

**Recommendations by the Risk Equalisation Technical  
Advisory Panel**

**to the Council for Medical Schemes**

**Methodology for the Determination  
of the Risk Equalisation Fund  
Contribution Table  
[Base 2002, Use 2005]**

**RETAP Recommendations Report No. 1 of 2005**

**Approved at RETAP Meeting: 1 February 2005**

# **Risk Equalisation Technical Advisory Panel (RETAP)**

Following the approval of the Social Health Insurance (SHI) policy by the National Department of Health, the Minister of Health appointed a Ministerial Task Team (MTT) on Social Health Insurance to support the implementation of the SHI system in South Africa over the next five years. The MTT is made up of officials from the Department of Health, the Department of Social Development and the Council for Medical Schemes. In late January 2005 Cabinet approved the implementation of the Risk Equalisation Fund (REF) and placed the responsibility for implementation of the REF with the Council for Medical Schemes.

The Risk Equalisation Technical Advisory Panel (RETAP) was established on 20 October 2004 as a consultative group used to assist in the development of technical requirements for implementation of the REF. RETAPs role flows from some of the key recommendations made by the original Formula Consultative Task Team (FCTT). In particular, the panel must focus its attention on the practical requirements for the implementation of the REF formula. Its recommendations should enable an action plan to be developed for implementing the formula, taking into account all the practical and technical issues that will arise in the implementation phase.

The terms of reference are:

1. To provide final recommendations on the contents of the risk equalization formula to be used for implementing health-related cross subsidies across the medical schemes industry;
2. To propose appropriate definitions for the data to be collected for use in applying the formula;
3. To recommend appropriate time frames for the data flows to and from the REF Authority for formula application;
4. To make recommendations regarding the appropriate mechanisms for auditing the data provided by schemes, to ensure fairness in the application of the formula;
5. To prepare proposals for the timing and sequencing of funding flows between schemes and the REF, with logical links to the data flows;
6. To recommend appropriate mechanisms to prevent insolvency of the REF Fund;
7. To consider the affordability of the Basic Benefit Package in consultation with the task team developing the entry criteria for the BBP.
8. Consult directly with relevant stakeholders to obtain technical input when necessary;
9. Report on progress as and when requested;

The establishment of the Risk Equalisation Fund represents the single most fundamental transformation of the medical schemes industry since the 1998 Medical Schemes Act. For this reason, the members of the technical advisory panel have been drawn from the industry, with a focus on the specific technical expertise required for the determination of the equalisation formula, benefit package design, clinical auditing and administration. While every attempt has been made to allow sufficient industry representation, this has been tempered by the need to maintain a technical approach to the work. Participants were therefore selected according to their specific technical expertise, which only fortuitously coincided with industry representation.

Heather McLeod, who led the FCTT, was asked to establish and chair RETAP. The group is made up as follows:

Prof. Heather McLeod	FCTT Chair, Council for Medical Schemes
Brenda Khunoane	Ministerial Task Team, Department of Health
Alex van den Heever	Ministerial Task Team, Council for Medical Schemes
Robert Moeti	Department of Health
Jaap Kugel	Council for Medical Schemes
Dr. Izak Fourie	FCTT, Health Monitor
Pieter Grobler	FCTT, Solutio
Shaun Matisonn	FCTT, Discovery Health
Susan Mynhardt	FCTT, MxHealth
George Marx	FCTT, Health Monitor
Dr. Brian Ruff	Discovery Health
Prof. Alan Rothberg	NHRPL process, Solutio
Malcolm Brown	SCTT, SAICA
Vishal Brijlal	BHF
Paul la Cock	Old Mutual Healthcare
Dr Geetesh Solanki (with effect from 8 Feb 2005)	Fifth Quadrant

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# 1. Introduction and Nature of the Amendments

## 1.1 The REF Contribution Table

In view of the requirements of transparency, predictability and non-manipulability it was recommended in the FCTT Report that the REF formula not be expressed as a formula but rather in terms of a contribution table, known as the REF Contribution Table. The suffix, in the form [Base 200x, Use 200y] gives the date of the base year of the data used for the formula and the calendar year to which the table applies.

The REF Contribution Table is a table of amounts payable by the REF per beneficiary, according to the REF risk factors. The amount is determined from historic data and other inputs on costs per disease. The amount is set in order to cover:

- a defined benefit package (the Prescribed Minimum Benefits (PMBs));
- for the entire medical scheme industry population that is expected for the next year (the Target Population); and
- with an agreed dispensation of cost and other (managed care) efficiencies.

The Industry REF Community Rate is calculated by applying the REF Contribution Table to the expected universe of beneficiaries. Medical schemes effectively pay the Industry REF Community Rate in respect of every beneficiary to the Risk Equalisation Fund and receive the amounts per beneficiary according to the risk factors. See Section 8.3 for further explanation of the use of the Table.

Publishing in this format has the major advantage of simplifying the application of the formula so that schemes will apply the REF Contribution Table in a way which is familiar from their current use of contribution tables in their own schemes. Since publication of the FCTT Report it has become increasingly apparent that the REF Contribution Table also has substantial advantages for healthcare providers. Doctors in particular have had little access to this sort of data in order to enter negotiations for risk-sharing. The REF Contribution Table serves as a benchmark for providers and for trustees as to a relatively efficient cost of delivery for particular age groups and diseases.

## 1.2 Purpose of the Report

RETAP is required to advise on the REF Contribution Table to apply for the first shadow year of operation of the Risk Equalisation Fund (REF). During the shadow period, medical schemes are to submit data and will receive notification of the amounts that would be payable from the REF, however no money will change hands.

The purpose of the shadow period is to ensure that medical schemes and the REF Authority are able to handle the technical and administrative requirements of the full implementation of the Risk Equalisation Fund. The REF Authority is the Council for Medical Schemes during this period.

The Formula Consultative Task Team report of January 2004 (the FCTT Report) will serve as the basis for these recommendations. The initial FCTT Report is adapted by the recommendations of the International Review Panel that reported in February 2004 (the IRP Report).

The purpose of setting out the methodology is to ensure that the Council for Medical Schemes and the future REF Authority have a clear understanding of the technical work that needs to be performed each year. A further important purpose is to continue the transparency of the process that characterised the work of the FCTT to ensure that all stakeholders have full access to the technical work. Where appropriate, recommendations are made for adjustments or methodology needed for future REF Contribution Tables in 2006 or beyond.

RETAP delegated the preparation of this report to Heather McLeod and Pieter Grobler. The document was discussed, amended and adopted by a full meeting of RETAP on 1 February 2005. This report is thus the formal recommendations from RETAP to the Council for Medical Schemes which is responsible for the implementation of the REF. The Council for Medical Schemes will need to satisfy itself as to the appropriateness of the recommendations and to formalise a decision on the REF Contribution Table. That decision or the need for further consultation will need to be communicated to stakeholders by the Registrar of Medical Schemes.

The IRP Report made the following recommendations as to the process for the review of the formula:

### **IRP Report Recommendation 37: Independence of Periodic Reviews, page 41:**

The Panel reiterates its call to the Board of the REF to ascertain the independence of ongoing reviews of the risk factors, weights applied to each risk factor, cost of the PMB and the operational terms of the REF.

### **IRP Report Recommendation 21: Independent Validation of REF, page 53:**

The process of future reviews of (i) the appropriate risk factors to be used for risk equalization, and (ii) the weights to be attached to each factor needs to be independent of the administrators, schemes, and providers. It should be open to scrutiny, and independent validation should be envisaged.

## **1.3 Definitions and Guiding Principles**

A section on the Definition of Risk and Residual Risk and a section on Guiding Principles were originally contained in the FCTT Report. These have been edited by RETAP to ensure consistency with terminology adopted in the FCTT Report and the IRP Report. No philosophical changes have been made to the definitions or the guiding principles and RETAP found all the guiding principles to still be valid and useful. The definitions and guiding principles are included as Appendix A. RETAP recommends that these remain the foundation for work in each future year on the REF Contribution Table.

## **1.4 Choice of Base Year for Shadow Year 2005**

Section 15.1 of the FCTT Report recommended the base data for 2005 should be as follows:

Once the 2003 data has been run off (by end April 2004), the formula should be fitted on this more recent data set. It is not essential to gather data from additional schemes as over half the industry is already represented. Additional sources of data that can be supplied in the common format are of course appreciated. The adjustments in Section 9 should then be applied to these new results to obtain the REF Contribution Table [Base 2003, Use 2005]. This would need to be published for comment and then revised in time to publish by 31 July 2004 so that schemes can use it in pricing for January 2005.

This was supported by the IRP Report. However the recommendation did not envisage a shadow period in which no money would change hands. As the REF Contribution Table for 2005 is only indicative, it is recommended that a complete fitting of the formula is not necessary and would be needless expenditure. Rather, the base data for 2002 should be adapted to apply to 2005, giving the REF Contribution Table [Base 2002, Use 2005] for use in the shadow year 2005. This recommendation was formalised at the first meeting of RETAP on 20 October 2004, following from stakeholder discussions on 4 June 2004.

Thus this report will deal with the a series of relatively minor amendments to the formula and contribution table, rather than a complete re-fitting of the shape of the table. This also means that the risk factors in the formula will not be fully investigated again, with the exception of re-visiting the issue of gender and considering the timing of the CDL risk factors as recommended in the IRP Report. These issues are discussed in Section 3.

## 1.5 Amendments for Shadow Year 2005

The amendments identified by RETAP at meetings on 20 October and 29 November 2004 to be considered for the REF Contribution Table [Base 2002, Use 2005] were:

- Amend the definition of Prescribed Minimum Benefits (PMBs) as antiretroviral treatment for HIV/AIDS has been included in PMBs with effect from 1 January 2005 (see Section 2. 1).
- Reconsider the assumption for uncertainty in PMB definition as the Council for Medical Schemes has published a cross-walk of ICD-10 codes for all the PMB diagnosis-treatment pairs (PMB-DTPs). ICD-10 coding is also to become compulsory during 2005. (see Sections 2.2 and 2.3)
- Amend the layout of the Contribution Table so that it runs across a spreadsheet instead of fitting vertically on an A4 page. (see Section 8. 1 )
- Use single figures for the modifiers for multiple diseases and for maternity as these do not differ by age. (see Section 8. 1 )
- Make a technical adjustment to the maternity modifier so that it applies once per delivery/confinement and is not a monthly amount as is the rest of the table. (see Section 8. 1 )
- Adjust the maternity modifier to reflect a lower Caesarean section rate than occurs in private practice (see Section 7. 2 )
- Adjust the Haemophilia average cost and prevalence to reflect only the costs of treating Haemophilia and not other benefits under the blood products part of benefit structures. (see Section 7.1).
- Adjust the HIV/AIDS average cost to reflect changes in the cost of treatment and monitoring (see Section 7.3).
- Adjust the HIV/AIDS prevalence figures to account for the expected prevalence in 2005 (see Section 7.4).
- Remove the estimates of inflation for 2003-2004, replacing them with actual experience if feasible. Include an estimate of inflation for the period 2004-2005 (see Section 6. 5 )

## 1.6 Choice of Base Year for Live Operation of REF

With the shadow period continuing until 2007 it would not be essential to revise the shape of the REF Contribution Table for 2006 although a full REF Study could be commissioned. Note that as 2004 saw rapid and large gyrations in medicine prices there would need to be a separate component commissioned to determine a reasonable expectation for medicine prices that might apply in 2006 as the raw data will not be reliable enough to use as the base.

It must be borne in mind that medical schemes calculate and finalise their contributions for the following year during August and September in order to lodge rule amendments in October with the Registrar. It is critical for the live operation of the REF that schemes have access to the REF Contribution Table for the next year while doing their pricing. Accordingly the REF Contribution Table can be published no later than 31 July if the REF is to be live from the following January. It is not feasible to make the REF live from the middle of a calendar year.

The Council for Medical Schemes needs to indicate by 30 May 2006 whether the REF will be live from January 2007. In that case, a complete fitting of the formula should be undertaken on 2005 data and publication of the REF Contribution Table [Base 2005, Use 2007] must occur by 31 July 2006. The full study will need to use data from 2005 that has been substantially run-off, thus probably extracted at the end of May 2006 for treatment dates in the period 1 January to 31 December 2005. This cycle is illustrated below.

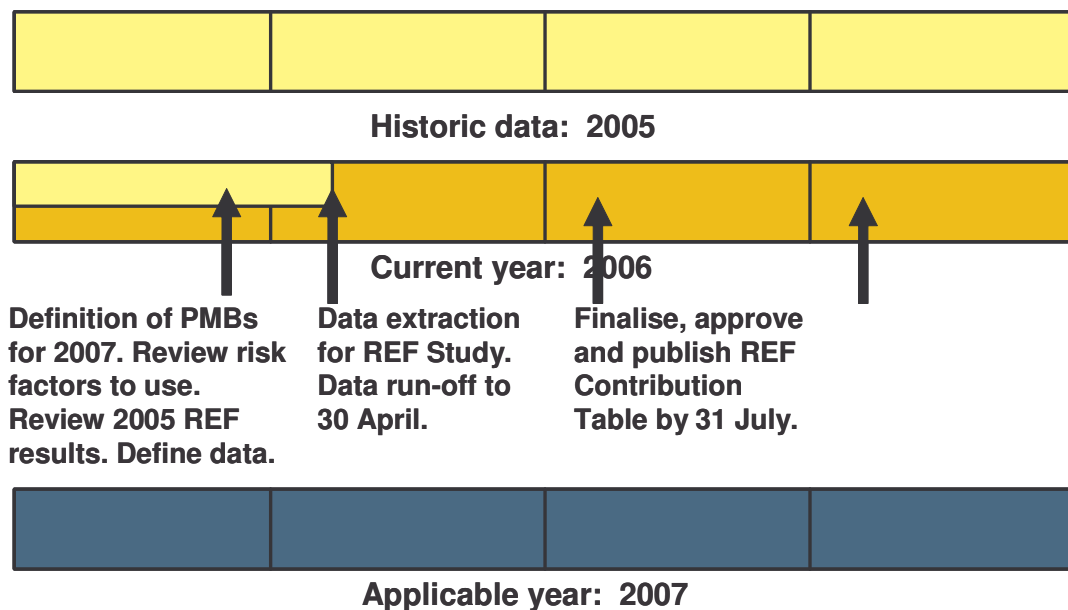


Figure 1: REF Contribution Table Cycle  
Illustrated for REF Contribution Table [Base 2005, Use 2007]

## 2. Benefit Package to be Equalised

The International Panel Report recommended the introduction of a Basic Benefit Package (BBP) and that schemes should be restricted in their product offerings to a small number of Standardized Benefit Packages (SBP). This would require extensive discussion with industry stakeholders and as this process has not yet begun by January 2005, there is little possibility of the SBP discussions being completed in time for 2006. It might just be feasible to include primary healthcare with PMBs in a Basic Benefit Package in time for 2006 if discussions are expedited. However for the purposes of the REF Contribution table for 2005, the standard package remains the PMBs as currently legislated.

Since the publication of the FCTT Report there have been minor changes to the PMB package and substantial improvements in the definition of PMBs. Industry-wide ICD-10 coding is also to be implemented gradually from January 2005.

### 2.1 Amendments to PMBs in Regulation

The only change to the definition of Prescribed Minimum Benefits (PMBs) for 2005 is that antiretroviral treatment for HIV/AIDS according to public sector national protocols was included in PMBs with effect from 1 January 2005. This was done by way of Notice No. R 1410, Government Gazette No. 27055, dated 3 December 2004.

This amendment to PMBs had been widely expected and had already formed part of the assessment of the price of PMBs for the REF Study in 2002.

The cost of treatment for HIV/AIDS, and particularly the cost of antiretroviral medicine has decreased substantially in recent years. Historic data is thus of little use and the costs of treatment are specifically addressed in Section 7.3. The prevalence of HIV/AIDS develops in magnitude from year to year and this is addressed in Section 7.4.

To date work has not yet begun on the widely-anticipated inclusion of a primary healthcare package in the definition of PMBs. That work has critical implications for the pricing of the REF Contribution Table in future years. It is expected that work could be completed during 2005 for implementation in the REF in 2006 if discussions are expedited.

The REF is a key stakeholder in the discussions on the inclusion of primary healthcare. The timing of the change to the PMB package must be coordinated so that the REF Contribution table can be published by 31 July of each year. This implies that the definition and pricing of the primary healthcare package must be completed by 31 May of the year prior to the implementation of that package in the REF formula.

RETAP strongly recommends co-ordination of the process by the Council for Medical Schemes to ensure that the REF deadlines are taken into account.

## **2.2 Improved Definition of PMB-DTPs**

The FCTT Report considered in some depth the issue of the cross-walk to be used to extract PMB diagnosis-treatment pair conditions (PMB-DTPs) from all medical scheme benefit payments. The final choice was to use the ICD-10 cross-walk developed by the Centre for Actuarial Research as described in the report “The Costing of Existing Prescribed Minimum Benefits in South African Medical Schemes in 2001”. While more up-to-date cross-walks did exist, they did not have a clearly defined set of adjustments to obtain the full price from the raw price.

The FCTT Report demonstrated that different cross-walks produced different raw prices for PMBs and strongly recommended to the Council for Medical Schemes that a single industry cross-walk be established, based on those available in the industry.

In the second half of 2004 the Council for Medical Schemes rapidly published a series of draft cross-walks of ICD-10 codes for each chapter of the PMB-DTPs. Industry feedback was requested and the finalised list of ICD-10 codes was released as a 132 page document on 30 December 2004. The Council for Medical Schemes website cautions:

These codes serve as guidelines to interpretation of the prescribed minimum benefits set out in Annexure A of the General Regulations, made in terms of the Medical Schemes Act, 131 of 1998. These guidelines, however, have no legal status. Accordingly, if there is a conflict of interpretation between these guidelines and the definition of conditions set out in Annexure A to the regulations, the definition of conditions contained in the regulations will prevail.

Circular 58 of 2004, dated 17 December 2004, from the Registrar of Medical Schemes states:

The process of coding of PMB has been completed... The coded PMB will serve as a guideline during the first half of 2005. During this time any additional comments, with motivations will be considered.

During November and December RETAP attempted to obtain the results of any technical work that might have been carried out by medical schemes to assess the implications on the price of PMBs of the draft cross-walk. This assessment had not been carried out by the Council for Medical Schemes as the draft PMB cross-walk was essentially a series of clinically driven amendments. All feedback received was that there had been insufficient time and that there had been more important pressures at that time of the year in terms of finalising contribution tables. No industry participants were able to provide an assessment of the impact on the price of PMBs.

Some work was carried out by students at the University of Pretoria on one of the smallest chapters of the draft ICD-10 cross-walk, namely the Ear, Nose and Throat chapter. The work has not been peer reviewed and the preliminary results are given below.

**Table 1: Preliminary Indication of Impact of Council for Medical Schemes PMB ICD-10 Cross-walk on PMB and REF Studies**

	Number of Admissions	Total Cost	Total Length-of-Stay
<b>PMB definition used in PMB and REF Studies</b>	<b>3,587</b>	<b>18,940,066</b>	<b>7,488</b>
Removed from this chapter	10	27,121	18
Switched from OUT to IN for this chapter	147	655,138	214
New PMBs in this chapter - IN elsewhere	32	165,693	145
New PMBs in this chapter - OUT elsewhere	175	518,927	300
<b>Draft Council for Medical Schemes PMB definition</b>	<b>3,931</b>	<b>20,252,702</b>	<b>8,129</b>
Percentage change this chapter	9.6%	6.9%	8.5%
<b>Change OUT to IN</b>	<b>322</b>	<b>1,174,065</b>	<b>513</b>
Percentage change OUT to IN	9.0%	6.2%	6.9%

This preliminary work suggests that for the Ear, Nose and Throat chapter, admissions are 9.6% higher and total cost is 6.9% higher than was estimated in the original price of PMBs. This is not in itself cause to raise the estimated price of PMBs as that study allowed generous margins for the uncertainty in PMB definition and for the inclusion of a proportion of events not in PMBs (OUT) becoming part of PMBs (IN). In assessing only one small chapter it is not possible to generalise this result to the other 13 chapters.

Of greater concern is that those margins need to be continued through for use in the REF Contribution Table adjustments (see Section 6.3). In time, as schemes fully adopt the ICD-10 coded PMBs, so the data obtained from the industry will reflect this definition of PMBs and an adjustment from raw to full cost of PMBs will become increasingly unnecessary. However an adjustment is still needed for the REF Contribution Table for 2005 and will be needed at least for 2006 (likely to be based on 2004 data) and 2007 (possibly based on 2005 data). It is only from the 2006 raw data onwards that we might be reasonably certain of the definition of PMBs

in the raw data but this is dependent on the provision of ICD-10 codes as discussed in the next section.

It is thus imperative that a proper study be conducted of the impact of the new finalised Council for Medical Schemes cross-walk on the earlier studies on the price of PMBs and the REF Contribution Table for 2004. RETAP strongly recommends that the Council for Medical Schemes produce an assessment of the financial impact of the newly published PMB ICD-10 cross-walk, compared to the PMB 2001 Study and the REF 2002 Study.

## **2.3 Compulsory ICD-10 Coding**

The definition of PMBs in terms of ICD-10 codes was discussed above, but the actual provision of these ICD-10 codes by healthcare providers has been problematic in the past.

The FCTT Report stated:

The FCTT reaffirmed its support for the early and compulsory implementation of the industry-agreed clinical coding system, namely ICD-10. Importantly this will facilitate the definition of the PMBs in terms of ICD-10 codes.

The Council for Medical Schemes has worked extensively with the Department of Health, industry stakeholders and healthcare providers in particular on the issue of a common diagnosis code. Late in 2004 this process was brought to fruition with the announcement that ICD-10 codes would begin to be compulsorily implemented from January 2005.

Circular 58 of 2004, dated 17 December 2004, from the Registrar of Medical Schemes states:

The implementation of ICD-10 in the medical scheme environment takes effect on 1 January 2005. All health service providers are encouraged to begin submission of ICD-10 diagnosis codes in their accounts for administrative and statistical purposes.

The implementation process will entail a phase-in period of 6 months, to allow stakeholders to finalise their preparations for the implementation of ICD-10. During this period, no outright rejection of accounts without ICD-10 codes will be permitted. However regular monthly meetings will be held in order to monitor and review the implementation process.

