.01% of the population – yet the ANC survey of pregnant woman found prevalence rates amongst women of child-bearing age ranging between 9% and 31.1% across districts, and averaging 17.6% for the whole Province. This mismatch indicates either that the reporting of STD cases is undercounting massively, or that the health system is significantly under-servicing people with syphilis – or both simultaneously. While some pregnant women may well receive treatment for syphillis that is recorded as antenatal care, and not as STD care, there appears to be something wrong with both data collection and service delivery in this area.

5.4.6 Clearly, if the health system is failing to deal effectively with STDs, there are important implications for HIV prevention, given the close relationship between STD and HIV risk. A positive message from this analysis is that the incremental cost of expanding STD treatment (essentially drug costs) is relatively quite low. Further work may be necessary, but it seems likely that a more concerted effort to improve uptake of STD services (combined with HIV prevention activities targeted at this population group) might be a cost-effective and relatively affordable approach to improving HIV control. Table 7 indicated that such a strategy would obviously involve increased costs, but that these increases are not particularly large, especially if they contribute longer term to reduced spread of HIV infection, with its very high care costs.

5.4.7 Meanwhile, the cost of efforts to expand HIV testing and counselling must be borne in mind when planning developments in this area. Provincial data suggests from those districts reporting their activity indicated that some 1.2% of the population was tested during 1998. Clearly, the costs of an expanded programme of testing and counselling may well be considered to be appropriate (e.g. to implement a policy of encouraging everyone to know their HIV status) – but in planning such an expansion these costs must carefully considered. It is hoped that this analysis will at least provide a rule of thumb that can be used to illustrate the cost impact of substantially expanding HIV testing.

5.4.8 From these estimates of total costs of HIV/AIDS/STD activities in the Province, it is therefore suggested two core areas should receive particular attention in the near future:

- Identifying and developing viable, lower cost alternatives to current hospitalisation practice for AIDS related conditions. These should include both community based options and "intermediate care" institutional options. If steps are not taken soon to put such alternatives in place, the cost burden on the provincial hospital network will soon become intolerable.

- Addressing the apparent under-provision of STD care in the province, particularly given the fact that good STD control is a prerequisite for effective control of HIV infection. Opportunities to target better HIV prevention information through such an improved STD control programme should be investigated.

Cautionary Note

Before proceeding to discuss recommendations for further action, it is again stressed that the overall cost estimates derived here for TB control and HIV/AIDS/STD management are open to a range of valid criticisms, and many points of weakness are acknowledged. They represent the "best guess" possible given limited time and data, and it is fully accepted that more detailed research would provide more robust and, quite possibly, different answers. Nevertheless, it is felt that these estimates provide a reasonable indication of the direction and rough scale of the critical cost drivers in these areas of service delivery.

6. Recommendations for Action

Budget Planning and Service Planning

6.1 It is hoped that this analysis illustrates a point fundamental to successful financial and budget planning. It has identified that several service delivery issues have crucial financial impacts (e.g. failure to achieve high cure rates for TB leads to multi-drug resistance, with very high drug costs) – mainly by illustrating that sub-optimal service delivery in these areas carries heavy financial risks for the future. Successful financial outcomes (e.g. cost containment) depend on successful service delivery planning and management - and not on purely financial techniques.

6.2 Therefore, in terms of planning budgets for 2000/01, it is essential that the key cost drivers and budget risks identified in this report be examined urgently, in order to identify service delivery and management actions which can be taken to address them – and that the resources required to implement these actions be identified and costed. Once this has been done, budgets for TB and HIV/AIDS and STD control can be agreed, with a clearer understanding of the risks and benefits of funding or not funding certain activities.

6.3 The remainder of this report therefore seeks to identify some key areas in which it is felt that practical management action can achieve results which are beneficial to both service and financial outcomes. It is hoped that these recommendations will form the basis of more detailed discussion within the province.