Submission of ICD-10 codes will be compulsory from 1 July 2005. All health service providers will be required to include ICD-10 codes in their accounts to medical schemes in compliance with legislation. Any claim that is submitted without ICD-10 codes will be liable for rejection from 1 July 2005.

It is thus only for the 2006 raw data onwards that we might be reasonably certain of the definition of PMBs but this will need to be reviewed depending on the success of implementation of both the provision of ICD-10 codes and the ICD-10 definition of PMBs throughout the industry.

RETAP recommends that a specific component of the study for the REF Contribution Table for 2008 (which would be the first to utilise 2006 data) should include an assessment of the quality of implementation of ICD-10 codes. At that stage it may be possible to substantially eliminate the margins for uncertainty in the PMB price.

A danger of the delay in including primary care in PMBs is that there is an incentive for doctors to 'up code' i.e. a diabetic will always carry an ICD of diabetes or a hypertensive will be coded for hypertension even if the doctor is consulted for a cough or sore throat. Therefore more codes over time may not be a sign of better coding, just more coding in order to get paid from the pooled funds. It is recommended that the discussions to include a complete primary healthcare package in the legislated definition of PMBs be held as soon as possible in 2005.

## 3. Risk Factors for Equalisation

### 3.1 FCTT Choice of Risk Factors for 2004

The FCTT Report states:

After testing the various factors against the Principles for the Choice of Risk Factors in the Formula and comparing their effect on the predictive power of the formula, it was decided that the following factors should be included in the formula:

- Age;
- A Pregnancy/Maternity indicator;
- The 25 PMB–CDL conditions as well as HIV/AIDS;
- An adjustment for the number of CDL conditions that a member has. Allowance was made for 2, 3, and 4+ diseases.

As a member can have more than one CDL disease, occurring in various combinations, the list of diseases and combinations of diseases can become very long if every combination is allowed for... over 2,000 combinations of the 25 CDL diseases were found (in the raw PMB Study data).

In order to simplify matters the decision was thus taken that where a member has more than one CDL disease, only one of these diseases will be allowed for in calculating the amount due to the scheme. The rational administrator would obviously take the disease that will have the highest amount. To cater for the members with more than one disease, a modifier is added to allow for the increased severity.

The definition of age to be used is age last birthday on 1 January. Age ranges are specified in the table as Under 1, 1-4, 5-9, 10-14... 75-79, 80-84, 85+.

In the REF Contribution Table for 2004, modifiers for two, three and four (or more) diseases were used. Although it was found that up to eight diseases could be simultaneously present, the numbers with four or more simultaneous diseases are very small.

### 3.2 Advice from the International Review Panel

The International Review Panel agreed with the use of all the factors recommended by the FCTT but recommended that gender be incorporated directly and that the CDL conditions be implemented gradually. The following extracts are taken verbatim from their report.

### **IRP Report Recommendation 16, page 32:**

The Panel recommends inclusion of the following factors for risk equalization:

1. Age - using age ranges: 0, 1-4, 5-9, 10-14... 75-79, 80-84, 85+. The age band of 75+ years should be split into three separate age bands, and that definition of birth year should be standardized to mean “age in years on 1 January”.
2. Gender – based upon interactions with age.
3. CDL [note: HIV/AIDS was included as a “CDL”] – should be phased in as a factor for REF calculations, with a weight of 10% in the first instance. An additional maternity / pregnancy indicator column should be added to the CDL. A beneficiary should be recorded as belonging to the maternity category if she had an episode of maternity utilization in the last year prior to the returns.

### **IRP Report Section 2.8: Risk Factors, page 29:**

The Panel considered that the following criteria should be met for a risk factor to be retained for equalization:

- **Measurable:** The factor should be clearly defined and easy to determine for each medical scheme. It should not be contaminated through measurement error.
- **Determinant of utilization:** Each factor must have a credible link to underlying morbidity and must explain variations in healthcare utilization.
- **Easily recordable:** It should be possible for the schemes to gather the information required for each risk factor easily, administratively feasible and without undue expenditure of time or money.
- **Free from perverse incentives:** The risk factor should not offer incentives for inefficient practice, and should not be open to manipulation by medical schemes, administrators and/or providers.
- **Validated:** It should be possible to verify the factor independently.

### **IRP Report Section 2.8.3: Gender, page 29:**

Gender is often used as a criterion for risk equalization in other countries. Information on gender is easy to collect, requires no updating and allows schemes to plan prospectively.

While in general it is quite difficult to cream-skim on the basis of gender alone, there are considerable variations in healthcare utilization by gender in certain age groups: women between the ages 25 to 40 attract higher healthcare costs compared to men; and men aged 60 and above outweigh women in terms of expenditure, particularly within the medium/high socio-economic group. Further investigation into the observed differences in expenditures by gender among babies should be done to consider gender-age inequality among this sub-group as well. The adjustment for gender should therefore capture appropriately the gender differentials in healthcare expenditures across the full age profile, by including interactions with age.

Interactions with all age categories are preferable and should be considered seriously. As a minimum, gender-age interactions should be performed between ages 25 to 40 and 60 upwards.

In the reality of South Africa, considerable variations in the gender profile of existing schemes are likely, due to the occupational nature of some medical schemes. This needs to be verified and if confirmed an adjustment should be made.

The Panel tends to consider gender as a more appropriate factor to equalize than the suggested pregnancy maternity indicator, subject however to the next section.

**IRP Report Section 2.8.4: Pregnancy/Maternity indicator, page 30:**

Considerable statistical evidence has been presented to the Panel about the significance of maternity as a risk factor. Based upon this information, the Panel agrees that the pregnancy / maternity indicator could be a better explanatory variable of health costs for women within the maternity age groups than gender. The Panel does however have concerns that using the maternity indicator alone, without the gender indicator, may raise problems for other age groups where cost variations between males and females are unrelated to maternity expenditures.

The Panel concludes that the age / gender interaction factor should be primarily used, with an additional allowance for maternity as part of the CDL (and therefore introduced with the same weighting as applied to the CDL factor). This will allow recording the considerable variation in utilization between females within the maternity age group to be reflected in the contribution table.

The basis for identifying female beneficiaries within the maternity age group could be according to whether or not there was a maternity episode within the last year preceding the latest REF claims data.

**IRP Report Section 22.8.6: Chronic diseases list (CDL), page 30:**

All other things being equal, CDL should be used as a factor for equalization.

However, the following observations suggest that, in the short term, it will be impractical to count on having sufficient data to enable the use of this list as a factor:

- The 'cross-over' algorithms that the FCTT needed to develop for the purposes of considering CDL as a factor suggest that the definitions used currently may be imprecise.
- There are no established criteria or protocols for a review of the CDL.
- Many medical schemes are currently unable to report the CDL that apply to their beneficiaries;
- The assignment of CDL to beneficiaries may be subjective and not clearly defined.
- The criteria for monitoring that the assignment of CDL to beneficiaries continues to be valid over time are not clear. For example, childhood asthma may ameliorate with age.

- Providers and schemes may have a financial incentive to up-code their categorization of beneficiaries. And
- The auditing of CDL categorizations is likely to prove problematic.

The Panel recognizes the empirical evidence of a link between CDL and healthcare expenditures, and the underlying rationale that the CDL reflect morbidity characteristics of beneficiaries. However, until such a time that the issues raised above are resolved, the Panel considers that CDL is not yet usable to its full extent as a basis for equalization.

On the other hand, medical schemes should be encouraged to collect accurate information on assignment of CDL to beneficiaries. The Panel therefore recommends a gradual phasing-in of the CDL component in the calculation of the REF, starting with a weight of 10% in the first instance. This would reduce the adverse effect of the potential pitfalls flagged above, but introduce morbidity elements into risk equalization. This would also provide a clear incentive to the schemes to apply the CDL assignment to their beneficiaries for more accurate calculation of the REF formula. Schemes that are unable to provide CDL data will not be able to claim payment from REF in respect of this component, or load CDL costs onto their contribution.

Changing the weight attached to CDL should be based both on resolution of the issues raised above and on analysis of the experience with using the CDL as a factor for risk equalization at a weight of 10%.

### **3.3 Choice of Risk Factors for 2005**

At a meeting of stakeholders on 4 June 2004 the recommendations of the International Review panel were discussed in detail.

#### **3.3.1 Gender**

There is no doubt that there is a difference in prevalence of certain chronic diseases by gender. However differences in prevalence are taken into account in the REF Grid structure and would be apparent if the REF Grid was collected by gender.

The meeting felt that the more important issue was whether there was a difference in average cost between male and female beneficiaries with each chronic condition, thus necessitating separate columns in the REF Contribution Table. The healthcare providers and pricing actuaries in that meeting did not feel there was any evidence of different average costs by gender for the CDL conditions.

Prof Alan Rothberg has done extensive work on average costs and prevalences by cluster in the Medscheme environment. His opinion subsequent to the June meeting is that for ischaemic heart disease there are differences in costs between male and female and between African/Black lives and White lives. He suggests that, it could be that when data are merged (when ethnicity is not taken into account) the lower costs for black males brings down the costs for males overall and minimises the gender differences. Also, even though ischaemic heart disease is very prevalent it is probably a unique example of gender and race differences, so he would accept the general view that we do not adjust now but track this over time. He raises the possibility of a male vs. female difference in the first year of life (females known to be stronger and may cost less) but will provide further evidence once the investigation is completed.

Graphs were shown at the June meeting of the impact of maternity on the price implicit in the REF Contribution Table and are reproduced below.

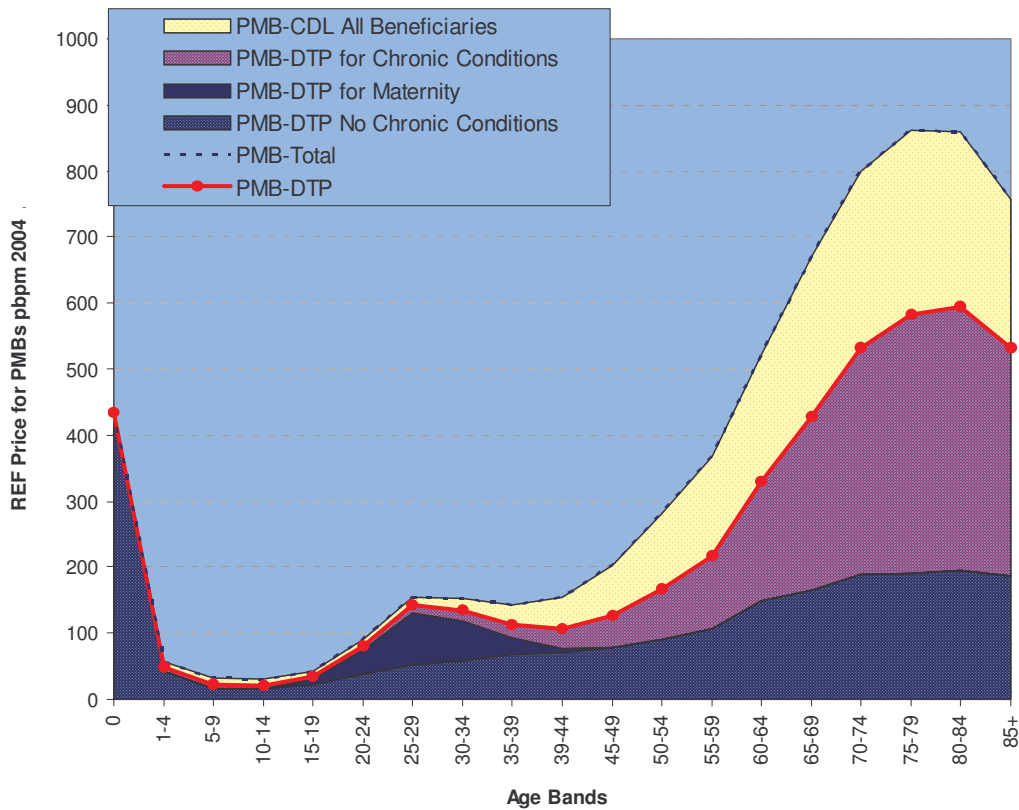
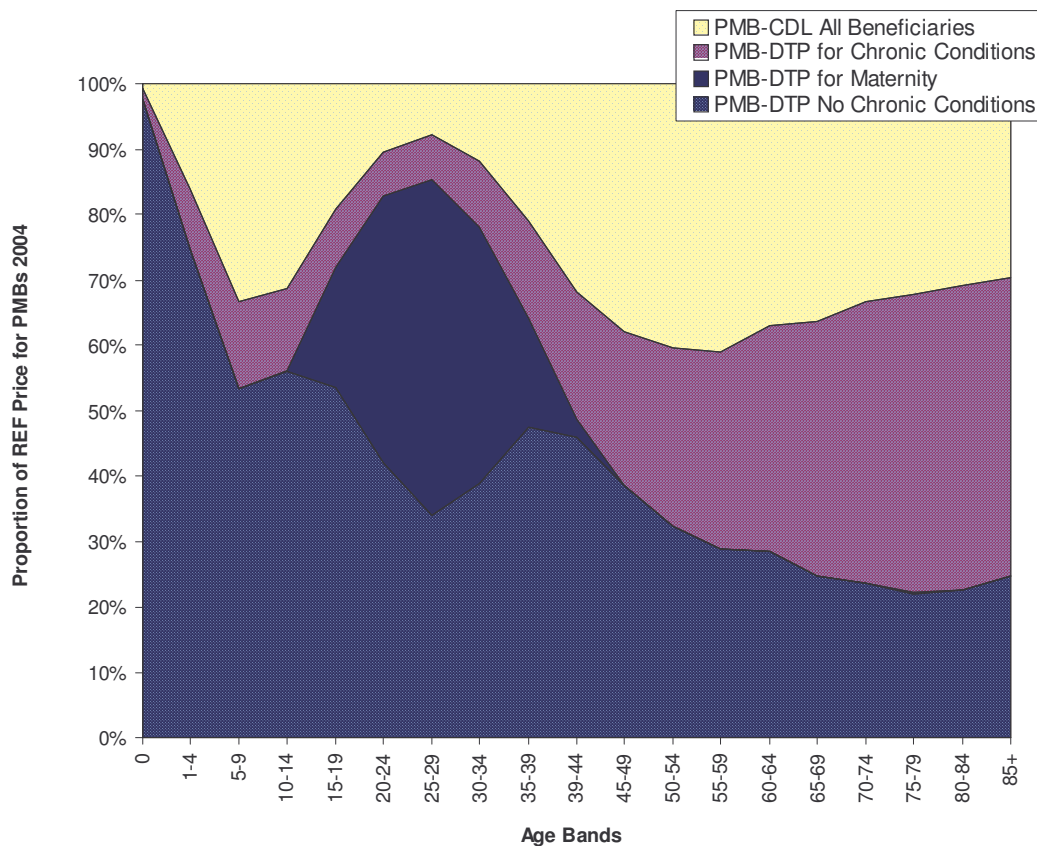


Figure 2: Implicit Price by Age of Chronic Disease and Maternity, using the REF Contribution Table for 2004



**Figure 3: Proportion of Price by Age using the REF Contribution Table for 2004**

The general feeling of the June meeting was to ‘keep it simple’ and remain with the current criteria of the REF for the shadow year in 2005. The REF Grid and actual expenditure information will be collected by gender during 2005. This decision was formalised at the RETAP meeting on 20 October 2004.

RETAP recommends that the REF Grids be collected separately for males and females during the shadow year. The REF Grids should be collected in two forms:

- The **REF Grid Count** gives the cell to which each beneficiary in the scheme is allocated. The total number of beneficiaries sums to the number in the scheme. This table is used to obtain the amount payable by the REF to the scheme.
- The **REF Grid Prevalence** gives the prevalence of each condition. For example a beneficiary with asthma and hypertension is counted in both columns. The total therefore exceeds the number of beneficiaries in the scheme by the extent of multiple CDL conditions. This table is used for research purposes and to enable comparison of prevalences to published medical literature.

RETAP recommends that a component of the study for the REF Contribution Table for 2006 must include an assessment of the impact of gender. As the first data on the effect of gender

will only be available some months after the first submission in the REF shadow year, a preliminary decision can already be taken to include gender in the extraction of data from medical schemes in May 2005. There needs to be a specific study of the gender issue prior to the finalisation of the 2006 Contribution Table.

The REF Authority will need to consider whether there is sufficient evidence to split at least the NON (i.e. no CDL) column into male and female columns in time for the REF Contribution Table for 2006. If evidence of gender-specific differences in average cost becomes apparent in the data then consideration will need to be given to the degree of impact and whether any or all of the CDL diseases should also be split into male and female columns.

### **3.3.2 Pregnancy/Maternity**

There was discussion at the meeting on 4 June 2004 about the definition of the pregnancy/maternity indicator. This was subsequently enhanced with a description of the term of the pregnancy in order to exclude early miscarriages. RETAP recommends that “delivery” be defined as the delivery of a single/multiple foetus either stillborn or alive following a pregnancy of at least 24 weeks duration.

The delivery should be counted in the month that it occurs and the cost should be annualized. The delivery needs to be coded with CPT-4 codes and ICD-10 codes, taking into account the structure of the NHRPL.

The new-born child will be incorporated into the age structure by taking the age of the beneficiary as on 01 January of the year of evaluation. The naming of the category as “Under 1” allows for that calculation to produce either a zero or a negative result.

### **3.3.3 Chronic Disease**

The graphs above also demonstrate the importance of chronic disease in the REF Contribution Table price. It is not only the PMB-CDL component (which has been demonstrated in the PMB pricing) but also the PMB-DTPs attributable to those with CDL conditions. This new information on the impact at higher ages of the CDL conditions suggests that a delay in implementing the CDL risk factors could be worse for schemes with a less healthy beneficiary group than previously thought.

Much progress had already been made on the definitions for entry criteria to the CDL by the June meeting and a team was tasked with finalising definitions that would be acceptable to stakeholders. The final recommendations in that regard will be dealt with in a separate document.

RETAP thus has confidence that the key reason for a delay in implementing the CDL risk factors has been dealt with by defining the entry criteria for the CDLs. In addition, the REF Contribution Table for 2005 is indicative and no money changes hands. Thus the CDL risk factors have been fully incorporated in the REF Contribution table for 2005.

RETAP recommends that in the review for the REF Contribution Table for 2006 that the issue of whether to fully include the CDL risk factors again be considered. The greatest danger is now seen to be the potential up-coding of beneficiaries from no CDL condition to having a CDL condition. Any potential problems in this regard should begin to become apparent in the reporting during the shadow period.

RETAP recommends reviewing each set of submissions in the shadow period and comparing the REF Grid Counts submitted against those implicit in the construction of the REF Contribution Table as shown in Appendix F.

In summary, the risk factors recommended for use in the REF Contribution Table [Base 2002, Use 2005] are as follows:

- Age last birthday on 1 January, summarised into age bands Under 1, 1-4, 5-9, 10-14... 75-79, 80-84, 85+.;
- The 25 PMB–CDL conditions. Where a beneficiary has more than one CDL conditions, the scheme may choose the most expensive of the conditions for the placement of the beneficiary in the REF Grid Count.
- HIV/Aids provided the beneficiary is receiving or has received anti-retroviral therapy according to the PMB definition;
- A modifier for maternity, delivery of a single/multiple foetus either stillborn or alive following a pregnancy of at least 24 weeks duration;
- A modifier for the number of multiple CDL conditions. Allowance is made for 2, 3, and 4+ simultaneous CDL conditions.

## 4. Target Population

The table below from the FCTT Report, Section 9.4 gives the number of beneficiaries expected in each age group for the potential target populations, compared to the existing medical scheme population in 2002.

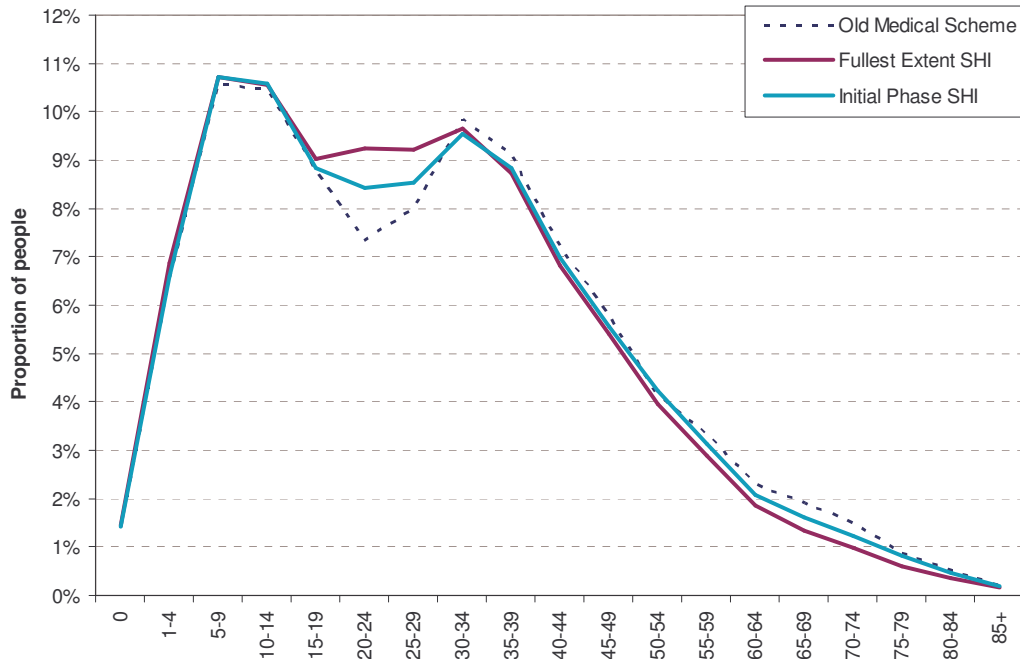
**Table 2: Beneficiaries in Target Populations by Age Band**

Age bands	Derived from Registrar's Returns 2002	October Household Survey 1999 data		
		Old Medical Scheme	Initial Phase SHI	Fullest Extent SHI
0	87,161	97,546	145,381	219,769
1-4	421,456	461,714	678,216	1,042,455
5-9	602,480	742,710	1,098,442	1,624,172
10-14	643,825	733,049	1,084,580	1,600,515
15-19	601,525	617,601	906,668	1,366,786
20-24	414,923	515,905	863,950	1,400,851
25-29	447,382	561,051	876,290	1,398,038
30-34	597,077	690,796	980,238	1,460,809
35-39	610,047	640,382	907,283	1,323,357
40-44	561,179	505,530	717,111	1,033,185
45-49	464,792	406,802	571,869	819,374
50-54	366,006	289,581	432,520	600,313
55-59	289,962	233,777	321,927	438,928
60-64	207,395	160,260	212,551	282,557
65-69	146,079	133,679	165,235	202,030
70-74	110,328	105,039	125,825	147,490
75-79	73,520	60,485	82,837	91,246
80-84	33,230	35,743	47,020	52,873
85+	35,502	16,155	19,710	23,469
(age unknown)		17,260	20,638	23,473
<b>Total</b>	<b>6,713,870</b>	<b>7,025,065</b>	<b>10,258,291</b>	<b>15,151,692</b>

The age profile from the Registrar's data differs from the age profile given in the October Household Survey 1999 (OHS99) data because the latter is only an estimate of the population using the Census to weight the sample results. Wherever possible we should use the actual data as submitted to the Registrar.