Tuberculosis Control

6.4 The fundamental message of the costing of TB control activities is that a failure to improve coverage and cure rates will ensure that costs cannot be controlled in future years. The following practical measures are therefore recommended for serious consideration when finalising the 2000/01 budget:

1) Ensure that all District CDCs have adequate access to a vehicle (preferably exclusive use) to allow them to provide adequate management supervision at clinic level – as soon as practically possible. This is especially vital in districts where clinics lack telephone communication capacity. District budgets will need to be adjusted to reflect this (although vehicles might be redeployed from other use, and/or off-road vehicles repaired for this purpose), and district managers must be made to understand that they must ensure that these resources actually reach the CDCs. This will require monitoring by senior management. [District budgets]

2) Given the disproportionate impact of MDR TB on treatment costs, undertake an analysis of the distribution of MDR cases by district (and, if possible, by clinic catchment area). If any "clustering" of MDR cases can be detected, there should be no hesitation in allocating additional management and treatment coordination resources to the areas in question, as control of MDR costs is critical to overall TB cost control. [Provincial TB Coordinator's budget]

3) Ensure that pharmaceutical budget caters adequately for anticipated growth in caseload, and conforms to agreed protocols [Medical Stores budget]

4) Achieve an improvement in transport availability and reliability for drug supply and sputum smear collection/results delivery. Again, this may only require allocation of adequate funds to transport maintenance at both provincial and district level, and better prioritisation of vehicle use. Interrupted drug supply and/or test turn-around will impact negatively on cure rates, again with down-stream financial costs. [Provincial and district transport budgets]

5) Developing a simple system for monitoring TB drug *use* by district, to generate simple information on actual drug use, which can then be related to district-level statistics on TB caseload, to allow more accurate and timely ordering and resupply. [Medical stores and/or Provincial TB Coord. Budget]

6) It has been suggested by the South African Drug Action Programme representative that the Province may also be able to improve its ordering practices, hence reducing wastage and improving predictability. No recommendation can be made by the author on this issue, but it appears to warrant further investigation locally, perhaps with national support.

7) Resolve finally the question of payments to Anglogold etc. for TB hospitalisation as soon as possible. [Budget line unknown – action by Provincial Senior Management]

HIV / AIDS and STD Control

6.5 Given the key issues identified in the cost estimates, the following actions are recommended for consideration in the area of HIV/AIDS and STDs.

1) Promote uptake of STD services, diagnosis of STDs, and develop a strengthened approach to STD management and targeted HIV prevention activities with STD patients. This will require management resources, staff training, and provision for increased demand for EDL drugs under STD protocols. [HIV/AIDS provincial and district coordination budgets, pharmaceuticals]

2) Improve the quality and completeness of data reporting on HIV testing and STD statistics by districts, and use analysis of these statistics to provide management information for decision-making. This will require regular follow-up of non-reporting districts, and analysis at provincial level.

3) Commence the development and piloting of alternatives to conventional inpatient care for people with AIDS, and develop a strategy on AIDS care for the medium term, identifying likely demand in more detail, assessing what care options are feasible in the province, and what restructuring of current services is necessary. [Allocate some funds for development of alternative services – District and Provincial Hospitals budgets]

6.6 It is accepted that this is a less comprehensive set of recommendations than those made for TB – clearly, various other issues need to be considered for the 2000/01 budget in this area – but it is felt that failure to address these issues soon will carry a cost penalty in the near future.

Improving Data Availability

6.7 A final note is necessary to make some suggestions concerning general data availability and collection in the Province. There is clearly a general problem at present, in that most data returns are not provided by all districts or for all months. It is suggested that serious thought be given to which data returns are actually of value to management. If a return is not used, it should not be collected; equally, where returns are needed, the Provincial department should actively “chase” districts for data until they receive it. In certain areas it appears that incomplete data is not actually followed up, which ensures that complete data is never available.

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Health Financing & Economics Directorate
Budget Planning Assistance for North West Province

Appendix I

TB Control Programme Cost Model: Data, Assumptions and Model

1. Workload and outcome assumptions
2. Adaptation of Fourie & Weyer epidemiological forecasting model
3. Drug regime costs
4. Model flows and key assumptions
5. Model data tables
6. Critique and areas for future development

1. TB Workload and Outcome Assumptions Used in Model

Total TB Workload in 1998

A number of different options were available to act as the source of the 1998 "actual" pulmonary TB workload estimate (the starting point of the model). The 1998 North West Case Finding Report presented the following data for that year:

- 14858 total cases registered in the province in 1998
- Of which 10822 were note "transferred in"
- Of which 86.3% were pulmonary TB (9473 cases)
- New cases represented 80% of pulmonary TB cases
- Retreatments represented 20% of pulmonary TB cases

The choice of whether to take total registered cases, or "not transferred in" cases proved difficult to resolve in costing terms. The key issue is whether or not "transferred in" patients do or do not receive care from the NWP health system – if they do, then the higher estimate should be used to estimate costs. A compromise position was adopted, by using both options as upper and lower limits within the scenarios. They were calculated as follows:

1998 scenarios:

Low		***High***	
Total not transferred in	10822	Total registered cases	14858
Total PTB cases	9473	PTB (86.3%)	12778
New cases (80%)	7578	New cases (80%)	10222
Retreatment (20%)	1895	Retreatment (20%)	2556

A slightly different estimate of "not transferred in" pulmonary TB cases was provided by the National TB Programme – 9328 cases. However, estimates of new and retreatment cases provided by the National Programme (6237 and 921 respectively) were for cases with a known outcome only. As the focus of the analysis was on treatment costs, it was assumed that even cases without a known outcome would have received treatment – hence the North West estimates shown above were used for the exercise.

Treatment Outcomes

The 1997 Treatment Outcomes report was available from the Province (but, at the time of writing, not the 1998 Report), so these data were used as the basis for the model, in particular:

Cured plus treatment completed cases:
New cases: 3981 (out of 5613) = 70.9% cure or completion rate
Retreatments: 832 (out of 1277) = 65.2% cure or completion rate

Treatment interrupted:
New cases: 1085 (out of 5613) = 19.3% interruption rate
Retreatments: 272 (out of 1277) = 21.3% interruption rate

Treatment Failure:
New cases: 141 (out of 5613) = 2.5% failure rate
Retreatments: 64 (out of 1277) = 5% failure rate

Died of TB:
New cases: 332 (out of 5613) = 5.9% mortality rate
Retreatments: 91 (out of 1277) = 7.1% mortality rate

Died of other cause:
New cases: 74 (out of 5613) = 1.3% mortality rate
Retreatments: 18 (out of 1277) = 1.4% mortality rate

These values and rates are used as the 1998 baseline within the model (see model description).

Multi Drug Resistance

Two sources were used to provide an estimate of the number of multi-drug resistant cases in North West Province. The National TB Control Programme provided the following estimate of MDR prevalence:

New pulmonary TB cases: 1% become MDR
Retreatment cases: 4% become MDR

In the absence of explicit local data on MDR cases, an alternative estimate was derived by assuming that the numbers of cases recorded as treatment failures after six months (but who were not dead) were MDR. This may overstate the situation; but equally, it does not include TB deaths who might well have been MDR. The NWP Treatment Outcomes report for 1997 gave the following treatment failure rates:

New pulmonary TB cases: 2.9% fail
Retreatment cases: 5.3% fail

2. The Fourie & Weyer Epidemiological Model

The MRC Weyer and Fourie model of likely growth of the TB epidemic (and linkages with HIV infection) was adapted to provide annual estimates of caseload growth under different scenarios. The model as published did not provide numbers for each year for North West Province, but provided a 1996 start point, a 2000 mid-point, and a 2005 end-point. Annual estimates were obtained by interpolating arithmetically from these points, and hence the estimates do not correspond exactly to those that the Weyer & Fourie model would produce if it was run for NWP for all years. The estimates are likely to be close, however, given that they remain within the model's parameters.