When Social Health Insurance is implemented with income-based cross-subsidies, this should make medical scheme cover more affordable for a substantial number of additional members and their families. This will necessitate the use of estimates of the target population such as those derived from the OHS99.

There is substantial anti-selection in the voluntary medical schemes environment as illustrated in the graph below. The graph below, from the FCTT Report, shows the age profile of the industry and future target populations using the October Household Survey 1999.



**Figure 4: Age Profile Future Target Populations under SHI (OHS99)**

The age profile of the industry with the introduction of SHI is likely to become younger because the elderly not already in medical schemes have incomes which are too low to be able to join a medical scheme and they will remain in the public sector.

It is argued that if the policy changes achieve the aims of making schemes more efficient, with income cross-subsidies and with better designed low cost (BBP) options, more older people will find it more affordable. However modelling of the target SHI population has shown that some 85% of older people with an income in the SHI target range are already in medical schemes, presumably with the aid of subsidies from previous employment. These subsidies for future retirees are however unlikely to continue. A further factor is the impact of HIV/AIDS especially amongst the lower income groups. This would probably cause a shift in the demographic pyramid with proportionally more older people than in the absence of HIV/AIDS.

Note that the target population age profile used does not affect the REF Contribution Table itself, but does have a substantial impact on the Industry REF Community Rate derived from

the table and hence on the payments to or from the REF. The impact is described in the FCTT Report, Section 9.9:

The Industry REF Community Rate could be determined by applying the REF Grid for the entire industry to the REF Contribution Table. The Industry REF Grid is not available at this point and the best estimate, using the Registered scheme age profile from 2002 is that the Industry REF Community Rate for 2004 is R180.69 per beneficiary per month.

If the full adjustment to the expected population in the first phase of SHI is taken, then the Industry REF Community Rate in the above examples falls to R173.45. At the full extent of SHI the Industry REF Community Rate is estimated to be R163.90.

The REF Contribution Table for 2004 used the existing medical scheme population as derived from the age profiles submitted to the Registrar of Medical Schemes in 2002.

Note that although the Registrar now holds age data from 2003, the data has not been cleaned and tested as was done extensively on the 2002 data. As there was very little difference in the number of beneficiaries in 2002 and 2003 and given that the 2005 Table is for the shadow year, it has not been felt necessary to redo the exercise of obtaining a cleaned industry age profile.

As at January 2005 the full SHI framework which incorporates income-based cross-subsidies has not yet been approved by Cabinet, although it is policy of the Department of Health. Accordingly it seems unlikely that there will be any substantial change in the membership of medical schemes during 2005 or even 2006.

RETAP thus recommends the use of the age profile from the Registrar's data in 2002 as the target population age profile for the REF Contribution Table for 2005.

RETAP recommends that the actual data gathered from the schemes using the REF Grids during the shadow year should be used as the base age profile for the work on the 2006 table and subsequent tables.

RETAP recommends that once clarity is obtained on the implementation of the Social Health Insurance framework incorporating an income-based cross-subsidy, the issue of the appropriate target population should be revisited. It is recommended that the age profile for the target population at that time be determined from the SHI Model developed by the Department of Health that incorporates the Census 2001 data.

## 5. Base Data for the Formula

The decision was discussed in Section 1.3 to use the REF Study 2002 as the basis for the REF Contribution table for 2005. Accordingly there is no REF Study repeated. In order to give the Council for Medical Schemes and the future REF authority an indication of the work needed for a REF Study, elements of the FCTT Report are repeated here.

### 5.1 Methodology for the REF Study 2002

The methodology for the REF Study was initially developed and reported in the Technical Report by Grobler, Theron & Cooper (2003). Their report sets out the justification for the approach adopted and provides references to papers on the subject. Actuaries and statisticians are directed to consult the original Technical Report. The methodology is summarised for a general audience below.

In order to decide which factors should be included in the formula, two distinct steps were involved:

- Test the individual factors against the Principles for the Choice of Risk Factors in the Formula [now in Appendix A]
- Test the proposed factors to determine their relative predictive power based on the available data sets. The most common measure of predictive power of risk adjustment models is the  $R^2$  measure. This measures the proportion of variance in health expenditure that is explained by a set of risk factors.

When assessing the predictive power of a model, it should be noted if this model also performs well outside of the sample originally studied. In order to assess this, the dataset was randomly divided into two sample datasets. A first model was fitted using the first data sample and applying the stepwise selection method. Only risk factors whose regression coefficient estimates were significant at level 0.01 in the model were retained. The less significant risk factors ( $p > 0.01$ ) were dropped from the model.

A second model was fitted on the second sample of data. Only those risk factors significant from the first regression model were used as risk factors in this second model. Again, the stepwise selection method was applied so that the final model contains only statistically significant risk factors. The probability of a risk factor being in the final model by chance was minimised when using this 2-step approach. The  $R^2$  measure obtained for this second model was used for assessing the predictive power.

The preferred route chosen was to have separate models for the PMB-DTPs and the PMB-CDL conditions as that would lead to a better fit of the model due to more homogeneous data sets. The models obtained were additive and the parameters of the risk factors could be added together to obtain a combined formula for the complete PMB package. A Generalised Linear Model was used to estimate the parameter values for each of the risk factors.

Appendix C sets out the methodology of the REF Study in the detail required to replicate the work. The document summarises the steps that should be followed to test the significance of certain risk factors for the risk equalisation formula as well as to test the impact of a formula on a specific scheme.

The International Review Panel recommended as follows:

**IRP Report Recommendation 19, page 33:**

The Panel recommends running a model on a single dataset to select risk factors; this is said in relation to the “stepwise methodology” used to select the risk factors as described in section 5.3. (i) of the FCTT Report.

**IRP Report Recommendation 20, page 33:**

An alternative approach to assessing the predictive ability of a given model is suggested. The data provided by the medical schemes could be split at random into two subsets (but not necessarily of equal amounts). One dataset would then be used to define the appropriate weights to be applied to the risk factors. The second dataset would be used to calculate the expected expenditure claims given the risk factors and weights attached to these. A comparison of expected expenditures to actual expenditures will then be possible. This would provide a useful out-of-sample assessment of the predictive power of the risk equalization model to complement measures of fit provided through R-squared and mean-squared error statistics.

RETAP recommends that the IRP recommendations on methodology be considered when the next full study of the risk factors and the shape of the curve is undertaken.

## **5.2 Data for the REF Study 2002**

The Formula Consultative Task Team decided against attempting to combine data sets from different administrators as the complexity of doing so and the confidentiality issues were too great. There was general consensus that each administrator would work on their own data sets (with the permission of the schemes) on an independent basis. The results were produced in a common format and then combined by Pieter Grobler.

The majority of the work was based on the datasets supplied by Medscheme and Discovery Health. Data from MxHealth, Old Mutual and MediClinic was used to confirm some aspects of the work. The Medscheme and Discovery Health datasets were for treatment dates in 2002. The data included CPT-4 and ICD-10 coding for the PMB-DTPs.

The data used to determine if a beneficiary had a specific disease was based on pre-authorisation data obtained from the Medscheme and Discovery Health pharmacy benefit management programs.

Medscheme and Discovery Health worked independently on their own data and the results were combined. The combined data (the REF Study) gave the following exposure:

- PMB-DTP: 26 schemes with 32.018 million member months of exposure, representing about 40% of the medical scheme population;
- PMB-CDL: 27 schemes with 33.460 million member months of exposure, representing more than 41% of the medical scheme population.

The FCTT Report considered the degree of coverage of the study data in each age band and reached the conclusion that coverage was over 50% of the industry data in all age bands below 55 years. The proportion in each age band then began to decline, reaching under 30% in the 75+ age band. The FCTT was of the opinion that there was still sufficient credible data in the older ages not to need to include other schemes. This was agreed by stakeholders.

The International Review Panel concurred that the data was credible and made additional technical points:

**IRP Report Recommendation 17, page 33:**

Future assessments of appropriate risk factors and the weights to be attached to these should ideally be based on data on all beneficiaries from all schemes participating in the REF. If this is not possible, there is a possibility that risk equalization could be contaminated by biases brought about through use of an unrepresentative sample of data. This risk should be assessed, both in relation to the choice of risk factors and to their weights.

**IRP Report Recommendation 18, page 33:**

Given the potentially huge number of observations available for statistical analysis when all schemes contribute data, the REFTG may wish to consider analyzing a subset of observations selected at random, provided that the sample size provides sufficient coverage of all categories of the risk factors being considered.

**IRP Report Section 2.9.3: Credibility of the data, page 34:**

The Panel considers that the data underlying the analysis presented in the FCTT Report and the Technical Annex thereto is credible. The Panel is also satisfied with the credibility of data used for the determination of the specimen contribution table. In this regard, two technical points need to be made here:

**Recommendation 23:** The age band of 75 years and above should be split into three separate age bands of 75-79, 80-84 and 85+ years. We understand that this information is not routinely recorded by schemes for these age bands, but we suggest recording this information in the future. This is because of the variation in the usage profile for health services of these three sub-groups.

As discussed above, data on the profile of beneficiaries by CDL may not be credible at present and measures should be put in place to ensure more accurate classification of beneficiaries by these classes before this factor is used in full to equalize risk profiles.

RETAP recommends that the IRP recommendations on data be considered when the next full study of the risk factors and the shape of the curve is undertaken. Note that the recommendation on age bands will already have been implemented in the shadow year 2005.

[See overleaf for Section 5.3]

### 5.3 Raw Price of PMBs in the REF Study

The table below gives the raw price of PMBs determined in the REF Study using 2002 data. Note that this raw price needs to be adjusted by a number of factors (discussed in Sections 6 and 7) before it can be used for the REF Contribution Table 2005.

**Table 3: Raw Price of PMBs pbpm in the REF Study (2002 data)**

Age bands	PMB-DTPs REF Study 2002	PMB-CDLs REF Study 2002	Total PMBs REF Study 2002
Under 1	348.33	0.75	349.08
1-4	33.04	3.04	36.08
5-9	14.23	4.87	19.10
10-14	13.53	5.08	18.61
15-19	24.59	5.08	29.67
20-24	58.71	6.40	65.10
25-29	105.78	8.08	113.86
30-34	98.29	11.13	109.42
35-39	79.56	18.58	98.14
40-44	71.30	30.02	101.33
45-49	84.55	47.48	132.03
50-54	110.86	71.32	182.18
55-59	144.43	96.63	241.06
60-64	222.29	125.80	348.09
65-69	293.22	159.74	452.96
70-74	365.55	175.48	541.03
75-79	415.25	176.31	591.56
80-84	417.40	161.23	578.64
85+	372.66	128.97	501.63
<b>All Ages</b>	<b>81.92</b>	<b>26.79</b>	<b>108.71</b>

## 6. Adjustments in the REF Contribution Table

The International Review Panel was satisfied with the methods used by the FCTT to calculate the contribution table and recommended that they be maintained.

### 6.1 Adjustment for Target Population

When an adjustment needs to be made to a new target population in future, RETAP recommends taking the actual age profile from the submitted REF Grid Counts and adjusting by a factor derived from Census 2001 data. The factor is the ratio of increase from the medical scheme population to the new target population chosen.

An adjustment for the REF Contribution Table 2004 was suggested in the FCTT Report using the OHS99 figures. Note that the target population actually used for that table was the medical scheme population and so the adjustment factor was not implemented.

OHS99 uses Census 1996 and it will be necessary to use a more recent equivalent to the OHS study from StatsSA that makes use of Census 2001 to adjust the population figures. RETAP recommended in Section 4 that the Department of Health SHI Model be used in future to develop the appropriate factors.

The target population is not expected to differ materially from the existing medical scheme population until Social Health Insurance is implemented. Accordingly for the REF Contribution Table for 2005, no adjustment is recommended.

### 6.2 Adjustment for Demographic Profile of Base Data

It was found in the FCTT Report (Section 9.2 on p 76) that given that the REF Contribution Table uses age as a factor, no adjustment needs to be made to the raw price from the REF Study on account of age differences in the target population.

It was also found, fortuitously, that the REF Study 2002 had a proportion of African/Black lives between the industry level and the target population in the first phase of SHI. It was thus not recommended that there be any change to the raw PMB price from the REF Study as a result of ethnicity. As there is no reason to change the target population for the shadow year in 2005, there needs to be no further consideration of an adjustment for the demographic profile.

RETAP recommends that once the full SHI framework is imminent and there is expected to be a substantial influx of new beneficiaries that the question of an adjustment for the demographic profile of the target population compared to the REF Study population is revisited.

### 6.3 Adjustment from Raw to Full PMB Cost

From the FCTT Report, Section 9.3 on page 75:

The raw PMB price needs to be adjusted to take account of items in the PMB costing that may not be available in the data. While the definition of PMB-DTPs remains a matter for individual scheme interpretation, a large part of this adjustment is for the uncertainty in the price of PMBs. The margins and adjustments to go from the raw price to the full price of PMBs are detailed in the reports on the costing of PMBs by Fish et al (2002) and McLeod, Rothberg et al (2003).

Note that a decision was taken by the Formula Consultative Task Team to exclude non-healthcare costs (i.e. the costs of administration and managed care) in the work of the REF. The graph below shows the relationship between raw and full price from the data in the reports described above.

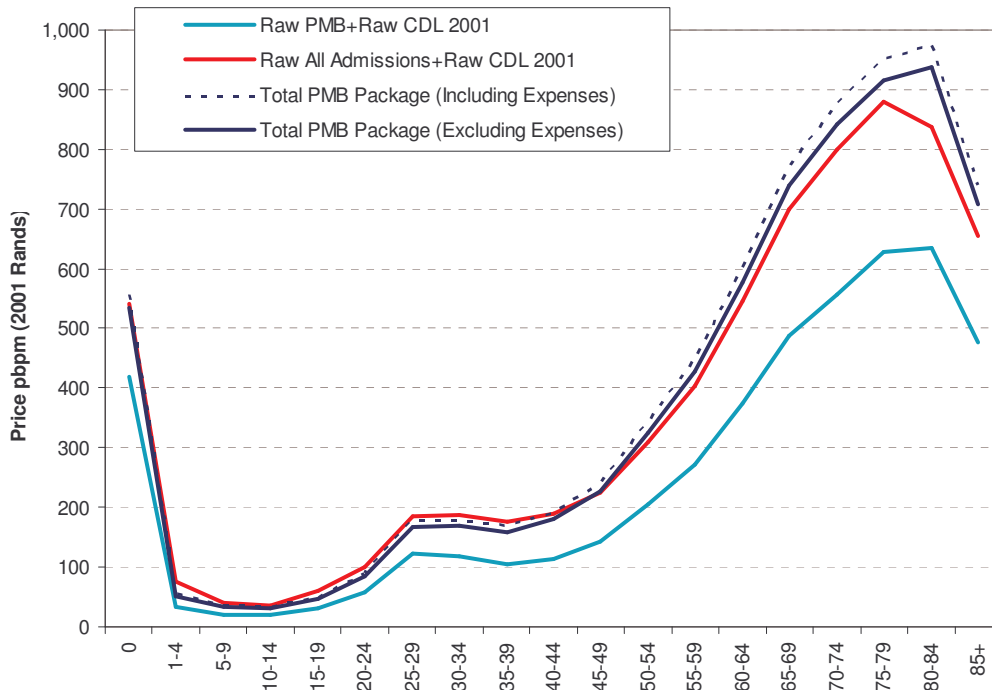
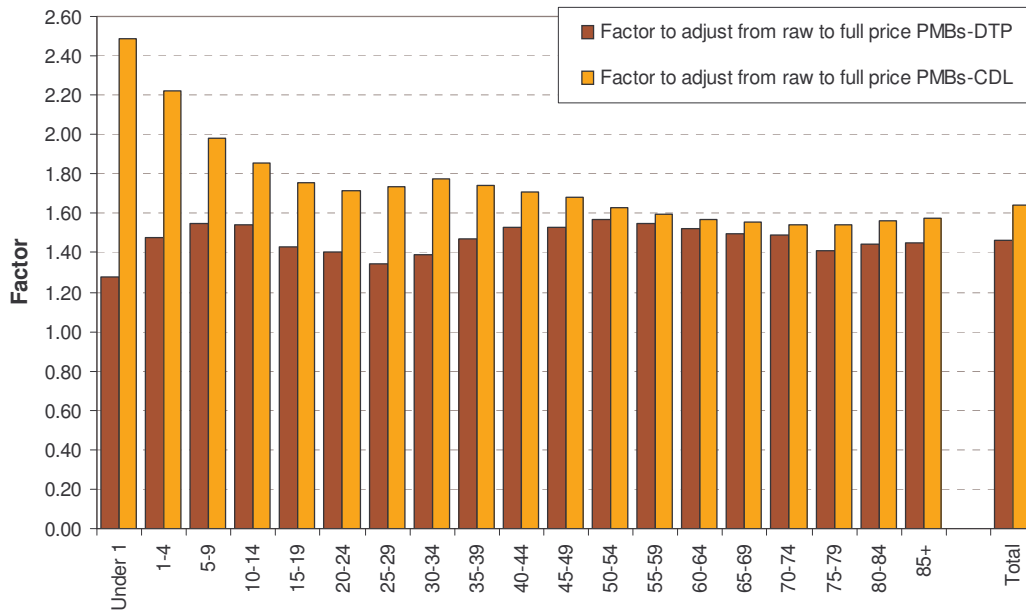


Figure 5: Adjustments and Margins for Full Price of PMBs by Age (2001)

Note that the non-healthcare costs (expenses in the graph) are a small component. The major difference between the raw and full prices is due to the margins for uncertainty in the PMB definition, both the PMB-DTPs and the PMB-CDL package.

The factors for adjustment are given separately for PMB-DTPs and PMB-CDLs, as shown graphically below and in the table in Section 9.8 [of the FCTT Report]. Note that as PMB definitions and protocols improve in future, so these factors are expected to reduce.



**Figure 6: Factors for Adjustment from Raw Price to Full Price (no expenses)**

Some concern has subsequently been expressed that the factors for the CDL adjustment for children and particularly for the Under 1 category may be too high. The high multiple needs to be seen in relation to a very low Rand amount for PMB-CDLs at these ages and the greater part of the adjustment at these ages is the estimate of primary care for diagnosis and treatment. There is insufficient numeric evidence to alter the shape of these factors until there is a complete review as discussed further below.

Note that the adjustment factors above include a substantial margin for the uncertainty due to the first mandatory implementation of the PMB-CDLs in 2004. Options that may only have provided hospital benefits in the past had to provide for diagnosis, management and treatment of the 25 CDL conditions. The uncertainty in the behaviour of providers and members as the benefits became part of PMBs will fall way in future PMB studies.

In Section 2.2 it was discussed that greater clarity has been achieved in the definition of PMBs by December of 2004 and that the final industry cross-walk for PMBs should be agreed by July 2005. In Section 2.3 it was discussed that the implementation of industry-wide ICD-10 coding will begin in January 2005 and may be compulsory from July 2005.

In time, as schemes fully adopt the ICD-10 coded PMBs, so the data obtained from the industry will reflect this definition of PMBs and an adjustment from raw to full cost of PMBs will become increasingly unnecessary. However an adjustment is still needed for the REF Contribution Table for 2005 and will be needed at least for 2006 (likely to be based on 2004 data) and 2007 (possibly based on 2005 data).

It is thus only for the 2006 raw data onwards that we might be reasonably certain of the definition of PMBs but this will need to be reviewed depending on the success of implementation of both the provision of ICD-10 codes and the ICD-10 definition of PMBs throughout the industry.

The lack of a study of the implications of the changes in the Council for Medical Schemes cross-walk published on 30 December 2004 means that there is no evidence before RETAP as to how to adjust the margins in the graph above. Accordingly RETAP recommends that no adjustment be made and that the same factors are used for the REF Contribution Table 2005 as were used in 2004 for the adjustment from raw to full price of PMBs. This issue must receive urgent attention in the first six months of 2005 in order to make an informed decision for the REF Contribution table for 2006.

## 6.4 Adjustment for Inflation

The International Review Panel suggested a new inflation index be developed to facilitate annual changes in the REF Contribution Table.

### **IRP Report Section 2.12.2: Adjustment for inflation & cost changes, page 38:**

For the success of the REF, the Panel deems necessary a stringent adjustment for inflation and cost changes. Adjustments for inflation and cost changes need to go hand in hand. This exercise needs to take into account prospective increases in utilization and changes in technology, particularly for the mix of goods and services included in the provision of the basic package (PMB). One problem with this is that none of the statistical indexes readily available from Statistics South Africa or research institutions reflects price development in the medical schemes sector adequately.

Medical schemes can assess the real costs of services only retrospectively, while the contribution table that REF needs to issue should be inflated forward. Hence, an index that allows forward-projection of these costs needs to be developed. This index should ideally be based on a weighted average of salary-related and price-related information. The index needs to be subject to rigorous evaluation, based on a set of stringent criteria including validity and reliability. This index can be developed on the basis of existing longitudinal data from parts of the industry, but it needs to be constantly refined and tested.