The estimates of TB cases thus derived are as follows:

	Scenario:			
	1	**2**	**3**	4
1996	9557	**9557**	**9557**	9557
1997	13280	**11681**	**10194**	9410
1998	17003	**13805**	**10831**	9264
1999	20726	**15928**	**11468**	9117
2000	24449	**18052**	**12105**	8970
2001	28173	**20176**	**12743**	8824
2002	31896	**22300**	**13380**	8677
2003	35619	**24423**	**14017**	8530
2004	39342	**26547**	**14654**	8384
2005	43065	**28671**	**15291**	8237

The original scenarios (1 to 4) are defined as follows:

1. No improvement in TB or HIV control achieved
2. 20% improvement in HIV control, no improvement in TB control achieved
3. 50% improvement in TB control, no improvement in HIV control achieved
4. 50% improvement in TB control, 20% improvement in HIV control achieved

Given actual numbers of cases observed, scenarios 2 and 3 were selected as best reflecting the actual position (n.b. growing caseload in early 1999 suggests that Scenario 2 is likely to be a more accurate description).

Within the model of costs, Scenario 3 provides a model of the benefits of improved control, and removes the need to have a complex mathematical model of the impact of treatment on overall prevalence (which would have been too complex for the current exercise). Scenario 2 is taken to represent a situation in which performance does not improve as significantly, hence leading to a reduced impact on number of cases.

3. Drug Regime Costs

The drug costs used in the model were derived from data provided by the South African Drug Action Programme, who have undertaken comprehensive costing of the different approved protocols of the National TB Control Programme.

The costs of a complete drug treatment course for one case thus derived were as follows:

	Rand
New Cases	215.00
Retreatment	440.47
MDR	26,354.00

4. Model Flows and Key Assumptions

The model of drug costs presents four different scenarios, with the following characteristics and assumptions:

Scenario	Fourie & Weyer Scenario	1998 Workload	MDR Cases	Outcomes Achieved
A	2	High	2.9% new 5.3% retreat	1997 actual, no change
B	2	High	1% new 4% retreat	85% cure rate
C	3	Low	2.9% new 5.3% retreat	1997 actual, no change
D	3	Low	1% new 4% retreat	85% cure rate

Within the model, drug costs are driven as follows:

New cases:

- In year 1, new cases are dictated by the 1998 workload (high – all cases, low – excluding transfers in)
- In subsequent years, new cases are driven by the relevant Fourie & Weyer estimate, minus the number of retreatment and MDR cases

Retreatment cases:

- In year 1, retreatment cases are dictated by 1998 workload (as above)
- In year n, retreatment cases are determined as:
  [number of new cases in year n-1 x % treatment interruption rate in year n-1] + [number of new cases in year n-1 x % failure rate in year n-1] + [number of retreatment cases in year n-1 x % treatment interruption rate in year n-1]

MDR cases:

- In year 1, MDR cases are dictated by assumption as per table above
- In year n, MDR cases are determined as:
  [number of new cases in year n-1 x % failure rate in year n-1] + [number of retreatment cases in year n-1 x % failure rate in year n-1]

6. Critique and Areas for Future Development

The model presented here is simplistic and open to many criticisms, yet is still felt to be of some value. However, the key criticisms which should be registered immediately are as follows:

- The model is based on assumptions, which may or may not be reasonable, especially assumptions about treatment outcomes and generation of MDR cases
- Data and definitions are open to question (e.g. whether to use all cases including transfers in)
- Much of the impact of improved treatment has to be captured via the Fourie and Weyer model (which is exogenous to the model). A more sophisticated model would attempt to make the impact of better control fully endogenous to the model