**Recommendation 29:** The Panel recommends that an index should be developed for determination of the contribution table. This index should take into account retrospective salary-related and price-related figures, which will be weighted and inflated forward. The Panel recommends that risk-specific costs included in the cells of the contribution table should be reviewed annually, at a fixed date, and shall then remain unchanged for the next year.

RETAP suggests that this index would have wider application in the medical scheme environment than only the updates to the REF Contribution Table. Considerable research work would need to be done and should be linked to the research underpinning the annual increases in the National Health Reference Price List. Thus RETAP recommends that this issue be considered by the research division of the Council for Medical Schemes.

The REF Contribution Tables for 2004 and 2005 are based on raw data from 2002. This needs to be adjusted for inflation to the year to which the REF Contribution Table will apply. The inflation estimates allow for both price inflation and a utilisation component because of factors other than changes in the demographic profile (such as new technology). Inflation is dealt with separately for the two major components, namely PMB-DTP and PMB-CDL, as these elements of the benefit package experience different cost pressures. This is particularly true of the year 2004 for medicine price changes and accordingly PMB-CDL has been split into a medicine component and a diagnosis and treatment component.

For the REF Contribution Table 2004 an estimate of the inflation increase from 2002 to 2003 for PMB-DTP was obtained from the Discovery and Medscheme data used in the REF Study. The adjustment from 2002 to 2003 for PMB-CDL was based on an estimate as it is very difficult to derive an exact number from the Medscheme data because of the many benefit changes that took place between the two years. The adjustments from 2003 onwards were based on estimates from actuaries at Medscheme and Discovery Health. An indicative estimate for the inflation for 2004-2005 was prepared but of course not needed for the REF Contribution table applicable in 2004.

Effectively it is necessary to remove the estimate of inflation factors for 2003-2004 used in the 2004 table and replace them with actual inflation for the 2003-2004 period and then add a revised estimate for 2004-2005. The inflation factors used for the 2005 table are based on an estimate from the pricing actuaries at Medscheme and Discovery Health. RETAP called for information on inflation from other stakeholders but did not receive any additional data.

The PMB-DTP inflation estimate for 2004-2005 is 7.0% which includes a price change of 6% and an additional 1% for new technology.

Inflation for the PMB-CDL diagnosis and treatment component is of necessity an estimate as these events are not fully linked to the CDL condition by ICD-10 codes in existing data. As ICD-10 coding becomes fully implemented, so it will be feasible to get more information directly from the raw data.

The 2003-2004 PMB-CDL diagnosis and treatment component was estimated to be 7.5% as much of the treatment is GP consultations and this had a much higher National Health Reference Price List (NHRPL) price increase than the 4.9% for other fees. The NHRPL for 2005 has very high increases granted for GP and specialist consults and thus an inflation factor of 20% has been estimated.

The change in medicine prices from 2003 to 2004 was estimated by Discovery and Medscheme using two different methodologies. The outcomes were similar. Discovery used a chain-linked medicine price index while Medscheme calculated the change in the cost per line authorised for the CDL diseases. Accordingly the inflation in PMB-CDL medicines for 2003-2004 is set at -10.05% while the expected increase for 2004-2005 is 0.0%. It should be pointed out though that the increase from 2004-2005 is very dependent on the outcome of the current legal battle between the Department of Health and the PSSA and other parties.

An initial attempt to use age-related proportions of medicines to treatment was found to cause a complex rearrangement of the most expensive disease in the REF Contribution Table. This is not advisable as this means that the price curve does not adjust smoothly and some beneficiaries with multiple diseases need to be placed in different cells in the grid when compared to 2004. Instead we have chosen to use a fixed proportion across all ages of 23.1% for the treatment component relative to total PMB-CDL expenditure.

The inflation adjustments used for the 2004 table and the recommended inflation adjustments for the 2005 table are given below.

**Table 4: Inflation Adjustment for REF Contribution Table 2004**  
(Source: FCTT Report)

Year	PMB-DTP	PMB-CDL
2002 – 2003	11.3%	10.0%
2003 – 2004	9.4%	10.5%
Indication for 2004 – 2005	9.3%	9.0%

**Table 5: Inflation Adjustment for REF Contribution Table 2005**

Year	PMB-DTP	PMB-CDL Medicines	PMB-CDL Diagnosis and Treatment
2002 – 2003	11.3%	10.0%	Combined with Medicines
2003 – 2004	12.35%	-10.05%	7.5%
2004 – 2005	7.0%	0.0%	20.0%

## 6.5 Adjustment for Efficiency

The REF seeks to equalise the “most reasonably achievable efficient cost” of PMBs. The FCTT Report recommended the use of the concept of levels of efficiency as developed from the Milliman USA model:

- **Loosely managed:** the standard level of managed care interventions in general use by SA schemes i.e. includes pre-authorisation, case management, drug-utilisation review but almost no risk-sharing with providers.
- **Moderately managed:** an intermediate level of managed care that involves some risk-sharing. Examples would be per diem or per case rates on hospitalisation. In SA there has been substantial movement towards risk-sharing for some primary care options but less movement in hospital contracting. Although some options may be approaching this level, it is unlikely that many whole schemes would have reached this level yet.
- **Well managed:** a full implementation of managed care with extensive risk-sharing with providers or complete risk-taking by providers as in staff model Health

Maintenance Organisations. The best examples in SA are the mine healthcare systems like Impala Platinum and the system that used to be operated by Igolide.

The efficiency target for the REF Contribution Table was recommended to be set at “Moderately Managed”. This is achievable by schemes in the medium-term whereas only some schemes will proceed down the route to staff model type structures.

From work by Milliman USA it was noted that there were similar shapes for the different efficiency levels in their market. It was recommended in the FCTT Report that once the shape of the curve was set in South Africa for the REF, that the adjustment for efficiency in the formula effectively sets only the level of the curve. Adjustment factors were derived from the Milliman USA models.

The FCTT Report recommended that the target be set at Moderately Managed and that a full adjustment of 80% across all age bands be taken into account immediately. The rationale is that the full price of PMBs contains substantial margins for the lack of clarity in definition.

The International Review Panel did not agree with the adjustment for efficiency, arguing as shown below.

**IRP Report Section 2.12.1: Adjustment for efficiency, page 37:**

On pp. 84-87 of the FCTT’s report, one can read a strong argument in favor of including ‘efficiency adjustments’ in the REF. The Panel agrees with the concerns raised by the FCTT that it is important to encourage efficiency that translates into lower costs. As stated by the Minister of Health, the ultimate objective of the reform is to pave the way for SHI, not just to clean up the present flaws in the industry. Cost will be the single most important factor in any move toward SHI.

The current fee-for-services environment creates cost distortions, which should be corrected by measures that support a shift towards a more efficient cost structure that stimulates competition, particularly between hospitals, such as reference pricing. The Panel has set eyes on a number of underlying problems, notably a well-documented fraud element. Costing, calculations of diagnosis-treatment pairs, and other adjustments need to be done on a rigorous and balanced basis. Also, benefits packages need to be reasonably standardized (see Sections 2.7.1 and 2.7.2) and competition between schemes needs to be based on prices. These are yet to be implemented. The panel is therefore skeptical that at the present juncture, self-regulated, market-driven competition alone will lower costs to the point which would make the contribution widely affordable, or substantially reduce the very large gap in

costs between the public and private sectors in South Africa. This skepticism is based on an impression that medical schemes have been operating in an environment akin to oligopolistic. The Panel is therefore of the view that although the REF can make a major contribution to enhanced price competition through risk equalization (see Sections 2.5, 2.6, 2.7 of the IRP Report), all cost control cannot be left to the industry alone (see Section 3.4 of the IRP Report).

However including a flat-rate efficiency adjustment into the calculations of the REF may not be the best approach. First, its calculation would be hard to justify. What cost levels would be regarded as achievable? Second, it would reduce the amounts to be equalized through the REF and might therefore allow some scope for cream-skimming based on risk profiles rather than justified cost differences. To that extent, the rewards for efficiency would be weakened. The inclusion of efficiency adjustments within the REF could be revisited when more data is available about the achievement of efficiency targets by other measures taken outside it.

**Recommendation 28:** The Panel endorses the need for cost control in any move to SHI. However it does not recommend the introduction of an across-the-board efficiency adjustment within the REF.

The arguments that the efficiency adjustment would weaken the rewards for efficiency is a powerful one and is endorsed by RETAP. However the removal of the efficiency adjustment of 80% without considering the other margins in the implicit price of the REF Contribution Table would also not be correct as this would give an immediate 25% increase in the benchmark industry price of PMBs. Providers and schemes who have little access to large reliable data sets look to the REF Contribution Table for guidance on the price of PMBs. An increase in that benchmark price would mean affordable products with consequently more low income people being unable to afford the minimum package of benefits.

There are two competing demands here: on the one hand the PMB package is perhaps only 45% of the expenditure on benefits by medical schemes each year and hence there is a legitimate drive to increase the amount equalised to ensure that the REF has an effect on competitive behaviour; on the other hand the REF Contribution Table is also seen as the benchmark industry price for the PMB package.

The FCTT Report had suggested:

A possible trade-off is to use a less aggressive adjustment for raw to full prices together with a lower efficiency adjustment. Although this would have the same effect on the REF Contribution Table (it) may prove to be more acceptable to the industry.

The current margins from raw to full price differ by age group but are effectively some 46% for PMB-DTPs and 64% for PMB-CDLs (see table in Section 6.6). After the 80% efficiency adjustment these become 17% and 32% respectively.

Despite several promises of research on the price of PMBs there has been no alternative PMB price suggested by any industry participants and anecdotal evidence from the two largest administrators suggests that the price has been at about the right levels. Inherent in the margins in Section 6.3 is a large margin for uncertainty to ensure that the PMB benchmark price is realistic in a fee-for-service environment. Uncertainty is certainly decreasing with the publication of the cross-walk and the implementation of ICD-10 coding but until the next full REF study, we have no clear evidence of how much that reduction should be. We therefore artificially maintain the margin until the next study. Recent legislation has moved more schemes towards contracting with Designated Service Providers for their PMB delivery and providers claim to have increased their risk-sharing contracting, hence the attainable price of PMBs may have been under some downward pressure. Compounding this is the question of the behaviour of providers and members as they become more aware of the PMBs and hence the price of the PMB package would be under upward pressure.

On reflection, we believe that the benchmark price for PMBs as contained in the REF Contribution Table with the efficiency adjustment is set at about the right level. The consequences of increasing the benchmark PMB price for 2005 by 25% are considered to be too severe and RETAP does not recommend simply removing the efficiency adjustment. RETAP recommends maintaining the efficiency adjustment at 80% as used for the REF Contribution Table for 2004 in determining the REF Contribution Table for 2005. The efficiency adjustment should be maintained while the margins from raw to full price of PMBs still remain at the 2001 PMB study levels. Both issues need to be flagged for revision for 2006 and particularly when data improves on PMBs for the study in 2007 for the 2008 Contribution Table.

RETAP recommends strongly that if the REF Authority wants to ensure that a larger amount be equalised, that they do not adjust the benchmark PMB price inherent in the REF Contribution Table but rather allow for the REF to pay a multiple of the published REF Contribution Table. For example, this would mean that the REF Contribution Table for 2005 is as published in this report but that the REF amounts are calculated as (say) 1.25 times those in the Contribution Table.

## 6.6 Summary of Factors Used in Adjustments

The table below contains the factors for all the adjustments described in the previous sections. There are several policy overlay adjustments and adjustments to specific diseases which are discussed in Section 7. However as these are to particular conditions there is no single factor that can be included in the table below.

**Table 6: Factors for Adjustments to Obtain the REF Contribution Table 2005**

	Factor to adjust demography of raw data	Factor to adjust from raw to full price PMB-DTPs	Factor to adjust from raw to full price PMB-CDLs	Factor to adjust to Target Population	Factor to adjust for inflation from 2002 to 2005	Factor to adjust for inflation from 2002 to 2005	Factor for Efficiency	Factor for policy overlay
Section of report	S 6.2	S 6.3	S 6.3	S 6.1	S 6.4	S 6.4	S 6.5	S 7
Apply to	Raw data	Raw price DTP	Raw price CDL	Industry age profile	Raw price DTP	Raw price CDL	Raw Price	Changes made to particular conditions. Not as a global amount.
Age Bands				Illustrative only. Not implemented for 2005.				
Under 1	1.0000	1.2757	2.4901	1.4904	1.3380	1.0887	0.8000	1.0000
1-4	1.0000	1.4785	2.2194	1.4689	1.3380	1.0887	0.8000	1.0000
5-9	1.0000	1.5464	1.9830	1.4790	1.3380	1.0887	0.8000	1.0000
10-14	1.0000	1.5411	1.8563	1.4795	1.3380	1.0887	0.8000	1.0000
15-19	1.0000	1.4326	1.7571	1.4680	1.3380	1.0887	0.8000	1.0000
20-24	1.0000	1.4036	1.7142	1.6746	1.3380	1.0887	0.8000	1.0000
25-29	1.0000	1.3425	1.7327	1.5619	1.3380	1.0887	0.8000	1.0000
30-34	1.0000	1.3908	1.7739	1.4190	1.3380	1.0887	0.8000	1.0000
35-39	1.0000	1.4687	1.7451	1.4168	1.3380	1.0887	0.8000	1.0000
40-44	1.0000	1.5319	1.7115	1.4185	1.3380	1.0887	0.8000	1.0000
45-49	1.0000	1.5313	1.6816	1.4058	1.3380	1.0887	0.8000	1.0000
50-54	1.0000	1.5690	1.6314	1.4936	1.3380	1.0887	0.8000	1.0000
55-59	1.0000	1.5502	1.5951	1.3771	1.3380	1.0887	0.8000	1.0000
60-64	1.0000	1.5238	1.5711	1.3263	1.3380	1.0887	0.8000	1.0000
65-69	1.0000	1.4960	1.5538	1.2361	1.3380	1.0887	0.8000	1.0000
70-74	1.0000	1.4925	1.5409	1.1979	1.3380	1.0887	0.8000	1.0000
75-79	1.0000	1.4130	1.5428	1.3695	1.3380	1.0887	0.8000	1.0000
80-84	1.0000	1.4425	1.5607	1.3155	1.3380	1.0887	0.8000	1.0000
85+	1.0000	1.4512	1.5750	1.2200	1.3380	1.0887	0.8000	1.0000
Total	1.0000	1.4618	1.6442	1.4602	1.3380	1.0887	0.8000	1.0000

## 7. Policy Interventions and Specific Disease Costs

The FCTT Report stated in Section 9.7:

The final adjustments to obtain the REF Contribution Table are policy overlays on the shape of the curve. This gives a final opportunity to alter the shape or height of the curve for specific policy reasons or health issues.

Two areas where this is likely and that have been discussed in principle are:

- The high incidence and cost for neo-natal admissions in the private sector.
- The unusually high caesarean rate for giving birth in South Africa in the private sector.

If no adjustment is made, then excessive utilisation or cost is effectively rewarded. In a fee-for-service environment there could be many such areas of intervention needed and the best way to remove these from healthcare costs is to move more aggressively towards risk-sharing arrangements with providers. As demonstrated in Section 9.6 (of the FCTT Report), this has the potential to bring down the total cost of PMBs substantially in the future.

Exact disease costs for specific diseases should also be implemented at this stage. A potential example is the cost of treating HIV/AIDS which could be further reduced as more generic drugs are manufactured locally.

It is recommended that these policy adjustments be done as the last stage of all the adjustments. While evidence needs to be gathered to support policy adjustments, the actual amount will always contain an element of judgement.

In this first version of the REF Contribution Table (for 2004), no policy adjustments have been implemented. It is strongly recommended that an adjustment be made for haemophilia and to the shape of the curve to take into account the high caesarean rate, in time for the actual implementation in 2005.

Subsequent data from Prof Alan Rothberg had suggested that it was not appropriate to make an adjustment for neo-natal admissions and an adjustment in this area was not included as a final recommendation in the FCTT Report.

## 7.1 Treatment of Haemophilia

The FCTT Report stated:

An issue that must be addressed in the final REF Contribution Table is the cost of treating haemophilia. The REF Contribution Table (for 2004) has an amount of just over R10,000 per month for treating this disease. In the pricing of the CDL by McLeod, Rothberg et al (2003), the following was noted about the treatment of haemophilia:

The mainstay of treatment of haemophilia is home therapy with replacement of the missing blood factor, an approach which has cut down on emergency admissions for problem bleeds, but out-patient treatment and hospital admission may well be required if/when haemorrhage occurs. In some cases patients develop antibodies to the plasma, in which case costs may escalate dramatically as highly specialised blood components may be required. The plasma is locally produced and obtained from one of the blood banks.

Costs of treatment are difficult to ascertain. Discovery Health Medical Scheme argues for a cost per case of R13 000 pm (R156 000 pa) and a price of R 0.52 pbpm (R6.24 pbpa). Medscheme shows an average case cost of closer to R2 500 per month (R30 000 p.a.) for all claimants against the 'Blood and related products' benefit.

The analysis of Medscheme data showed 220 people claiming from the 'Blood and related products' benefit. However it is almost certain that the majority of these are renal failure patients who are using the benefit to cover costs of erythropoietin for treatment of chronic anaemia. The expected number of haemophiliac cases at Medscheme is some 67 people (of the above 220). The average cost per case is expected to be much lower than the amount of R30 000 quoted above once the renal failure cases are removed.

In the absence of clinical and case mix detail it is difficult to speculate on reasons for the differences. As stated above, costs may be different if there are some haemophiliacs who have antibodies to the missing factor, and/or older patients may have joint disease related to past bleeding into joints

Prof Alan Rothberg approached Dr Johnny Mahlangu and the Medical Scientific Advisory Council of the Haemophilia Foundation for assistance in quantifying the costs of treating haemophilia. Prof Rothberg wrote:

It is currently administratively impossible within our systems to identify any haemophiliacs other than those who claim for disease-related hospitalisation or for products such as Novo7 that have so-called NAPPI codes. The result is that we only see what it costs for the most severe or complicated patients. The average patient who is maintained on locally-produced factors slips through our identification systems because we can't distinguish between members claiming whole blood, packed cells, FFP or factors – all are simply reflected as 'blood products.' We therefore need to get a list of all haemophiliacs for whom Medscheme was billed (at least for 2004), and I can then go into the databases to establish what their annual and monthly costs were for overall management of their disease (medicines, doctor visits, physio, X-rays, surgery etc).

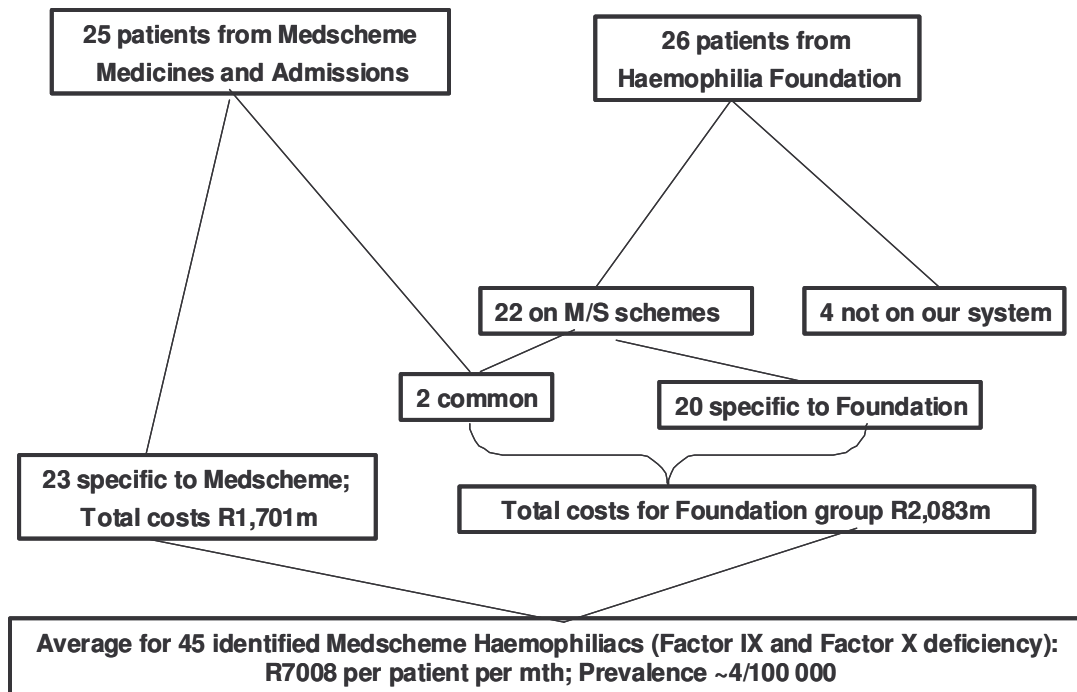
Furthermore, as you rightly pointed out, to that list we should add the cost of visits to your clinics, and referrals to other services for which we might not receive accounts. This exercise will enable other major players such as Discovery to repeat the exercise, and will go a long way towards giving RETAP a valid figure for the reimbursement for haemophilia.

As discussed, the first step would be for you to give me the full list of medical schemes that cover your patients. I will identify those that are administered by Medscheme and you would then ask members of those schemes for permission to disclose their names to me. Once I have the names and schemes I can have all their claims data drawn and can a) get a clear picture of the spectrum of the disease in our environment; and b) derive average costs for the total group. I assure you that no members would be identifiable in any dataset that leaves Medscheme, but more importantly, undertake to involve you at all stages and not forward any results without your prior approval.

The extraction and validation of data in respect of beneficiaries with haemophilia still proved to be a difficult exercise. It was found that final figures are not only complicated by the factors previously indicated (e.g. patients not identified unless they claim for specific products or have disease-specific events that we can match), but some of the patients are now at the higher age groups and so they have other disease and co-morbidities unrelated to the haemophilia.

The schematic representation below summarises the evidence found for the data and Prof Rothberg's findings and recommendations. A similar study at Discovery Health and other environments has not been completed.