To develop sounder models in future, the key need is to obtain better data and a more soundly based set of assumptions. Key areas for strengthening through data or generation of consensus assumptions are:

- Factors generating MDR cases, and relationship to treatment failure / interruption
- Relationship between coverage and disease spread (current model incorporates only cure rates, not coverage per se)
- Current utilisation of TB drugs and inappropriate prescribing
- Actual cost data on DOTS and other TB treatment, from e.g. District Health Expenditure Reviews (if available) or specific local studies
- Actual data on hospitalisation for TB patients (in all hospital settings), and consensus estimates of desirable / achievable hospitalisation rates with improved DOTS delivery

Developing a more sophisticated model to handle some or all of these variables, and obtaining actual data thereon, would greatly enhance our ability to demonstrate the practical cost-effectiveness and financial returns from improved TB control.

STD Statistics for North West Province

High Estimate:

Source: "Preliminary report: STDs in North West Province 1998"

Reported no. new STD attenders	54971
Follow up attenders	4620

Districts reported an average of 7 months data

Adjusted to twelve months:

Estimated no. new STD attenders	93494
Estimated no. follow up attenders	7858

Estimated no. of cases by syndrome:

Syndromes Reported	%	n
Urethral discharge	21.9%	20475
Vaginal discharge	30.9%	28890
Genital ulcer	13.2%	12341
Lower abdom. Pain	16.1%	15053
Inguinal swelling - no ulcer	4.6%	4301
Itching glans / balanitis	3.7%	3459
Syphilis	3.5%	3291
Scrotal swelling / pain	1.5%	1402
Genital warts	0.1%	47
Other	4.5%	4207

Low Estimate:

Source: Spreadsheet - "Compilation of STD Data 1998"

Reported no. new STD attenders	11757	Qtr 3 Only
Follow up attenders	387	Qtr 3 Only

Only Quarter 3 was fully reported by each district

Adjusted to twelve months:

Estimated no. new STD attenders	47028
Estimated no. follow up attenders	1548

Estimated no. of cases by syndrome:

Syndromes Reported	%	n
Urethral discharge	20.7%	9735
Vaginal discharge	30.5%	14344
Genital ulcer	12.0%	5643
Lower abdom. Pain	17.5%	8230
Inguinal swelling - no ulcer	5.0%	2351
Itching glans / balanitis	3.9%	1834
Syphilis	3.5%	1655
Scrotal swelling / pain	2.1%	988
Genital warts	0.1%	24
Other	4.5%	2116

Unit Costs of STD Drugs as per North West Province STD Protocols

Source: Directorate Pharmaceutical Programmes & Planning, National Department of Health

STD Drugs		Pack Size	Estimate	Pack Price	Unit Price
Ciprofloxacin	250mg(10)	10	6000		
	500mg(10)	10	9000	54.89	5.49
	750mg(10)	10	150	97.3	9.73
Doxycycline	100mg(10(	100	50000	11.4684	0.11
Metronidazole	200mg(21)	21	50000	1.35	0.06
	200mg(25(	250	20000	7.07	0.03
	400mg(50(	500	3000	3.29	0.01
	50ml	50	38000	3.94	0.08
	100ml	100	2500		
Spectinomycin Inj	2g	1	4000		
Erythromycin Inj	1g	1	350	65.664	65.66
Erythromycin Tab	250mg(10(	100	10500	13.19	0.13
	250mg(50(	500	6000	156.88	0.31
	125mg(10(	100	85000	4.3434	0.04
Clotrimazole Vag Tab	1	1	5000	2.11	2.11
Benzathine Penicillin	2.4mu	1	87000	2.337	2.34
Tincture Podophyllin	0	0	unk		
Tetracycline Ophthalmic Ung	5g	0	80000		

Ideal Drug Treatment for Syndromic Management of STDs (as per North West Province Protocols)