Table 7: Study of Haemophilia Average Costs Medscheme 2005



On balance we recommend using the amount of R7,008 per patient per month for 2005. In line with decisions on other specifically costed diseases we recommend that an adjustment for efficiency of 90% be used, rather than 80% as with the rest of the PMBs. This produces an additional amount of R6,307.20 per beneficiary with haemophilia over and above the PMB-DTP shape for those with no chronic disease. The final table reflects the total amount which thus varies by age. A REF Count of 4 per 100,000 has been used in the costing of the Industry REF Community Rate.

## 7.2 Maternity Modifier Protocols and Costs

The FCTT made recommendations and provided evidence of the need to reduce the Caesarean section rate in the REF Contribution Table. The issue was not commented on by the International Review Panel.

### FCTT Report Section 6.2.3: Deliveries / Confinements, page 36

Team 2 supported the specific inclusion of deliveries in the REF formula as suggested early in the process by Team 3. This could be based on a standard protocol(s) and costed in a bottom-up approach as described above for the PMB-CDL. Note that the proportions for normal deliveries and caesarean sections should be altered to reflect desired practice rather than current industry practice in SA.

FCTT Report Section 7.4: Births and First-Year-of-Life, page 50

Average Cost per admission (2001)			
	High and Medium Clusters	Low Cluster	Total PMB Study
All Deliveries	9,848	9,077	9,276
Baby problems	24,082	26,561	25,824
Maternal problems relating to pregnancy	3,991	3,961	3,967
Maternal issues relating to delivery	4,442	4,315	4,338
<b>All Conditions in Female Reproductive System chapter and Pregnancy and Childbirth chapter</b>	<b>9,888</b>	<b>8,948</b>	<b>9,181</b>
Caesarian deliveries	11,635	11,072	11,227
Spontaneous and assisted deliveries	7,744	7,069	7,233
Caesarian rate	54.0%	49.9%	50.9%

Other studies by Prof Rothberg on Medscheme data suggest a Caesarean rate for the Low cluster of 50.2% and 51.7% for 2002 and 2003 respectively. The High and Medium clusters also each showed rates higher than 55.0% during 2003.

The College of Paediatricians<sup>1</sup> provided the following (edited for this report):

While national statistics for caesarean delivery are not particularly noteworthy, South Africa's private sector caesarean section rates continue to rank among the highest in the world at 50-60%. Efforts to lower the rate have been futile, with both patients and providers playing a role in the decision to deliver operatively.

Scottish researchers ...in a review of some 120 000 singleton births of which approximately 14% were delivered by caesarean section, ..... our private sector caesarean section rates are 4x higher than the Scottish figure ... Lancet 2003;362:1779-84; Lancet 2003;362:1774-5; JAMA 2002;287:2684-90; BMJ 2000;321:137-41

In the Annual summary of USA vital statistics 2002<sup>2</sup>, the following was given:

26.1% of births were delivered by cesarean section, up 7% since 2001 and 26% since 1996. The primary caesarean rate has risen 23% since 1996, whereas the rate of vaginal birth after a previous caesarean delivery has fallen 55%.

<sup>1</sup> College of Paediatricians of South Africa, website [www.collegemedsa.ac.za/Paeds](http://www.collegemedsa.ac.za/Paeds)

<sup>2</sup> Arias E, MacDorman MF, Strobino DM, Guyer B., Annual summary of USA vital statistics 2002 Division of Vital Statistics, National Center for Health Statistics, Centers for Disease Control and Prevention, Hyattsville, Maryland 20782, USA. [earias@cdc.gov](mailto:earias@cdc.gov)

The FCTT recommends that an adjustment be made to the raw PMB costs for deliveries in order to reflect the excessively high rate of deliveries by caesarean section and the resulting higher costs to schemes. The confounding issue in South Africa is the high rate of HIV infection as the clinical protocol for HIV+ births is to deliver by caesarean section. The adjustment to use requires further work.

### Section 7.3: Pregnancy and Delivery Protocols and Costs, page 101

Team 2 reiterated its view that this condition should be incorporated into the formula based on actual incidences, an international best practice percentage of abnormal deliveries (Caesars, etc.) times the most reasonably achievable efficient protocol at standard industry tariff.

A revised costing of maternity has been done from first principles using the WHO guidelines and NHRPL prices for 2004. An assumption is made that 10% of maternities need some additional tests (this covers items like a Downs Syndrome test for older women or women where there is a family history; cases where the maternity goes over the normal period of 36 weeks etc.). The table below shows the composition of the ante-natal costs and special costs.

**Table 8: Costing of Elements of the Maternity Modifier in 2004 Rand Terms**

<b>Ante-Natal Costs</b>	<b>Code</b>	<b>Average Cost per unit</b>	<b>Weighting</b>	<b>Average Cost</b>
<b>Visits</b>				<b>1,570.70</b>
	2601	142.70		
	2602	95.20	15	
<b>Pathology</b>				<b>199.40</b>
Haemoglobin	3762	12.00		
Blood grouping	3764	24.00		
Urine MC&S	3893	42.00		
VDRL	composite	19.50		
	3951	24.00	0.5	
	3949	15.00	0.5	
Rubella	composite	89.90		
	3946	93.60	0.5	
	3948	86.20	0.5	
<b>Ultrasound</b>	3615,3617	274.50	2	<b>549.00</b>
<b>Pharmacy</b>				<b>477.66</b>
Complenatal 90 tabs	715700	73.38	0	
Fillibon	726257	61.35	7	
Folic acid	810967	61.56	0	
Vornifene	778265	47.48	0	
Maxalon	740500	48.21	1	
<b>Total Ante-Natal Costs</b>				<b>2,796.76</b>

Special Costs	Code	Average Cost per unit	Weighting	Average Cost
Cardiotocography	2610			91.80
Amniocentesis				730.00
	2605	206.60		
	5026	214.10		
	4380	179.80		
	4381	66.60		
	4382	62.90		
Pelvimetry	3517			213.00
Fetal maturity (ultrasound)				549.00
	3615	274.50	1	
	3617	274.50	1	
Down Syndrome screen	4540			99.90
Foam test	4390			21.00
Glucose tolerance test	4061			143.60
Triple test				199.10
	4494	116.40	1	
	4522	82.70	1	
<b>Total Special costs - only valid in some cases</b>			<b>0.1</b>	<b>2,047.40</b>

Much discussion ensued at the meetings of RETAP on 20 October and 29 November 2004 about the appropriate weighting for normal vaginal deliveries (NVDs) and Caesarean sections (c/s). In principle, RETAP believes it is inappropriate to simply use actual data on maternity cost from the industry because of the very high c/s rate in the private sector. The guiding principles for the REF Contribution Table (see Appendix A) require that the “reasonably efficient achievable price” is used for the maternity benefit.

While it may be technically feasible to immediately change the weighting of NVDs to c/s to a level closer to international experience or to academically defined levels, this is unlikely to be achievable by schemes in the short term. RETAP notes the difficulties schemes have experienced in the past in attempting to reduce the c/s rate. In a forthcoming paper submitted to the SA Medical Journal, Rothberg and McLeod state:

Over the years, funders both locally and internationally have devised strategies to force c/s rates down, mostly without success. An extremely aggressive approach was cited by Bateman i.e. that of a U.K. healthcare fund which has apparently taken the decision to deny payment for all caesarean sections because of the excess of cases that were not medically necessary. At the other extreme, reference is made of a dominant local funder with a generous policy of universal cover for c/s, whether medically necessary or not. Other local experiences over the years include higher professional fees for vaginal delivery than for c/s, and even cash rebates for women who elected to deliver at home. In terms of the latter examples, one can clearly picture the awkward position of a funder or obstetrician if challenged in court to defend such perverse incentives in the event of problems that resulted in foetal death or damage. Other strategies such as routine second opinion prior to approval for c/s have also not been successful.

RETAP notes the recommendation by the Board of Healthcare Funders (BHF) to the Council for Medical Schemes that delivery by a midwife becomes the prescribed minimum benefit (PMB) for normal pregnancy and birth. RETAP also notes initiatives at the National Department of Health to consider appropriate practice with regard to c/s rates.

RETAP recommends using a weighting of 50% NVDs to 50% c/s for the REF Contribution Table 2005 and to reduce this proportion each year subject to annual review and further input from stakeholders. The current intention would be to reduce the c/s rate in the REF maternity modifier by 5% each year to perhaps a level of 25%. However this must be informed by further stakeholder input, particularly with regard to an appropriate level for c/s under the HIV/AIDS epidemic.

This recommendation on the maternity modifier is in no way a prescription about the c/s rate that should occur. Each medical scheme will determine its own policy on the c/s rate and will determine its own level of reimbursement for NVDs and c/s, as at present. The only impact is on the amount that the scheme receives from the REF for a delivery (as defined). Any costs above that level need to be funded by the members in the form of redirecting expenditure from other PMB conditions; in the form of direct contributions by all members to that medical scheme or in the form of co-payments for an elective c/s at the time of delivery.

The methodology of costing from first principles means that the adjustment from raw to full prices (Section 6.3) is no longer needed. An Initial attempt was made to respread the uncertainty margin over the remaining diseases but on further reflection this was found not to be appropriate. If perhaps half of the diseases were specifically costed we would expect to see a corresponding drop in the degree of uncertainty in the PMB price, not maintenance of the same uncertainty spread over the remaining diseases.

Discussions at the RETAP meeting of 1 February 2005 also lead to an agreement to include a smaller margin for efficiency (Section 6.5) in diseases that are specifically costed. In principle therefore:

- explicitly costed items will only attract a 10% efficiency adjustment i.e. a factor of 90% will be used.
- there will be no respreading of the adjustments from raw to full prices for items that were explicitly costed.

However the efficiency adjustment is excluded from the calculation of the maternity modifier as this is explicitly allowed for in the NVD : c/s split. Inflation is added for 2004-2005 using the PMB-DTP inflation rate of 7.0% (Section 6.4).

The table below shows the calculation of the recommended maternity modifier for the REF Contribution table for 2005 of R17,041.44 per delivery.

**Table 9: The Maternity Modifier for the REF Contribution Table 2005**

Average Costs per claim using 2004 NHRPL	Normal vaginal delivery	Caesarean section
Hospital cost	7,688.28	12,665.62
Total Major Medical costs	9,881.74	15,968.48
Ante-Natal costs	2,796.76	2,796.76
Total before Special costs	12,678.50	18,765.24
Special costs	2,047.40	2,047.40
Weighted impact of Special costs	204.74	204.74
<b>Total cost (Major medical + ante-natal + weighted Special costs)</b>	<b>12,883.24</b>	<b>18,969.98</b>
NVD : c/s Weighting	50%	50%
REF Maternity modifier in 2004	15,926.61	
<b>REF Maternity modifier for 2005</b>	<b>17,041.44</b>	

### 7.3 HIV/AIDS Treatment Costs

The in-hospital costs for PMB-DTPs are determined through the regression model and these were already reasonably well quantified for HIV/AIDS in the REF Study for the 2004 Contribution Table. However an area that requires attention is the out-hospital costs and the PMB-CDL component. The Medscheme Aid-for-AIDS unit deals with the treatment costs in a confidential manner and thus their data for the PMB-CDL component was not visible to the researchers in 2002. Data from Discovery Health alone was also not sufficient to give a fully credible result in the 2002 REF Study.

RETAP approached Aid-for-AIDS for assistance on the PMB-CDL component as this organisation is known to have the largest number of medical scheme beneficiaries supervised on anti-retroviral treatment. RETAP is grateful for their openness and willingness to provide the data below.

It was too complex in the time available to generate costs based on the stage of the disease a beneficiary is in when claiming. It was therefore agreed with Aid-for-AIDS that average costs based on the stage at ART commencement would be sufficient for the REF purposes. In this context, there are only two standard stages within which ART is authorised, stage 3 (CD4 200 - 349) and stage 4 (CD4 < 200).

**Table 10: Average Cost for Beneficiaries on Anti-Retroviral Therapy in 2003**  
**Source: Aid-for-AIDS**

Average Cost per beneficiary per month	ART Stage	
	CD4 200-349	CD4 < 200
Treatment Year	2003	2003
Patients	1,081	3,423
GP	R 61	R 58
Specialists	R 73	R 102
Pathology	R 158	R 182
Medicine	R 892	R 909
Hospital	R 362	R 700
Other	R 109	R 126
<b>Total Average Cost</b>	<b>R 1,655</b>	<b>R 2,078</b>

As data for 2004 was not fully run-off and was incomplete, Aid-for-AIDS have provided the average monthly cost for 2003. The data is for all patients on on-going ART registered after 1 January 2002. The total population sampled was 4,840 which includes Medscheme administered patients registered after 1 January 2002 on ART with post ART claims in 2003. The majority of Aid-for-AIDS patients on ART enter with CD4 < 200 (68%).

It is important to note that Aid-for-AIDS treatment costs are reported as per beneficiary per month paid amount, adjusted for active non-claiming months. All costs prior to the initiation of ART have been excluded in the table above. However the mix between the different stages will also be different over time which will affect the numbers quoted.

A second estimate of the cost of anti-retroviral therapy was prepared by AfA from first principles. The best estimate for the current direct cost of treating HIV where on-going ART is required is **R935** per patient per month. This cost, including both ART and non-ART costs, was derived as follows;

- The **cost of ART** is the actual annualised authorised costs for current AfA patients who are currently on on-going therapy. This sample comprises 12,749 patients, and provides the most likely 'real world' costs where patients will be on different lines of therapy, depending on how long they have been on treatment.
- Although some patients are formally authorised on generic products, this is not always the case. Many are still authorised on the branded drug.
- VAT (14%) and dispensing fee (26% or R26) have been included. A conservative assumption has been made, namely that all medicine is pharmacy dispensed. In reality, this is approximately 60%, with the remainder being dispensed primarily by dispensing doctors for a lower dispensing fee.

- We have not applied **MPL** to the costing.
- The primary **non-ART** costs are for monitoring (pathology tests, including CD4, viral load, ALT and FBC).
- Five GP consultations per year have been included.
- Also included is some inexpensive prophylactic treatment, e.g. INH and Cotrimoxazole.
- The non-ART costs are costed for a year and divided by 12 to obtain the average monthly non-ART cost.
- VAT has been included in all non-ART costs.
- Average costs for treating HIV where on-going ART is required will need to be reviewed at least on an annual basis.

At the RETAP meeting on 1 February 2005 it was agreed that this amount of R935 per patient per month should be used but with a 90% efficiency adjustment applied, in line with other conditions costed from first principles. The PMB-DTP amounts are added to this to obtain an amount that varies by age.

The envisaged definition for HIV/AIDS is to include only patients on anti-retroviral therapy in terms of the clinical protocols specified in the PMB Regulations. Subsequent to the RETAP meeting and following the draft publication of a document on entry criteria for the CDL conditions there has been extensive electronic correspondence on the entry criteria for HIV/AIDS. The essence of the concern is that the PMB definition and hence the entry criteria are based on the National Guidelines for anti-retroviral therapy. Although the National Guidelines were initially drawn up in line with the WHO criteria and in discussion with the SA HIV Clinicians Society, it seems that the WHO may have subsequently amended their guidelines. This has led to new draft guidelines by the SA HIV Clinicians Society and these standards have been implemented by some schemes.

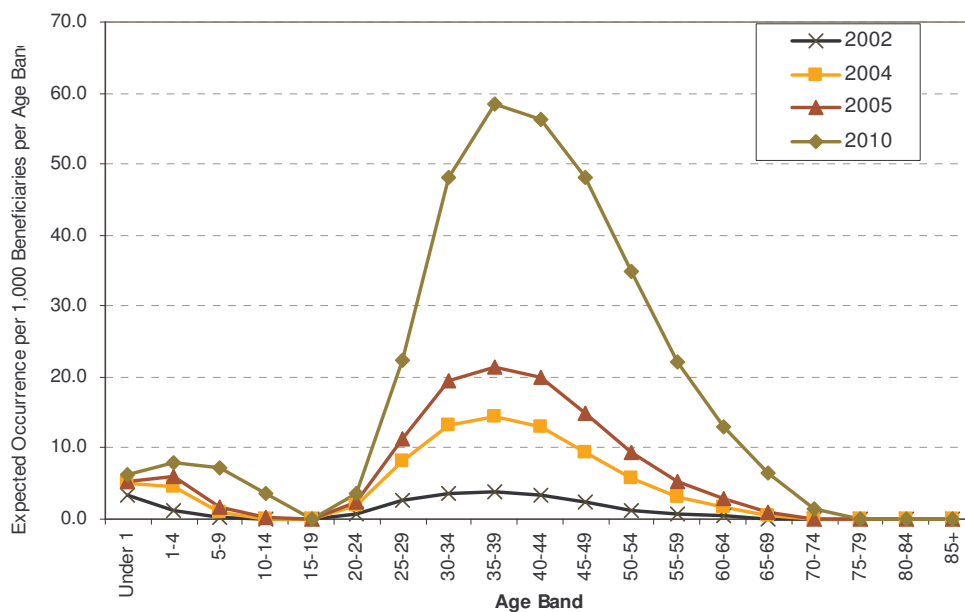
The definition of the starting point for anti-retroviral therapy affects the data extracted both for this section and the subsequent one dealing with the prevalence at various stages in the epidemic. There can be no adjustment of the REF Contribution Table for 2005 but RETAP recommends that the PMB definition be evaluated and entry criteria agreed so that appropriate data can be extracted before the next adjustment to the REF Contribution Table for 2006.

In the interim schemes are requested to provide evidence of the impact of the difference in the guidelines for evaluation by RETAP.

## 7.4 Progression of the HIV/AIDS Epidemic

An area that will require work each year is to update the count of people in the HIV/AIDS column with the numbers expected at that stage in the progression of the epidemic. Leigh Johnson of the Centre for Actuarial Research (CARE) was approached to provide estimates of the numbers of people on HAART each year in the private sector.

The estimates from CARE are estimates of the percentage of users of private health facility users on antiretroviral treatment in each year, for each age band. These estimates were derived by adapting the ASSA2002 lite model (version 040701) to allow for differential rates of HAART access in private and public health facility users. Note that the same survival assumptions have been used for both groups. The estimates by age band for the progression of the epidemic from 2002 to 2010 are given in Appendix G. The graph below illustrates these figures.



**Figure 7: Percentage of Users of Private Health Facility Users on Antiretroviral Treatment Each Year [Source: Centre for Actuarial Research]**

The ASSA model results were checked against historical estimates of numbers on treatment in the private health sector, and the model was found to be fairly consistent. It was noted that the REF Study in 2002 gives estimates substantially higher than the CARE 2002 estimates (4.56 per 1000 vs. 1.69 per 1000). The REF Study had looked at all people who had claims paid from the benefit from which ART is usually paid from. No adjustment was taken for the REF Contribution Table for 2004 and the comparative CARE number for 2004 was 5.9 per 1000.

CARe warns that there is a lot of uncertainty as to future trends in numbers on HAART, so the numbers beyond 2005 should be treated with caution. These projections are based on the fairly optimistic assumption that ultimately 90% of users of private health facility users will access HAART.

Discovery Health provided a model of the expected take-up of anti-retroviral therapy for patients at Stage 3 in their environment but these figures could not be split by age. Differences to the CARe estimates have been satisfactorily explained. The Board of Healthcare Funders has offered their data but it was not available at the time this report was completed.

RETAP recommends using the CARe estimate in respect of 2005 as the effective REF Grid Count for the HIV/AIDS column.

RETAP recommends that the Centre for Actuarial Research be approached annually for updates of the expected number of people on anti-retroviral therapy in the private sector. These projections will need to be carefully blended into the actual numbers of people being treated as disclosed by schemes in their REF Grid submissions.

## 8. The REF Contribution Table 2005

### 8.1 Design and Layout of the REF Contribution Table

RETAP recommends three amendments to the layout of the REF Contribution Table for 2005:

- The REF Contribution Table for 2005 has been set out so that it runs across a spreadsheet instead of fitting vertically on an A4 page. While the vertical layout was useful in a printed document, it is not the optimal way to set out the Table for calculation purposes. The REF Grids for the submission of data have also been amended to mirror the horizontal spreadsheet layout.
- The modifiers for multiple diseases and for maternity do not differ by age. Queries arose particularly on maternity as the age bands showed a maternity modifier for women who could clearly not be pregnant. The modifiers are now shown as a single figure, regardless of age.
- The REF Contribution Table for 2004 showed the monthly amount that would be payable for the maternity modifier. This flowed from the regression study and the implicit understanding was that a maternity event would lead to 12 months of payments. This proved to be too complex to administer as it would require maintaining a woman in the grid for 12 months after the date of the delivery. It was thus decided to make a technical adjustment to the maternity modifier so that it applies once per delivery/confinement and is not a monthly amount as is the rest of the table.

The REF Contribution Table for 2004 is shown as originally published in Appendix B and in the revised layout in Appendix D. The revised layout is used for the REF Contribution Table for 2005 which is given in Appendix E.

### 8.2 Industry REF Community Rate 2005

The Industry REF Community Rate could be determined by applying the REF Grid for the entire industry to the REF Contribution Table. The Industry REF Grid is not available at this point and the best estimate, using the Registered scheme age profile from 2002 (see Section 4) is that the Industry REF Community Rate for 2005 is R193.90 per beneficiary per month.

The Industry REF Community Rate for 2004 was R180.69 per beneficiary per month. The sources of the change in community rate are given in the table below.

**Table 11: Analysis of Changes in Industry REF Community Rate from 2004 to 2005**

		<b>Monthly amount</b>	<b>Percentage Increase</b>
<b>Industry REF Community Rate 2004</b>		<b>180.69</b>	
Technical adjustment	Use of single REF Grid to obtain rate and rounding to highest five cents	1.81	1.0%
Price Changes	Effect of inflation and revised costings for maternity and HIV/AIDS	5.35	3.0%
Conditions	New costing and prevalence of Haemophilia	0.26	0.1%
Prevalence Changes	Effect of increase in HIV/AIDS prevalence due to expected progression of the epidemic	5.79	3.2%
<b>Industry REF Community Rate 2005</b>		<b>193.90</b>	<b>7.3%</b>

The major part of the technical change arises from the methodology used to obtain the price in 2004. The REF formula is separately fitted to the PMB-DTP and PMB-CDL data and then combined to create the REF Contribution Table. The PMB-CDL part of the study gives slightly different counts and the main difference is due to the effect of confidentiality on HIV/AIDS cases. However many industry stakeholders called for a table of expected REF Grid Counts and such a table is more transparent for calculating the Industry REF Community Rate. It also brings the methodology in line with the time when industry counts will be known with certainty. A table for 2004 was thus developed using largely the PMB-DTP counts from the REF Study 2002 with some smoothing of the counts for maternity. It is made available together with the REF Contribution Table for 2005 in the form of a spreadsheet and is given in Appendix F.

Once the industry begins to submit data on the REF Grid counts then a consolidated industry count will become available and will be used as the basis for future Industry REF Community Rates.

A small part of the technical change is a decision to round the Industry REF Community Rate to the higher 5 cents. It is not appropriate to round to the nearer 5 cents as this could sometimes result in the REF budget for payouts exceeding (by a very small amount) the amounts due to be paid in. The use of 5 cents rather than 1 cent is for practical ease of use.

In future years it would be expected that changes in the industry REF Grid Counts would have a substantial effect on the change in the Industry REF Community Rate. Once the full SHI framework is implemented, then changes in the target population will tend to reduce the Industry REF Community Rate.

## 8.3 Application of the REF Contribution Table 2005

Each scheme applies the REF Contribution Table to its own universe of beneficiaries to determine the scheme's REF Community Rate. The difference between the Industry REF Community Rate and the scheme's REF Community Rate is then the amount per beneficiary notionally paid to or received from the REF in terms of risk equalisation:

- If the Industry REF Community Rate is higher than that of the scheme, the scheme notionally pays the difference to the Risk Equalisation Fund.
- If the Industry REF Community Rate is lower than that of the scheme, the scheme notionally receives the difference from the Risk Equalisation Fund.

Note that the explanation of payment flow has been determined in the absence of any flow to the REF in the form of a contribution subsidy or income-based contribution. This is the form in which the shadow year 2005 will operate. Once the full SHI framework is implemented with an income-based cross-subsidy, there should be a one-way flow from the REF to all medical schemes.

The effective use of the REF Contribution Table [Base 2002, Use 2005] at an individual beneficiary level is illustrated below:

- The REF Contribution Table gives a rate of R89.47 per month for a beneficiary aged between 40 and 45 who has no chronic conditions and has not been a maternity case. The Industry REF Community Rate is R193.90 which implies that a net payment of R104.43 per month is payable to the REF in respect of this beneficiary.
- The REF Contribution Table gives a rate of R1,013.53 per month for a beneficiary aged between 40 and 45 who has Type 1 diabetes, suffers from no other chronic condition and has not been a maternity case. The Industry REF Community Rate is R193.90 which implies that a net contribution of R819.63 per month is payable to the scheme in respect of this beneficiary.
- The REF Contribution Table gives a rate of R1,366.66 per month for a beneficiary aged between 40 and 45 who has asthma and Type 1 diabetes and has not been a maternity case. (The higher cost disease is used, i.e. that for Type 1 diabetes, plus the modifier for two diseases). The Industry REF Community Rate is R193.90 which implies that a net contribution of R1,172.76 per month is payable to the scheme in respect of this beneficiary.

In the Shadow Period of operation, each medical scheme will notionally pay to the REF the Industry REF Community Rate in respect of each beneficiary in the scheme.

Each scheme will collect data in a defined format which mirrors the REF Contribution Table. This data collection format is known as the REF Grid Count.

The REF Authority multiplies the cell from the REF Grid Count by the amount in the same cell of the REF Contribution Table. This is summed across all cells in the table to obtain the amount notionally payable to the scheme from the REF.

## 9. Summary of Recommendations to Council for Medical Schemes

### 9.1 Base Year, Package and Risk Factors for 2005

- (A) RETAP found all the guiding principles contained in the FCTT Report to still be valid and useful. The definitions and guiding principles have been edited only for consistency and no philosophical changes have been made. RETAP recommends that these remain the foundation for work in each future year on the REF Contribution Table. (Section 1.3 and Appendix A)
- (B) As the REF Contribution Table for 2005 is only indicative, it is recommended that a complete fitting of the formula is not necessary and would be needless expenditure. Rather, the base data for 2002 should be adapted to apply to 2005, giving the REF Contribution Table [Base 2002, Use 2005] for use in the shadow year 2005. (Section 1.4)
- (C) For the purposes of the REF Contribution table for 2005, the standard package remains the PMBs as currently legislated. The only change to the definition of Prescribed Minimum Benefits (PMBs) for 2005 is that antiretroviral treatment for HIV/AIDS according to public sector national protocols was included in PMBs with effect from 1 January 2005. This was anticipated and already formed part of the assessment of the price of PMBs for the REF Study in 2002. (Section 2.1)
- (D) A danger of the delay in including primary care in PMBs is that there is an incentive for doctors to 'up code'. It is recommended that the discussions to include a complete primary healthcare package in the legislated definition of PMBs be held as soon as possible in 2005. (Section 2.3)
- (E) RETAP recommends that the REF Grids be collected separately for males and females during the shadow year. The REF Grids should be collected in two forms:
- The **REF Grid Count** gives the cell to which each beneficiary in the scheme is allocated. The total number of beneficiaries sums to the number in the scheme. This table is used to obtain the amount payable by the REF to the scheme.
  - The **REF Grid Prevalence** gives the prevalence of each condition. For example a beneficiary with asthma and hypertension is counted in both columns. The total therefore exceeds the number of beneficiaries in the scheme by the extent of multiple CDL conditions. This table is used for research purposes and to enable comparison of prevalences to published medical literature. (Section 3.3.1)

- (F) RETAP recommends that a component of the study for the REF Contribution Table for 2006 must include an assessment of the impact of gender. As the first data on the effect of gender will only be available some months after the first submission in the REF shadow year, a preliminary decision can already be taken to include gender in the extraction of data from medical schemes in May 2005. There needs to be a specific study of the gender issue prior to the finalisation of the 2006 Contribution Table. (Section 3.3.1)
- (G) RETAP recommends that “delivery” be defined as the delivery of a single/multiple foetus either stillborn or alive following a pregnancy of at least 24 weeks duration. The delivery should be counted in the month that it occurs and the cost should be annualized. The delivery needs to be coded with CPT-4 codes and ICD-10 codes, taking into account the structure of the NHRPL. (Section 3.3.2)
- (H) The new-born child will be incorporated into the age structure by taking the age of the beneficiary as on 01 January of the year of evaluation. The naming of the category as “Under 1” allows for that calculation to produce either a zero or a negative result. (Section 3.3.2)
- (I) RETAP thus has confidence that the key reason for a delay in implementing the CDL risk factors has been dealt with by defining the entry criteria for the CDLs. In addition, the REF Contribution Table for 2005 is indicative and no money changes hands. Thus the CDL risk factors have been fully incorporated in the REF Contribution table for 2005. (Section 3.3.3)
- (J) In summary, the risk factors recommended for use in the REF Contribution Table [Base 2002, Use 2005] are as follows (Section 3):
- Age last birthday on 1 January, summarised into age bands Under 1, 1-4, 5-9, 10-14... 75-79, 80-84, 85+.;
  - The 25 PMB–CDL conditions. Where a beneficiary has more than one CDL conditions, the scheme may choose the most expensive of the conditions for the placement of the beneficiary in the REF Grid Count.
  - HIV/AIDS provided the beneficiary is receiving or has received anti-retroviral therapy according to the PMB definition;
  - A modifier for maternity, delivery of a single/multiple foetus either stillborn or alive following a pregnancy of at least 24 weeks duration;
  - A modifier for the number of multiple CDL conditions. Allowance is made for 2, 3, and 4+ simultaneous CDL conditions.

## 9.2 Adjustments for REF Contribution Table 2005

- (K) Note that although the Registrar now holds age data from 2003, the data has not been cleaned and tested as was done extensively on the 2002 data. As there was very little difference in the number of beneficiaries in 2002 and 2003 and given that the 2005 Table is for the shadow year, it has not been felt necessary to redo the exercise of obtaining a cleaned industry age profile. (Section 4)
- (L) As at January 2005 the full SHI framework which incorporates income-based cross-subsidies has not yet been approved by Cabinet, although it is policy of the Department of Health. Accordingly it seems unlikely that there will be any substantial change in the membership of medical schemes during 2005 or even 2006. RETAP thus recommends the use of the age profile from the Registrar's data in 2002 as the target population age profile for the REF Contribution Table for 2005. (Section 4) No adjustment is therefore recommended for the target population. (Section 6.1) There needs to be no further consideration of an adjustment for the demographic profile. (Section 6.2)
- (M) The lack of a study of the implications of the changes in the Council for Medical Schemes cross-walk published on 30 December 2004 means that there is no evidence before RETAP as to how to adjust the margins from raw to full price of PMBs. Accordingly RETAP recommends that no adjustment be made and that the same factors are used for the REF Contribution Table 2005 as were used in 2004 for the adjustment from raw to full price of PMBs. Section 6.3)
- (N) RETAP recommends the inflation adjustments in the table below for the REF Contribution Table [Base 2002, Use 2005]. (Section 6.4)

<b>Year</b>	<b>PMB-DTP</b>	<b>PMB-CDL Medicines</b>	<b>PMB-CDL Diagnosis and Treatment</b>
2002 – 2003	11.3%	10.0%	Combined with Medicines
2003 – 2004	12.35%	-10.05%	7.5%
2004 – 2005	7.0%	0.0%	20.0%

- (O) On reflection, we believe that the benchmark price for PMBs as contained in the REF Contribution Table with the efficiency adjustment is set at about the right level. The consequences of increasing the benchmark PMB price for 2005 by 25% are considered to be too severe and RETAP does not recommend simply removing the efficiency adjustment. RETAP recommends maintaining the efficiency adjustment at 80% as used for the REF Contribution Table for 2004 in determining the REF Contribution Table for 2005. The efficiency adjustment should be maintained while the margins from raw to full price of PMBs still remain at the 2001 PMB study levels. (Section 6.5)
- (P) RETAP recommends strongly that if the REF Authority wants to ensure that a larger amount be equalised, that they do not adjust the benchmark PMB price inherent in the REF Contribution Table but rather allow for the REF to pay a multiple of the published REF Contribution Table. For example, this would mean that the REF Contribution Table for 2005 is as published in this report but that the REF amounts are calculated as (say) 1.25 times those in the Contribution Table. (Section 6.5)
- (Q) For Haemophilia: On balance we recommend using the amount of R7,008 per patient per month for 2005. In line with decisions on other specifically costed diseases we recommend that an adjustment for efficiency of 90% be used, rather than 80% as with the rest of the PMBs. This produces an additional amount of R6,307.20 per beneficiary with haemophilia over and above the PMB-DTP shape for those with no chronic disease. The final table reflects the total amount which thus varies by age. A REF Count of 4 per 100,000 has been used in the costing of the Industry REF Community Rate. (Section 7.1)
- (R) RETAP recommends in principle (Section 7.2) that:
- explicitly costed items will only attract a 10% efficiency adjustment i.e. a factor of 90% will be used.
  - there will be no respreading of the adjustments from raw to full prices for items that were explicitly costed.
- (S) A revised costing of maternity has been done from first principles using the WHO guidelines and NHRPL prices for 2004. An assumption is made that 10% of maternities need some additional tests. RETAP recommends using a weighting of 50% NVDs to 50% c/s for the REF Contribution Table 2005 and to reduce this proportion each year subject to annual review and further input from stakeholders. The methodology of costing from first principles means that the adjustment from raw to full prices is not needed. The efficiency adjustment is excluded from the calculation of the maternity modifier as this is now explicitly allowed for in the NVD : c/s split. Inflation is added for 2004-2005 using the PMB-DTP inflation rate of 7.0%. This produces a recommended maternity modifier for the REF Contribution table for 2005 of R17,041.44 per delivery. (Section 7.2)

(T) The cost of treatment for anti-retroviral therapy for HIV/AIDS was done from first principles by Aid-for-AIDS and checked against other data from that organisation. RETAP recommends that an amount of R935 per patient per month should be used with a 90% efficiency adjustment applied, in line with other conditions costed from first principles. The PMB-DTP amounts are added to this to obtain an amount that varies by age. (Section 7.3)

(U) The envisaged definition for HIV/AIDS is to include only patients on anti-retroviral therapy in terms of the clinical protocols specified in the PMB Regulations. There is concern that the PMB definition and hence the entry criteria derived from the National Guidelines are now out of step with amended guidelines from the WHO and the SA HIV Clinicians Society. The definition of the starting point for anti-retroviral therapy affects the data extracted to establish average cost as well as prevalence at various stages in the epidemic. There can be no adjustment of the REF Contribution Table for 2005 but RETAP recommends that the PMB definition be evaluated and entry criteria agreed so that appropriate data can be extracted before the next adjustment to the REF Contribution Table for 2006. (Section 7.3)

(V) Each year it will be necessary to update the count of people in the HIV/AIDS column with the numbers expected at that stage in the progression of the epidemic. The Centre for Actuarial Research (CARE) provided estimates of the numbers of people on HAART each year in the private sector. The estimates from CARE are estimates of the percentage of users of private health facility users on antiretroviral treatment in each year, for each age band. These estimates were derived by adapting the ASSA2002 lite model (version 040701) to allow for differential rates of HAART access in private and public health facility users. The same survival assumptions have been used for both groups. RETAP recommends using the CARE estimate in respect of 2005 as the effective REF Grid Count for the HIV/AIDS column. (Section 7.4)

(W) RETAP recommends three amendments to the layout of the REF Contribution Table for 2005 (Section 8.1):

- The REF Contribution Table for 2005 has been set out so that it runs across a spreadsheet instead of fitting vertically on an A4 page. This facilitates calculation and the REF Grids for the submission of data have also been amended to mirror the horizontal spreadsheet layout.
- The modifiers for multiple diseases and for maternity do not differ by age. The modifiers are now shown as a single figure, regardless of age.
- There is a technical adjustment to the maternity modifier so that it applies once per delivery/confinement and is not a monthly amount as is the rest of the table.

- (X) The Industry REF Community Rate could be determined by applying the REF Grid for the entire industry to the REF Contribution Table. The Industry REF Grid is not available at this point and the best estimate, using the Registered scheme age profile from 2002 (see Section 4) is that the Industry REF Community Rate for 2005 is R180.69 per beneficiary per month. The Industry REF Community Rate for 2004 was R180.69 per beneficiary per month. (Section 8.2)
- (Y) RETAP recommends to the Council for Medical Schemes the adoption of the REF Contribution Table [Base 2002, Use 2005] as set out in Appendix E. The Industry REF Community Rate for 2005 is given as R193.90 per beneficiary per month, compared to R180.69 pbpm in 2004. The sources of the change in community rate are given in the table below (Section 8.2).

		Monthly amount	Percentage Increase
<b>Industry REF Community Rate 2004</b>		<b>180.69</b>	
Technical adjustment	Use of single REF Grid to obtain rate and rounding to highest five cents	1.81	1.0%
Price Changes	Effect of inflation and revised costings for maternity and HIV/AIDS	5.35	3.0%
Conditions	New costing and prevalence of Haemophilia	0.26	0.1%
Prevalence Changes	Effect of increase in HIV/AIDS prevalence due to expected progression of the epidemic	5.79	3.2%
<b>Industry REF Community Rate 2005</b>		<b>193.90</b>	<b>7.3%</b>

### 9.3 Recommendations for REF Contribution Table for 2006 and Beyond

- (Z) With the shadow period continuing until 2007 it would not be essential to revise the shape of the REF Contribution Table for 2006 although a full REF Study could be commissioned. Note that as 2004 saw rapid and large gyrations in medicine prices there would need to be a separate component commissioned to determine a reasonable expectation for medicine prices that might apply in 2006 as the raw data will not be reliable enough to use as the base. (Section 1.6)
- (AA) Medical schemes calculate and finalise their contributions for the following year during August and September in order to lodge rule amendments in October with the Registrar. It is critical for the live operation of the REF that schemes have access to the

REF Contribution Table for the next year while doing their pricing. Accordingly the REF Contribution Table can be published no later than 31 July if the REF is to be live from the following January. It is not feasible to make the REF live from the middle of a calendar year. (Section 1.6)

(BB) The Council for Medical Schemes needs to indicate by 30 May 2006 whether the REF will be live from January 2007. In that case, a complete fitting of the formula should be undertaken on 2005 data and publication of the REF Contribution Table [Base 2005, Use 2007] must occur by 31 July 2006. The full study will need to use data from 2005 that has been substantially run-off, thus probably extracted at the end of May 2006 for treatment dates in the period 1 January to 31 December 2005. (Section 1.6)

(CC) The REF is a key stakeholder in the discussions on the inclusion of primary healthcare. The timing of the change to the PMB package must be co-ordinated so that the REF Contribution table can be published by 31 July of each year. This implies that the definition and pricing of the primary healthcare package must be completed by 31 May of the year prior to the implementation of that package in the REF formula. RETAP strongly recommends co-ordination of the process by the Council for Medical Schemes to ensure that the REF deadlines are taken into account. (Section 2.1)

(DD) In time, as schemes fully adopt the ICD-10 coded PMBs, so the data obtained from the industry will reflect this definition of PMBs and an adjustment from raw to full cost of PMBs will become increasingly unnecessary. However an adjustment is still needed for the REF Contribution Table for 2005 and will be needed at least for 2006 (likely to be based on 2004 data) and 2007 (possibly based on 2005 data). It is only from the 2006 raw data onwards that we might be reasonably certain of the definition of PMBs in the raw data but this is dependent on the provision of ICD-10 codes. (Section 2.2)

(EE) It is imperative that a proper study be conducted of the impact of the new finalised Council for Medical Schemes cross-walk on the earlier studies on the price of PMBs and the REF Contribution Table for 2004. RETAP strongly recommends that the Council for Medical Schemes produce an assessment of the financial impact of the newly published PMB ICD-10 cross-walk, compared to the PMB 2001 Study and the REF 2002 Study. (Section 2.2)

(FF) The REF Authority will need to consider whether there is sufficient evidence to split at least the NON (i.e. no CDL) column into male and female columns in time for the REF Contribution Table for 2006. If evidence of gender-specific differences in average cost become apparent in the data then consideration will need to be given to the degree of

impact and whether any or all of the CDL diseases should also be split into male and female columns.

- (GG) RETAP recommends that in the review for the REF Contribution Table for 2006 that the issue of whether to fully include the CDL risk factors again be considered. The greatest danger is now seen to be the potential up-coding of beneficiaries from no CDL condition to having a CDL condition. Any potential problems in this regard should begin to become apparent in the reporting during the shadow period. (Section 3.3.3)
- (HH) RETAP recommends reviewing each set of submissions in the shadow period and comparing the REF Grid Counts submitted against those implicit in the construction of the REF Contribution Table. (Section 3.3.3)
- (II) RETAP recommends that the actual data gathered from the schemes using the REF Grids during the shadow year should be used as the base age profile for the work on the 2006 table and subsequent tables. (Section 4)
- (JJ) RETAP recommends that once clarity is obtained on the implementation of the Social Health Insurance framework incorporating an income-based cross-subsidy, the issue of the appropriate target population should be revisited. It is recommended that the age profile for the target population at that time be determined from the SHI Model developed by the Department of Health that incorporates the Census 2001 data. (Section 4)
- (KK) When an adjustment needs to be made to a new target population in future, RETAP recommends taking the actual age profile from the submitted REF Grid Counts and adjusting by a factor derived from Census 2001 data. The factor is the ratio of increase from the medical scheme population to the new target population chosen. (Section 6.1)
- (LL) RETAP recommends that the IRP recommendations on methodology be considered when the next full study of the risk factors and the shape of the curve is undertaken. (Section 5.1)
- (MM) RETAP recommends that the IRP recommendations on data be considered when the next full study of the risk factors and the shape of the curve is undertaken. Note that the recommendation on age bands will already have been implemented in the shadow year 2005. (Section 5.2)
- (NN) RETAP recommends that once the full SHI framework is imminent and there is expected to be a substantial influx of new beneficiaries that the question of an adjustment

for the demographic profile of the target population compared to the REF Study population is revisited. (Section 6.2)

(OO) The lack of a study of the implications of the changes in the Council for Medical Schemes cross-walk published on 30 December 2004 means that there is no evidence before RETAP as to how to adjust the margins from raw to full price of PMBs. This issue must receive urgent attention in the first six months of 2005 in order to make an informed decision for the REF Contribution table for 2006.(Section 6.3)

(PP) RETAP suggests that this index would have wider application in the medical scheme environment than only the updates to the REF Contribution Table. Considerable research work would need to be done and should be linked to the research underpinning the annual increases in the National Health Reference Price List. Thus RETAP recommends that this issue be considered by the research division of the Council for Medical Schemes. (Section 6.4)

(QQ) The efficiency adjustment and the margins from raw to full price of PMBs need to be flagged for revision for 2006 and particularly when data improves on PMBs for the study in 2007 for the 2008 Contribution Table. (Section 6.5)

(RR) For the calculation from first principles of the Maternity modifier RETAP recommended using a weighting of 50% NVDs to 50% c/s for the REF Contribution Table 2005. It was recommended to reduce this proportion each year subject to annual review and further input from stakeholders. Initial expectations, before representation from stakeholders, are to reduce the amount by 5% to a weighting of 55% NVDs to 45% c/s for the REF Contribution Table 2006. (Section 7.2)

(SS) RETAP recommends that the Centre for Actuarial Research be approached annually for updates of the expected number of people on anti-retroviral therapy in the private sector. These projections will need to be carefully blended into the actual numbers of people being treated as disclosed by schemes in their REF Grid submissions. (Section 7.4)

## Bibliography

Grobler, P., Theron, H. and Cooper M. (2003). **Technical Report: Risk Equalisation in South African Medical Schemes**. Technical report prepared by Medscheme Integrated Care and submitted to the Risk Equalisation Fund Task Group of the Department of Health, June 2003. Available on <http://homepage.medicalschemes.com/REF/> See also Appendix N and Appendix O of the Formula Consultative Task Team report.

International Review Panel, **Report to the South African Risk Equalization Fund Task Group**, 16 February 2004. Available on <http://homepage.medicalschemes.com/REF/>

McLeod H, Matisonn S, Fourie I, Grobler P, Mynhardt S, Marx G, **The Determination of the Formula for the Risk Equalisation Fund in South Africa**, Draft Report, prepared for the Risk Equalisation Fund Task Group, January 2004. Available on <http://homepage.medicalschemes.com/REF/>.