Low Workload Estimate (1998 Final STD Report - Quarter 3 Activity)

Syndrome	Cases	Treatment	Qty	Unit Cost	Total Cost (R)
Urethral discharge	9735	Ciprofloxacin 500 mg	1	5.489	53434
	9735	Doxycycline 100mg x 7 days	7	0.114684	7815
		Sub-total			61249
Vaginal discharge	14344	Ciprofloxacin 500 mg	1	5.489	78732
	14344	Doxycycline 100mg x 7 days	7	0.114684	11515
	14344	Metronidazole 400mg x 7 days	7	0.00658	661
		Sub-total			90907
Genital ulcer	5643	Benzathine Penicillin 2.4 mu	1	2.337	13189
	5643	Erythromycin 500mg x 14 days	14	0.31376	24789
		Sub-total			37978
Lower Abdom. Pain	8230	Ciprofloxacin 500 mg	1	5.489	45174
with vaginal discharge	8230	Doxycycline 100mg x 7 days	7	0.114684	6607
	8230	Metronidazole 400mg x 10 days	10	0.00658	542
		Sub-total			52322
Inguinal swelling - no ulcer	2351	Benzathine Penicillin 2.4 mu	1	2.337	5495
	2351	Doxycycline 100mg x 14 days	14	0.114684	3775
		Sub-total			9271
Syphilis	1655	Benzathine Penicillin 2.4 mu 3 weeks	3	2.337	5803
(n.b. assume 50% split)	1655	OR Doxycycline 100mg x 30 days	30	0.114684	2848
		Sub-total			8651
Scrotal swelling / pain	988	Ciprofloxacin 500 mg	1	5.489	5421
	988	Doxycycline 100mg x 7 days	7	0.114684	793
		Sub-total			6214
Total Cost - All Syndromes					**266591**
Plus 20% Wasteage Factor					**53318**
Estimated Total STD Management Costs					**319910**

Ideal Drug Treatment for Syndromic Management of STDs (as per North West Province Protocols)

High Workload Estimate (1998 Preliminary STD Report - Adjusted)

Syndrome	Cases	Treatment	Qty	Unit Cost	Total Cost (R)
Urethral discharge	20475	Ciprofloxacin 500 mg	1	5.489	112388
	20475	Doxycycline 100mg x 7 days	7	0.114684	16437
		Sub-total			128826
Vaginal discharge	28890	Ciprofloxacin 500 mg	1	5.489	158575
	28890	Doxycycline 100mg x 7 days	7	0.114684	23192
	28890	Metronidazole 400mg x 7 days	7	0.00658	1331
		Sub-total			183098
Genital ulcer	12341	Benzathine Penicillin 2.4 mu	1	2.337	28841
	12341	Erythromycin 500mg x 14 days	14	0.31376	54210
		Sub-total			83052
Lower Abdom. Pain	15053	Ciprofloxacin 500 mg	1	5.489	82623
with vaginal discharge	15053	Doxycycline 100mg x 7 days	7	0.114684	12084
	15053	Metronidazole 400mg x 10 days	10	0.00658	990
		Sub-total			95698
Inguinal swelling - no ulcer	4301	Benzathine Penicillin 2.4 mu	1	2.337	10051
	4301	Doxycycline 100mg x 14 days	14	0.114684	6905
		Sub-total			16956
Syphilis	3291	Benzathine Penicillin 2.4 mu 3 weeks	3	2.337	11537
(n.b. assume 50% split)	3291	OR Doxycycline 100mg x 30 days	30	0.114684	5661
		Sub-total			17198
Scrotal swelling / pain	1402	Ciprofloxacin 500 mg	1	5.489	7698
	1402	Doxycycline 100mg x 7 days	7	0.114684	1126
		Sub-total			8824
Total Cost - All Syndromes					**533651**
Plus 20% Wasteage Factor					**106730**
Estimated Total STD Management Costs					**640381**