# Appendix A: Definitions and Guiding Principles

This section was originally contained in the FCTT Report and has been updated by RETAP to ensure consistency with terminology adopted in the FCTT Report and the IRP Report.

## A1. Objectives

The Department of Health discussion document was used as the main source for understanding policy in this regard.<sup>3</sup>

The primary objective of the Risk Equalisation Fund in South Africa is to protect the environment of open enrolment and community rating. The purpose is to prevent competition between medical schemes from occurring on the basis of risk selection. In doing so it will encourage competition between medical schemes on the basis of cost and quality of healthcare delivery.

Thus the FCTT developed the understanding that the REF will attempt to equalise the predictable financial consequences that are introduced to the medical schemes environment in view of the requirements of community rating, open enrolment and Prescribed Minimum Benefits (PMBs).

## A2. Definition of Risk

In the context of the Risk Equalisation Fund, **risk** is defined as:

The expected and predictable significant deviation from the theoretical national community-rated price for groups of beneficiaries with a measurable set of risk factors.

The national community-rated price is the reasonably efficient achievable price for the common set of benefits which is the PMBs. The concept of “reasonably efficient achievable price” is explored more fully in the Guiding Principles below.

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<sup>3</sup> Department of Health (2002), Inquiry Into the Various Social Security Aspects of the South African Health System. Policy Options for the Future., 14 May 2002.

### A3. Definition of Residual Risk

In the context of the Risk Equalisation Fund, **residual risk** is defined as:

The difference between actual cost of delivery of the common set of benefits in a particular scheme and the risk equalised contributions received by the scheme.

Residual risk occurs as a result of risk factors not incorporated in the Risk Equalisation Fund, benefits and claims in excess of core package and performance of the scheme that varies from the reasonably efficient achievable price.

Hence the REF does not alleviate:

- any risks associated with benefits in excess of the PMB package;
- any demographic profile risks other than reflected in the risk factors taken into account in the REF Contribution Table. This is principally the risk reflected by risk factors taken into account in the conceivably most sophisticated individual medical scheme's risk rated internal contribution table that are not in the REF Contribution Table;
- risks associated with (relative) cost and other efficiencies of health care delivery to the individual scheme's members;
- risks of actual claims experience differing from expected costs of claims according to the scheme's risk table, e.g. due to cost inflation, over-utilisation, over-servicing, fraud, poorer health outcomes, unexpected epidemics, small risk pools, pricing error, etc. and
- other risks such as administration expenses overrun, poor investment performance and losses on reinsurance.

It is important for stakeholders to understand the limits of what the Risk Equalisation Fund is designed to achieve. The REF deals primarily with age risk and health risk. Trustees of medical schemes and the Registrar's Office should not reduce their vigilance with regard to the solvency requirements for medical schemes as these deal with risks that are not equalised by the REF.

## A4. Guiding Principles for the REF Formula

<b>Guiding Principles for the Risk Equalisation Fund Formula</b>	
<b>Characteristic</b>	<b>Explanation</b>
Equalisation of risk profiles	The REF formula should eliminate incentives for medical schemes to select preferred risks by ensuring that each medical scheme bears a risk profile equivalent to the risk profile of all medical scheme beneficiaries.
Non-equalisation of actual costs	The REF formula should seek to equalise payments based on the most reasonably achievable efficient cost for an agreed set of benefits. Schemes will then compete on the basis of the actual cost of delivery of those benefits.
Impartial	The REF formula should be perceived to be impartial between medical schemes and should not result in any medical scheme having to share profits that it has made as a result of its own efficiencies and cost controls.
Cost Containment	The REF formula should contain positive incentives for medical schemes to maximize efficiency and to control the costs of healthcare delivery.
Proportion of risk to be equalised	The benchmark for risk to be equalised will be the Prescribed Minimum Benefit package, delivered in a cost-effective manner which may include the use of specific network settings.
Non-equalisation of benefit levels	The REF formula should not compensate medical schemes for more expensive benefit options which are driven by trustee or member choices.
Non-equalisation of variability in experience	The REF formula does not seek to equalise the variability in actual experience of medical schemes. This will be a function of the size of the medical scheme and the active management of beneficiaries and claims.
Practicality	The REF formula should be understandable and practical to operate.
Dynamic	The REF formula needs to be dynamic to deal with such changing influences on health care costs such as inflation, medical technology, managed care developments and changing regulation.

On-going validity	The REF formula needs to be tested rigorously at least every three years but should be reviewed each year for at least the first three years of operation.
Encourage competition and new entrants	The REF formula should encourage competition between medical schemes and not prohibit the introduction of new medical schemes.
Maintain cross subsidies	The REF formula should not discourage young and healthy beneficiaries from joining or remaining in medical schemes before the introduction of mandatory membership.
Equity	The REF should be consistent and support the National Department of Health's equity goals

## A5. Guiding Principles for the Choice of Risk Factors

<b>Guiding Principles for the Choice of Risk Factors in the Formula</b>	
<b>Characteristic</b>	<b>Explanation</b>
Validity	The risk factors should predict the need for medical care and define a system of adjustment in which the cells are relatively homogenous.
Reliability	The risk factors should be measured without measurement errors.
Availability	The risk factors should preferably be data items that are already collected by medical schemes or that are readily available in the industry.
Feasibility	Obtaining the risk factors for all beneficiaries should be administratively feasible without undue expenditure of time or money.
Measurable and Auditable	The risk factors need to be measurable, objective, repeatable and auditable.
Invulnerability to Manipulation	The risk factors should not be subject to manipulation by medical schemes, managed care organisations, administrators, providers, intermediaries or the beneficiaries.

No Perverse Incentives	The risk factors should not provide incentives for inefficiency or low quality care.
Legislative Consistency	The use of the risk factors needs to be consistent with provisions in the Medical Schemes Act, the National Health Act and the Constitution of South Africa.
Privacy	The risk factors should not conflict with the right to privacy of the beneficiary and healthcare provider.

## A6. Guiding Principles for the Operation of the REF

<b>Guiding Principles for the Operation of the Risk Equalisation Fund</b>	
<b>Characteristic</b>	<b>Explanation</b>
Transparent	The REF should be clear and transparent in its operation to the medical schemes industry.
Predictability	The REF should produce results that are as predictable as possible, in order to allow medical schemes to price their options appropriately.
Prospective vs. Retrospective Calculation	Given the highly competitive nature of open medical schemes in South Africa and the need to publish contribution tables in advance, the REF needs to adopt a predominantly prospective calculation approach.
Prospective vs. Retrospective Payments	The timing of payments needs to take into account the potential impact on scheme cashflow and solvency, as well as the most appropriate timing for the collection of data to be used in calculating the payments.
Frequency of Calculation of Payments	The frequency of payments to and from the REF should be at least on a quarterly basis, in line with the quarterly statutory returns to the Registrar of Medical Schemes. However under the full SHI framework with an income-based cross-subsidy, schemes will need to receive amounts monthly from the REF.
Sustainability	The REF should be sustainable in its own right and not require additional funding in the long run and should remove instability in the market.

Efficiency of Operation of the REF	The cost of the operation of the REF and the mechanism for guaranteeing solvency of the REF needs to be implemented at the lowest practical level.
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## **A7. Trade-offs and Compromises**

The principles described are wide ranging and the team has attempted to produce an exhaustive list. With a large list there are many principles which may involve the taking of decisions that support one principle but violate another. The implementation of these principles involves making final choices and in making these choices the principles above provide a useful tool to understand trade-offs that are made.

However to obtain the best use of the principles and to help resolve debates around final decisions where possible trade-offs should be quantified and the consequences of trade-offs identified and debated.

## Appendix B: Published REF Contribution Table for 2004

Diseases/Conditions	
Code	Explanation
NON	No CDL disease
ADS	Addison's Disease
AST	Asthma
BCE	Bronchiectasis
BMD	Bipolar Mood Disorder
CHF	Cardiac failure
CMY	Cardiomyopathy
COP	Chronic Obs. Pulmonary Disease
CRF	Chronic Renal Disease
CSD	Crohn's Disease
DBI	Diabetes Insipidus
DM1	Diabetes Mellitus 1
DM2	Diabetes Mellitus 2
DYS	Dysrhythmias
EPL	Epilepsy
GLC	Glaucoma
HAE	Haemophilia
HYL	Hyperlipidaemia
HYP	Hypertension
IBD	Ulcerative Colitis
IHD	Coronary Artery Disease
MSS	Multiple Sclerosis
PAR	Parkinson's Disease
RHA	Rheumatoid Arthritis
SCZ	Schizophrenia
SLE	Systemic LE
TDH	Hypothyroidism
HIV	HIV/AIDS
MAT	Caesarean / NVD in period
CC2	Two simultaneous conditions
CC3	Three simultaneous conditions
CC4	Four or more simultaneous conditions

REF Contribution Table [Base 2002, Use 2004]							Industry REF Community Rate				R180.69	
Per Beneficiary Per Month												
Age Bands	No CDL Diseases	CDL Conditions										
	NON	ADS	AST	BCE	BMD	CHF	CMY	COP	CRF	CSD	DBI	
Column	1	2	3	4	5	6	7	8	9	10	11	
Under 1	430.89	680.13	835.38	673.79	1,384.40	1,586.74	1,801.75	1,254.42	5,781.48	2,066.09	1,683.40	
1-4	43.51	292.75	448.00	286.41	997.02	1,199.36	1,414.37	867.04	5,394.10	1,678.71	1,296.02	
5-9	17.54	266.78	422.03	260.44	971.05	1,173.39	1,388.40	841.07	5,368.13	1,652.74	1,270.05	
10-14	16.86	266.10	421.35	259.76	970.37	1,172.71	1,387.72	840.39	5,367.45	1,652.06	1,269.37	
15-19	23.06	272.30	427.55	265.96	976.57	1,178.91	1,393.92	846.59	5,373.65	1,658.26	1,275.57	
20-24	38.66	287.90	443.15	281.56	992.17	1,194.51	1,409.52	862.19	5,389.25	1,673.86	1,291.17	
25-29	54.39	303.63	458.88	297.29	1,007.90	1,210.24	1,425.25	877.92	5,404.98	1,689.59	1,306.90	
30-34	62.57	311.81	467.06	305.47	1,016.08	1,218.42	1,433.43	886.10	5,413.16	1,697.77	1,315.08	
35-39	74.19	323.43	478.68	317.09	1,027.70	1,230.04	1,445.05	897.72	5,424.78	1,709.39	1,326.70	
40-44	81.42	330.66	485.91	324.32	1,034.93	1,237.27	1,452.28	904.95	5,432.01	1,716.62	1,333.93	
45-49	96.33	345.57	500.82	339.23	1,049.84	1,252.18	1,467.19	919.86	5,446.92	1,731.53	1,348.84	
50-54	123.42	372.66	527.91	366.32	1,076.93	1,279.27	1,494.28	946.95	5,474.01	1,758.62	1,375.93	
55-59	156.82	406.06	561.31	399.72	1,110.33	1,312.67	1,527.68	980.35	5,507.41	1,792.02	1,409.33	
60-64	244.29	493.53	648.78	487.19	1,197.80	1,400.14	1,615.15	1,067.82	5,594.88	1,879.49	1,496.80	
65-69	309.80	559.04	714.29	552.70	1,263.31	1,465.65	1,680.66	1,133.33	5,660.39	1,945.00	1,562.31	
70-74	388.61	637.85	793.10	631.51	1,342.12	1,544.46	1,759.47	1,212.14	5,739.20	2,023.81	1,641.12	
75-79	410.84	660.08	815.33	653.74	1,364.35	1,566.69	1,781.70	1,234.37	5,761.43	2,046.04	1,663.35	
80-84	416.25	665.49	820.74	659.15	1,369.76	1,572.10	1,787.11	1,239.78	5,766.84	2,051.45	1,668.76	
85+	356.98	606.22	761.47	599.88	1,310.49	1,512.83	1,727.84	1,180.51	5,707.57	1,992.18	1,609.49	
Age Bands	CDL Conditions (continued)											
	DM1	DM2	DYS	EPL	GLC	HAE	HYL	HYP	IBD	IHD	MSS	
Column	12	13	14	15	16	17	18	19	20	21	22	
Under 1	1,412.08	670.09	893.21	1,263.61	635.98	10,449.66	790.34	713.00	1,371.60	1,291.84	1,669.19	
1-4	1,024.70	282.71	505.83	876.23	248.60	10,062.28	402.96	325.62	984.22	904.46	1,281.81	
5-9	998.73	256.74	479.86	850.26	222.63	10,036.31	376.99	299.65	958.25	878.49	1,255.84	
10-14	998.05	256.06	479.18	849.58	221.95	10,035.63	376.31	298.97	957.57	877.81	1,255.16	
15-19	1,004.25	262.26	485.38	855.78	228.15	10,041.83	382.51	305.17	963.77	884.01	1,261.36	
20-24	1,019.85	277.86	500.98	871.38	243.75	10,057.43	398.11	320.77	979.37	899.61	1,276.96	
25-29	1,035.58	293.59	516.71	887.11	259.48	10,073.16	413.84	336.50	995.10	915.34	1,292.69	
30-34	1,043.76	301.77	524.89	895.29	267.66	10,081.34	422.02	344.68	1,003.28	923.52	1,300.87	
35-39	1,055.38	313.39	536.51	906.91	279.28	10,092.96	433.64	356.30	1,014.90	935.14	1,312.49	
40-44	1,062.61	320.62	543.74	914.14	286.51	10,100.19	440.87	363.53	1,022.13	942.37	1,319.72	
45-49	1,077.52	335.53	558.65	929.05	301.42	10,115.10	455.78	378.44	1,037.04	957.28	1,334.63	
50-54	1,104.61	362.62	585.74	956.14	328.51	10,142.19	482.87	405.53	1,064.13	984.37	1,361.72	
55-59	1,138.01	396.02	619.14	989.54	361.91	10,175.59	516.27	438.93	1,097.53	1,017.77	1,395.12	
60-64	1,225.48	483.49	706.61	1,077.01	449.38	10,263.06	603.74	526.40	1,185.00	1,105.24	1,482.59	
65-69	1,290.99	549.00	772.12	1,142.52	514.89	10,328.57	669.25	591.91	1,250.51	1,170.75	1,548.10	
70-74	1,369.80	627.81	850.93	1,221.33	593.70	10,407.38	748.06	670.72	1,329.32	1,249.56	1,626.91	
75-79	1,392.03	650.04	873.16	1,243.56	615.93	10,429.61	770.29	692.95	1,351.55	1,271.79	1,649.14	
80-84	1,397.44	655.45	878.57	1,248.97	621.34	10,435.02	775.70	698.36	1,356.96	1,277.20	1,654.55	
85+	1,338.17	596.18	819.30	1,189.70	562.07	10,375.75	716.43	639.09	1,297.69	1,217.93	1,595.28	
Age Bands	CDL Conditions (continued)						HIV/AIDS	Additions to amounts from Columns 1 to 28				
	PAR	RHA	SCZ	SLE	TDH	HIV		Maternity	Number of chronic conditions			
Column	23	24	25	26	27	28	MAT	CC2	CC3	CC4		
Under 1	1,256.53	737.50	1,190.20	682.26	480.71	1,902.51	1,398.84	367.30	800.97	1,496.09		
1-4	869.15	350.12	802.82	294.88	93.33	1,515.13	1,398.84	367.30	800.97	1,496.09		
5-9	843.18	324.15	776.85	268.91	67.36	1,489.16	1,398.84	367.30	800.97	1,496.09		
10-14	842.50	323.47	776.17	268.23	66.68	1,488.48	1,398.84	367.30	800.97	1,496.09		
15-19	848.70	329.67	782.37	274.43	72.88	1,494.68	1,398.84	367.30	800.97	1,496.09		
20-24	864.30	345.27	797.97	290.03	88.48	1,510.28	1,398.84	367.30	800.97	1,496.09		
25-29	880.03	361.00	813.70	305.76	104.21	1,526.01	1,398.84	367.30	800.97	1,496.09		
30-34	888.21	369.18	821.88	313.94	112.39	1,534.19	1,398.84	367.30	800.97	1,496.09		
35-39	899.83	380.80	833.50	325.56	124.01	1,545.81	1,398.84	367.30	800.97	1,496.09		
40-44	907.06	388.03	840.73	332.79	131.24	1,553.04	1,398.84	367.30	800.97	1,496.09		
45-49	921.97	402.94	855.64	347.70	146.15	1,567.95	1,398.84	367.30	800.97	1,496.09		
50-54	949.06	430.03	882.73	374.79	173.24	1,595.04	1,398.84	367.30	800.97	1,496.09		
55-59	982.46	463.43	916.13	408.19	206.64	1,628.44	1,398.84	367.30	800.97	1,496.09		
60-64	1,069.93	550.90	1,003.60	495.66	294.11	1,715.91	1,398.84	367.30	800.97	1,496.09		
65-69	1,135.44	616.41	1,069.11	561.17	359.62	1,781.42	1,398.84	367.30	800.97	1,496.09		
70-74	1,214.25	695.22	1,147.92	639.98	438.43	1,860.23	1,398.84	367.30	800.97	1,496.09		
75-79	1,236.48	717.45	1,170.15	662.21	460.66	1,882.46	1,398.84	367.30	800.97	1,496.09		
80-84	1,241.89	722.86	1,175.56	667.62	466.07	1,887.87	1,398.84	367.30	800.97	1,496.09		
85+	1,182.62	663.59	1,116.29	608.35	406.80	1,828.60	1,398.84	367.30	800.97	1,496.09		

# Appendix C: Risk Equalisation Model Steps

This document was prepared by Pieter Grobler and Helena Theron for the other members of Team 3 in July 2003. It was published as Appendix Q of the FCTT Report, January 2004.

## 1. Introduction

This document summarises the steps that should be followed to test the significance of certain risk factors for the risk equalisation formula as well as to test the impact of a formula on a specific scheme. If problems are experienced with the regression part, it will add value to the work of the Team to just do part 4.

## 2. Data preparation

### 2.1 Beneficiary File

- The data must be manipulated so that there is one record per unique beneficiary.
- Only members with exposure of at least one month in 2002 are stored in the final dataset.
- Use this set to create dichotomous demographic variables (age bands, gender, ethnicity etc.). A dichotomous variable has a value of 1 if it is true for a beneficiary, else it has a value of 0. For any given beneficiary, there will thus be 18 age variables with a value of 0 and one age variable with a value of 1.
- For each member, calculate the total 2002 exposure months, ranging from 1 month to 12 months.

### 2.2 Chronic disease data

- Extract data from the system that captures the chronic medicine authorizations in order to obtain a list of chronic diseases per member.
- These diseases include the CDL diseases as well as non-CDL diseases.
- Manipulate the dataset so that there is one record per beneficiary with a yes/no indicator per disease.
- Merge the disease data with the beneficiary data per beneficiary.
- The resultant set contains data of members with and without chronic diseases. For each disease a dichotomous variable is created where 1 indicates the presence of a disease and 0 the absence of a disease.

### 2.3 Hospital data

- Create a dataset that summarizes per hospital event, all costs related to that event.
- Link hospital pre-authorization data to this dataset to obtain ICD and or CPT codes applicable to the hospital event.
- Use the list of PMB ICD codes [or another defined crosswalk] to identify PMB hospital admissions.
- Calculate the total cost of PMB admissions per beneficiary and annualize through dividing by exposure months and multiplying by 12.
- Identify hospital events with obstetric deliveries (CPTs can be used).
- Merge this dataset with the dataset as created in 2.2. The resultant dataset will now have an annualized 2002 PMB cost per beneficiary added for beneficiaries where this cost is applicable. Beneficiaries with no PMB cost should have a value of 0.

- Create a dichotomous obstetric delivery indicator where 1 indicates that there was a hospital event where a delivery CPT was identified and 0 indicates that an obstetric delivery was not applicable.

## 2.4 NAPPI data

- Isolate all NAPPIs claimed by the beneficiaries with at least one CDL condition.
- Subset NAPPIs further by only using the Primary NAPPIs as defined in The Costing of the Proposed Chronic Disease List Benefits in South African Medical Schemes in 2001 (McLeod H et al. 2001).
- Determine compliance per disease. If a primary NAPPI that is applicable to a certain disease was claimed, but the beneficiary was not identified as having that disease then the NAPPI is excluded. Also, if a member is identified with a certain disease (through the authorization of chronic medicine) but never claimed a primary NAPPI for that disease, then it is assumed that the beneficiary does not really have the disease.
- Summarize the costs of all disease compliant primary NAPPIs per beneficiary. Use the tariff or "Blue Book amount since the paid amount may be influenced by limits and co-payments. This total 2002 CDL cost is annualized through dividing by exposure months and multiplying by 12.
- Merge the total CDL cost per beneficiary with the dataset as created in step 2.3.

## 3. Regression methodology

- Obtain statistical software that has the function of stepwise regression modelling.
- The regression methodology of the PMB and CDL models is similar. In the case of the PMB model (dataset resultant from 2.3) the dependent variable is the annualized PMB cost and in the case of the CDL model (dataset resultant from 2.4) it is the annualized CDL cost. Different sets of independent variables can be used to obtain different types of models that can be compared.
- Divide the dataset that is now in the format of one record per beneficiary randomly into two sets.
- Apply a stepwise regression on the first dataset with the significance level for entry and staying in the model equal to 0.01 (these probabilities can be changed depending on the significance levels required).
- Apply a stepwise regression on the second dataset using only independent variables significant from the model done on the first dataset.
- Apply regression on the total dataset using only independent variables significant from the model done on the second dataset. Specify that each record (beneficiary) be weighted by the 2002 exposure months of that beneficiary.
- Record the goodness of fit measures so that models can be compared.
- Determine the expected cost per beneficiary by applying the final regression model to the dataset. Observed to expected cost ratios per risk group can now be determined to further compare various models.
- Scale the regression parameters to obtain final model weights.

## 4. Testing the subsidy formula [directly]

- Summarise the data per age band and disease combination (taking deliveries as just another disease), with the beneficiary months as the variable.
- Calculate the expected cost per age band and disease combination, based on the formula (see formulae on pages 36 and 37 of the report by Grobler, Theron & Cooper (2003)).
- Calculate the subsidy per age band and disease combination from the following:
  - (i) expected cost per age band and disease combination (calculated above) divided by (/) the average number of beneficiaries for the period under review for that combination minus (this gives an expected cost per beneficiary per annum)

- (ii) the average cost per beneficiary per annum of the benefit package being equalised (one can refer to the PMB costing reports by McLeod et al. for an indication).
  - (iii) Take the tax subsidy as 0 at this stage, as this is just a constant that is added. (This is a simplified version of the formula on page 38 of the Grobler et al report).
- **The subsidy per age band and disease combination for the year is then: [(i) – (ii)] \* the average number of beneficiaries for the period under review.**
  - **Sum this over all age band and disease combinations to get the subsidy for the scheme for the year, assuming a tax subsidy of R0.**

Note that Part 4 has been simplified for general industry use by the decision to publish the formula in the form of a contribution table.

# Appendix D: REF Contribution Table for 2004 using revised layout

Obtainable in electronic form as a spreadsheet from [www.refsa.co.za](http://www.refsa.co.za)

REF Contribution Table [Base 2002, Use 2004]		Industry REF Community Rate										R180.69					
Per Beneficiary Per Month																	
Age Bands	No CDL Diseases NON	Chronic Disease List (CDL) Conditions															
		ADS	AST	BCE	BMD	CHF	CMY	COP	CRF	CSD	DBI	DM1	DM2	DYS	EPL	GLC	
Column	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Under 1	430.89	680.13	835.38	673.79	1,384.40	1,586.74	1,801.75	1,254.42	5,781.48	2,066.09	1,683.40	1,412.08	670.09	893.21	1,263.61	635.98	
1-4	43.51	292.75	448.00	286.41	997.02	1,199.36	1,414.37	867.04	5,394.10	1,678.71	1,296.02	1,024.70	282.71	505.83	876.23	248.60	
5-9	17.54	266.78	422.03	260.44	971.05	1,173.39	1,388.40	841.07	5,368.13	1,652.74	1,270.05	998.73	256.74	479.86	850.26	222.63	
10-14	16.85	266.10	421.35	259.76	970.37	1,172.71	1,387.72	840.39	5,367.45	1,652.06	1,269.37	998.05	256.06	479.18	849.58	221.95	
15-19	23.06	272.30	427.55	265.96	976.57	1,178.91	1,393.92	846.59	5,373.65	1,658.26	1,275.57	1,004.25	262.26	485.38	855.78	228.15	
20-24	38.66	287.90	443.15	281.56	992.17	1,194.51	1,409.52	862.19	5,389.25	1,673.86	1,291.17	1,019.85	277.86	500.98	871.38	243.75	
25-29	54.39	303.63	458.88	297.29	1,007.90	1,210.24	1,425.25	877.92	5,404.98	1,689.59	1,306.90	1,035.58	293.59	516.71	887.11	259.48	
30-34	62.57	311.81	467.06	305.47	1,016.08	1,218.42	1,433.43	886.10	5,413.16	1,697.77	1,315.08	1,043.76	301.77	524.89	895.29	267.66	
35-39	74.19	323.43	478.68	317.09	1,027.70	1,230.04	1,445.05	897.72	5,424.78	1,709.39	1,326.70	1,055.38	313.39	536.51	906.91	279.28	
40-44	81.42	330.66	485.91	324.32	1,034.93	1,237.27	1,452.28	904.95	5,432.01	1,716.62	1,333.93	1,062.61	320.62	543.74	914.14	286.51	
45-49	96.33	345.57	500.82	339.23	1,049.84	1,252.18	1,467.19	919.86	5,446.92	1,731.53	1,348.84	1,077.52	335.53	558.65	929.05	301.42	
50-54	123.42	372.66	527.91	366.32	1,076.93	1,279.27	1,494.28	946.95	5,474.01	1,758.62	1,375.93	1,104.61	362.62	585.74	956.14	328.51	
55-59	156.82	406.06	561.31	399.72	1,110.33	1,312.67	1,527.68	980.35	5,507.41	1,792.02	1,409.33	1,138.01	396.02	619.14	989.54	361.91	
60-64	244.29	493.53	648.78	487.19	1,197.80	1,400.14	1,615.15	1,067.82	5,594.88	1,879.49	1,496.80	1,225.48	483.49	706.61	1,077.01	449.38	
65-69	309.80	559.04	714.29	552.70	1,263.31	1,465.65	1,680.66	1,133.33	5,660.39	1,945.00	1,562.31	1,290.99	549.00	772.12	1,142.52	514.89	
70-74	388.61	637.85	793.10	631.51	1,342.12	1,544.46	1,759.47	1,212.14	5,739.20	2,023.81	1,641.12	1,369.80	627.81	850.93	1,221.33	593.70	
75-79	410.84	660.08	815.33	653.74	1,364.35	1,566.89	1,781.70	1,234.37	5,761.43	2,046.04	1,663.35	1,392.03	650.04	873.16	1,243.56	615.93	
80-84	416.25	665.49	820.74	659.15	1,369.76	1,572.10	1,787.11	1,239.78	5,766.84	2,051.45	1,668.76	1,397.44	655.45	878.57	1,248.97	621.34	
85+	356.98	606.22	761.47	599.88	1,310.49	1,512.83	1,727.84	1,180.51	5,707.57	1,992.18	1,609.49	1,338.17	596.18	819.30	1,189.70	562.07	

Code	Explanation
NON	No CDL disease
ADS	Addison's Disease
AST	Asthma
BCE	Bronchiectasis
BMD	Bipolar Mood Disorder
CHF	Cardiac failure
CMY	Cardiomyopathy
COP	Chronic Obs. Pulmonary Disease
CRF	Chronic Renal Disease
CSD	Crohn's Disease
DBI	Diabetes Insipidus
DM1	Diabetes Mellitus 1
DM2	Diabetes Mellitus 2
DYS	Dysrhythmias
EPL	Epilepsy
GLC	Glaucoma
HAE	Haemophilia
HYL	Hyperlipidaemia
HYP	Hypertension
IBD	Ulcerative Colitis
IHD	Coronary Artery Disease
MSS	Multiple Sclerosis
PAR	Parkinson's Disease
RHA	Rheumatoid Arthritis
SCZ	Schizophrenia
SLE	Systemic LE
TDH	Hypothyroidism
HIV	HIV/AIDS
MAT	Caesarean / NVD in period
CC2	Two simultaneous conditions
CC3	Three simultaneous conditions
CC4	Four or more simultaneous conditions

Table as published in the Formula Consultative Task Team report, January 2004. Revised layout but amounts unchanged.

HAE	HYL	HYP	IBD	IHD	MSS	PAR	RHA	SCZ	SLE	TDH	HIV/AIDS
17	18	19	20	21	22	23	24	25	26	27	28
10,449.66	790.34	713.00	1,371.60	1,291.84	1,669.19	1,256.53	737.50	1,190.20	682.26	480.71	1,902.51
10,062.28	402.96	325.62	984.22	904.46	1,281.81	869.15	350.12	802.82	294.88	93.33	1,515.13
10,036.31	376.99	299.65	958.25	878.49	1,255.84	843.18	324.15	776.85	268.91	67.36	1,489.16
10,035.63	376.31	298.97	957.57	877.81	1,255.16	842.50	323.47	776.17	268.23	66.68	1,488.48
10,041.83	382.51	305.17	963.77	884.01	1,261.36	848.70	329.67	782.37	274.43	72.88	1,494.68
10,057.43	398.11	320.77	979.37	899.61	1,276.96	864.30	345.27	797.97	290.03	88.48	1,510.28
10,073.16	413.84	336.50	995.10	915.34	1,292.69	880.03	361.00	813.70	305.76	104.21	1,526.01
10,081.34	422.02	344.68	1,003.28	923.52	1,300.87	888.21	369.18	821.88	313.94	112.39	1,534.19
10,092.96	433.64	356.30	1,014.90	935.14	1,312.49	899.83	380.80	833.50	325.56	124.01	1,545.81
10,100.19	440.87	363.53	1,022.13	942.37	1,319.72	907.06	388.03	840.73	332.79	131.24	1,553.04
10,115.10	455.78	378.44	1,037.04	957.28	1,334.63	921.97	402.94	855.64	347.70	146.15	1,567.95
10,142.19	482.87	405.53	1,064.13	984.37	1,361.72	949.06	430.03	882.73	374.79	173.24	1,595.04
10,175.59	516.27	438.93	1,097.53	1,017.77	1,395.12	982.46	463.43	916.13	408.19	206.64	1,628.44
10,263.06	603.74	526.40	1,185.00	1,105.24	1,482.59	1,069.93	550.90	1,003.60	495.66	294.11	1,715.91
10,328.57	669.25	591.91	1,250.51	1,170.75	1,548.10	1,135.44	616.41	1,069.11	561.17	359.62	1,781.42
10,407.38	748.06	670.72	1,329.32	1,249.56	1,626.91	1,214.25	695.22	1,147.92	639.98	438.43	1,860.23
10,429.61	770.29	692.95	1,351.55	1,271.79	1,649.14	1,236.48	717.45	1,170.15	662.21	460.66	1,882.46
10,435.02	775.70	698.36	1,356.96	1,277.20	1,654.55	1,241.89	722.86	1,175.56	667.62	466.07	1,887.87
10,375.75	716.43	639.09	1,297.69	1,217.93	1,595.28	1,182.62	663.59	1,116.29	608.35	406.80	1,828.60

Modifier for number of chronic conditions			
Number of Conditions	2	3	4 or more
	CC2	CC3	CC4
All Ages	367.30	800.97	1,496.09
Amount is per beneficiary per month.			
Add to amounts obtained from Columns 1 to 28			

Modifier for Maternity	
All Ages	MAT 16,786.08
Amount is per delivery (as defined).	
Use only once per delivery, not monthly.	



# Appendix F: REF Grid Counts implicit in REF Contribution Table 2005

Assumed REF Grid Count in REF Contribution Table 2005		Industry Assumptions																		
Total number of beneficiary months in the cell for the period, per 1,000 exposed beneficiaries in the scheme		Base Period	HIV/AIDS 2005, other diseases 2002																	
Explanation: This REF Grid Count used in the calculation of the REF Contribution Table is not prevalence of the disease. It is arrived at by taking the most expensive disease in any multiple disease combination. It can NOT be compared directly to prevalences in published medical literature.																				
Occurrence per 1,000 Beneficiaries in each age band in the Scheme		Chronic Disease List (CDL) Conditions																		
Age Bands	No CDL Diseases NON	ADS	AST	BCE	BMD	CHF	CMY	COP	CRF	CSD	DBI	DM1	DM2	DYS	EPL	GLC				
Column	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16				
Under 1	985.0	0.0	8.7	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.7	0.0				
1-4	969.1	0.0	22.4	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.3	0.0	0.0	2.1	0.0				
5-9	969.8	0.0	25.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	2.8	0.0				
10-14	976.3	0.0	18.6	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.1	3.5	0.0				
15-19	980.9	0.0	11.5	0.0	0.3	0.0	0.0	0.0	0.0	0.1	0.0	1.1	0.1	0.0	3.9	0.1				
20-24	977.1	0.0	8.7	0.0	0.9	0.1	0.0	0.0	0.1	0.2	0.0	1.6	0.3	0.2	3.9	0.1				
25-29	958.7	0.0	9.8	0.0	1.3	0.1	0.1	0.1	0.1	0.3	0.1	1.7	0.7	0.2	3.3	0.1				
30-34	935.3	0.0	11.1	0.0	1.2	0.2	0.1	0.1	0.2	0.3	0.1	2.2	1.7	0.3	3.4	0.2				
35-39	903.8	0.0	12.4	0.0	1.3	0.5	0.3	0.3	0.3	0.3	0.1	3.2	3.8	0.5	3.5	0.3				
40-44	858.9	0.0	13.6	0.0	1.3	1.0	0.3	0.6	0.3	0.3	0.2	5.1	6.5	1.0	4.0	0.5				
45-49	800.5	0.1	15.5	0.0	1.2	2.1	0.5	1.3	0.4	0.4	0.1	6.8	8.5	1.9	4.6	0.9				
50-54	732.7	0.0	17.3	0.0	1.4	3.4	0.7	3.1	0.7	0.4	0.2	9.2	8.8	3.2	5.0	1.6				
55-59	671.3	0.1	19.4	0.1	1.5	6.0	1.0	5.6	0.6	0.5	0.2	10.4	8.1	4.8	5.3	2.5				
60-64	605.9	0.1	21.9	0.0	1.5	9.8	1.6	9.2	1.1	0.6	0.3	11.4	8.2	7.9	5.9	3.4				
65-69	532.4	0.1	24.9	0.1	1.9	16.9	1.8	15.4	1.6	0.5	0.2	12.2	7.8	13.5	7.6	4.6				
70-74	487.6	0.2	22.2	0.1	1.6	26.4	2.3	20.3	1.7	0.5	0.3	10.4	6.6	18.4	7.9	6.0				
75-79	463.6	0.1	21.3	0.1	1.0	40.9	2.5	23.9	2.0	0.6	0.0	8.4	6.5	25.5	8.5	8.0				
80-84	468.8	0.1	17.3	0.1	1.5	56.5	4.2	21.3	0.9	0.4	0.0	6.3	6.0	27.9	7.3	8.8				
85+	522.1	0.0	13.8	0.0	0.7	79.7	3.1	10.3	0.6	0.0	0.0	3.7	6.8	30.1	6.6	10.6				
<b>Total by Condition*</b>	<b>876.2</b>	<b>0.0</b>	<b>15.9</b>	<b>0.0</b>	<b>0.9</b>	<b>3.0</b>	<b>0.4</b>	<b>2.0</b>	<b>0.3</b>	<b>0.2</b>	<b>0.1</b>	<b>3.7</b>	<b>3.2</b>	<b>2.1</b>	<b>4.0</b>	<b>0.9</b>				

\* using target population age profile used to determine Industry REF Community Rate

Diseases/Conditions	
Code	Explanation
NON	No CDL disease
ADS	Addison's Disease
AST	Asthma
BCE	Bronchiectasis
BMD	Bipolar Mood Disorder
CHF	Cardiac failure
CMY	Cardiomyopathy
COP	Chronic Obs. Pulmonary Disease
CRF	Chronic Renal Disease
CSD	Crohn's Disease
DBI	Diabetes Insipidus
DM1	Diabetes Mellitus 1
DM2	Diabetes Mellitus 2
DYS	Dysrhythmias
EPL	Epilepsy
GLC	Glaucoma
HAE	Haemophilia
HYL	Hyperlipidaemia
HYP	Hypertension
IBD	Ulcerative Colitis
IHD	Coronary Artery Disease
MSS	Multiple Sclerosis
PAR	Parkinson's Disease
RHA	Rheumatoid Arthritis
SCZ	Schizophrenia
SLE	Systemic LE
TDH	Hypothyroidism
HIV	HIV/AIDS
MAT	Caesarean / NVD in period
CC2	Two simultaneous conditions
CC3	Three simultaneous conditions
CC4	Four or more simultaneous conditions

																	Multiple CDL Conditions			Maternity (b)	Industry Age Profile per 1,000 beneficiaries
																	2	3	4 or more		
HAE	HYL	HYP	IBD	IHD	MSS	PAR	RHA	SCZ	SLE	TDH	HIV/AIDS	Total by Age Band	CC2	CC3	CC4	MAT					
17	18	19	20	21	22	23	24	25	26	27	HIV	28	29	30	31	32					
0.04	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.2	1,000.0	0.0	0.0	0.0	0.0					
0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	1,000.0	0.4	0.0	0.0	0.0					
0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.7	1,000.0	0.5	0.0	0.0	0.0					
0.04	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	1,000.0	0.5	0.0	0.0	0.0					
0.04	0.5	0.5	0.1	0.0	0.0	0.0	0.2	0.2	0.0	0.4	0.1	1,000.0	0.8	0.1	0.0	5.6					
0.04	1.3	1.4	0.2	0.0	0.0	0.0	0.2	0.4	0.1	0.8	2.4	1,000.0	1.3	0.2	0.0	26.1					
0.04	2.9	5.2	0.3	0.2	0.1	0.0	0.5	0.3	0.2	2.3	11.4	1,000.0	2.8	0.5	0.1	56.5					
0.04	5.6	13.1	0.3	0.4	0.1	0.0	0.8	0.3	0.2	3.2	19.6	1,000.0	6.2	1.0	0.1	42.5					
0.04	10.6	29.5	0.4	1.1	0.2	0.0	1.3	0.3	0.2	4.3	21.5	1,000.0	13.5	2.2	0.4	16.9					
0.04	19.0	54.6	0.5	3.0	0.2	0.1	2.1	0.4	0.2	6.4	19.9	1,000.0	25.5	5.0	0.9	3.2					
0.04	31.6	88.4	0.6	6.3	0.2	0.2	3.1	0.4	0.2	9.3	14.9	1,000.0	45.0	9.8	2.1	0.1					
0.04	51.0	120.3	0.9	12.8	0.2	0.4	4.6	0.4	0.2	12.2	9.3	1,000.0	71.3	18.6	4.0	0.0					
0.04	69.6	147.7	1.0	19.3	0.3	0.9	5.2	0.4	0.1	12.8	5.3	1,000.0	95.7	27.0	6.8	0.0					
0.04	84.6	169.0	1.0	31.7	0.2	2.0	6.5	0.4	0.1	12.9	2.8	1,000.0	123.3	38.9	10.8	0.0					
0.04	97.9	189.9	1.3	45.0	0.1	3.9	6.7	0.5	0.1	12.1	1.0	1,000.0	155.3	55.5	17.4	0.0					
0.04	90.6	207.6	1.3	59.6	0.0	8.6	7.2	0.4	0.1	12.0	0.1	1,000.0	170.4	62.3	20.9	0.0					
0.04	70.5	215.0	1.2	70.8	0.1	10.8	7.3	0.7	0.0	10.7	0.0	1,000.0	178.0	68.8	23.1	0.0					
0.04	43.4	220.8	1.3	75.8	0.0	13.5	7.4	0.7	0.0	9.7	0.0	1,000.0	170.6	66.3	18.8	0.0					
<b>RETAP</b>	14.7	198.7											155.1	49.2	13.3	0.0					
<b>0.04</b>	<b>18.7</b>	<b>45.2</b>	<b>0.4</b>	<b>6.8</b>	<b>0.1</b>	<b>0.6</b>	<b>1.7</b>	<b>0.3</b>	<b>0.1</b>	<b>4.4</b>	<b>8.8</b>	<b>1,000.0</b>	<b>29.1</b>	<b>8.4</b>	<b>2.3</b>	<b>11.5</b>					

Formula for REF Contribution Table 2005

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## Appendix G: Projected Prevalence for HIV/AIDS for REF Contribution Tables

Estimated REF Grid Count for HIV/AIDS		Industry Assumptions												
Total number of beneficiary months in the cell for the period, per 1,000 exposed beneficiaries in the scheme		Base Period												
Estimates from CARE below are estimates of the % of users of private health facility users on antiretroviral treatment in each year, for each age band. These estimates were derived by adapting the ASSA2002 lite model (version 040701) to allow for differential rates of HAART access in private and public health facility users. Note that the same survival assumptions have been used for both groups.														
Expected Occurrence per 1,000 Beneficiaries per age band in the Scheme														
Age Bands	Actual from 2002 REF Study	Estimate from CARE using ASSA2002 model adjusted for medical schemes										All Beneficiaries in Age Band	Industry Age Profile per 1,000 beneficiaries	
		2002	2003	2004	2005	2006	2007	2008	2009	2010				
Under 1	2.1	3.3	4.4	5.0	5.2	5.6	6.2	6.2	6.2	6.2	6.2	1,000.0	12.982	
1-4	2.4	1.3	2.9	4.5	5.9	6.8	7.3	7.7	7.9	8.0	8.0	1,000.0	62.774	
5-9	0.8	0.2	0.5	1.0	1.7	2.9	4.2	5.5	6.5	7.1	7.1	1,000.0	89.737	
10-14	0.1	0.0	0.0	0.1	0.3	0.6	1.2	1.8	2.7	3.6	3.6	1,000.0	95.895	
15-19	0.5	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1,000.0	89.594	
20-24	2.8	0.7	1.3	1.9	2.4	3.0	3.5	3.8	3.8	3.7	3.7	1,000.0	61.801	
25-29	8.6	2.6	5.2	8.2	11.4	14.5	17.5	19.7	21.3	22.3	22.3	1,000.0	66.636	
30-34	12.2	3.7	7.9	13.3	19.6	26.4	33.5	39.6	44.5	48.2	48.2	1,000.0	88.932	
35-39	11.0	3.9	8.4	14.4	21.5	29.4	38.0	45.8	52.6	58.5	58.5	1,000.0	90.864	
40-44	7.6	3.4	7.5	13.1	19.9	27.7	36.2	44.0	50.7	56.3	56.3	1,000.0	83.585	
45-49	5.2	2.3	5.2	9.5	14.9	21.5	28.9	36.1	42.6	48.2	48.2	1,000.0	69.229	
50-54	3.0	1.3	3.1	5.7	9.3	13.7	19.0	24.5	29.8	34.8	34.8	1,000.0	54.515	
55-59	1.6	0.7	1.7	3.2	5.3	8.0	11.3	14.9	18.5	22.1	22.1	1,000.0	43.189	
60-64	0.7	0.4	0.9	1.7	2.8	4.4	6.3	8.5	10.8	13.1	13.1	1,000.0	30.891	
65-69	0.5	0.1	0.2	0.5	1.0	1.7	2.6	3.7	5.0	6.4	6.4	1,000.0	21.758	
70-74	0.3	0.0	0.0	0.0	0.1	0.2	0.3	0.6	0.9	1.4	1.4	1,000.0	16.433	
75-79	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	1,000.0	10.951	
80-84	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,000.0	4.949	
85+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,000.0	5.288	
Total by column*	4.4	1.6	3.4	5.9	8.8	12.1	15.7	19.0	21.9	24.4	24.4	1,000.0	1,000.000	

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