



EDUCATOR ATTRITION & MORTALITY IN SOUTH AFRICA

A Study into Gross Educator Attrition Rates and Trends, including Analysis of the Causes of these by Age and Gender, in the Public Schools System in South Africa 1997/8 – 2003/04

for

The Education Labour Relations Council (ELRC)

March 2005



MOBILE TASK TEAM
ON THE IMPACT OF HIV/AIDS ON EDUCATION

The **Mobile Task Team** (MTT) is a network of Southern African professionals in complementary disciplines, currently working in 12 African countries, to assist MoEs to manage and mitigate the impact of HIV/AIDS through the strategic planning and implementation of sustainable and systemic interventions. It operates from the Health Economics & HIV/AIDS Research Division (HEARD) of the University of KwaZulu-Natal and is funded by USAID. For more information, please visit www.mttaids.com

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¹ Education Management Information Systems

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EXECUTIVE SUMMARY

This report provides the first overview of educator attrition and mortality trends not reliant on estimates, models or projections, but on primary data contained in government databases and registers. As such, there was no sampling frame and no statistical deduction in terms of attrition – only analysis of hard data.

The aim of this study is to estimate gross educator attrition rates and trends, including an analysis of the causes of these by age and gender, in the public schools system in South Africa. The **magnitude and dimensions of educator attrition** and its components, including mortality, were examined.

The key to the report was to ensure that the research team thoroughly understood South Africa's Personnel and Salary Administration System (PERSAL) data on which this analysis was based: A number of key assumptions had to be developed, including a definition of who within the educator workforce is an educator; how to calculate the size of the educator workforce; how to group educators into age bands; which denominator to use as a basis for calculating annual attrition trends (i.e. the number of educators in the education every year, given that there are fluctuations); how to manage in-service versus post-service mortality; and how to distinguish contract terminations in the PERSAL dataset from educator attrition.

The last aspect was an important basis for the rest of the study – It was recognised from the outset the fact that an educator's contract has ended in PERSAL did not necessarily mean that the educator has left the education system permanently. With an increasing number of temporary educators (whose contracts are terminated) being immediately reinstated every 3 months, simply counting all of the contract terminations in PERSAL as educator attrition would have led to an exaggeration in attrition.

In terms of the *magnitude of educator attrition*, the study added age bands to the dataset and then extracted the educator data only. The team then calculated the annual average number of educators in the education system, which would subsequently be used to calculate the attrition rates.

This was followed by a process during which 'real' attrition was extracted by considering only permanent contract terminations and contract terminations where there was no reinstatement of contract *within 6 months* of the first contract termination. These results were used to calculate gross attrition rates (educator attrition per year expressed as a percentage of the total number of educators per year).

In terms of the *dimensions of educator attrition*, the study focused its efforts on understanding the reasons for attrition, which was noted in PERSAL as the reasons for termination. In this regard, it was established that mortality is currently the third largest cause of terminations. With this in mind, the study triangulated the PERSAL educator mortality data with the Department of Home Affairs' Death Register dataset.

This enabled the study to, (i) verify whether the death that was recorded in PERSAL actually occurred; (ii) determine the time lag in recording the death on PERSAL; (iii) calculate both in-service and post-service mortality (confirmation of death and death data was requested of ALL

persons in PERSAL, irrespective of whether they were still employed by the Education Department or not).

A number of supplementary analyses were also undertaken: Firstly, the study analysed sick leave data for the period 2000 – 2004, focusing on persons who took sick leave in the categories of temporary and permanent incapacity. This analysis confirmed that an increased number of persons are applying for this type of sick leave, that there are strong provincial biases and that over two-thirds (67%) of this type of sick leave is taken by females.

Secondly, the study intended to analyse trends in relief educator appointments (There is an appointment category in PERSAL for relief educators). Because the number of relief educators that would be required is an unknown quantity to departments of education when annual budgets are prepared, each department has to estimate the annual number of relief educators (and use these estimates to allocate money in the budget for their salaries). Reports alluded to the fact that a steady increase in relief educator salaries has been observed in departments of education annual expenditure. With this information in hand, the study had intended to use PERSAL to analyse trends in relief educators and comment on whether an increase in this category of employment occurred. However, this has not been possible due to the fact that relief educators are often miscoded in PERSAL – the appointment category “Temporary Teacher” has often been used when capturing a relief educator on PERSAL. This made accurate analysis impossible.

That said, some key results that may be observed from the study include the following:

- a) Educators in South Africa appear to somewhat *less* at risk from HIV/AIDS than the general population in the same ages band. This conclusion is important given the level of national and international debate on the issue and South Africa’s high prevalence environment. Over the period 1997/98 to 2002/03, gross annual mortality amongst educators in the age group 20 to 49 grew from 1 006 to 1 825, an increase of 81%. By comparison, Statistics SA recently released data showing that in the same age group, and for almost the identical period (calendar years versus financial years), mortality in the general population grew from 121 548 to 250 936, an increase of 106%.
- b) The study’s results are based on approximately 92% of the total teaching force in South Africa, since there are no data in PERSAL on the 8% of all full-time CS (College School) educators employed by School Governing Bodies (SGBs).
- c) The reporting frame for the analysis is the Department’s financial year, which runs from 1st April to 31st March of the following year. Seven complete years from 1997/98 to 2003/04 have been analysed.
- d) There is a mortality undercount in the 2003/04 financial year of at least **15%**. This estimate of undercount is based on an observed average 3-month delay in the recording of deaths on PERSAL and the fact that the terminations data was only available for three months beyond the end of March 2004 (i.e. end of July 2004). Data for earlier years reveals that an additional 2 years of data would be required beyond March 2004 for all the deaths attributable to 2003/04 to appear in PERSAL. Hence, a proportion of deaths attributable to the 2003/04 financial year are not reflected in the data shown.
- e) The *educator workforce* is defined as CS Educators, an appointment category within the education system and coded by PERSAL. It includes school and office-based educators

- such as educators themselves, heads of department, principals, subject advisors, psychological and guidance services, district managers, but excludes staff such as personnel officers, administrative officers, regional directors and senior management from chief director level upward.
- f) The number of educators in-service varies significantly from month to month. These are evidenced by annual patterns of fluctuation: A low in January every year, rising to an annual peak in November. As the number of permanent educators remains fairly constant over time, this can be ascribed mainly to the ebb and flow of temporary educators in and out the education system. For analytical purposes, the total monthly number of educators was determined and an annual average was then calculated to form the denominator of the attrition rate calculations.
 - g) On average, only 83% of educators are classed as 'permanent' with the remainder defined as 'temporary', 'on probation', 'relief' and 'education specialist', which together (17%) represents a sizeable proportion of the educator workforce.
 - h) The average number of educators has declined over the period 1997/98 to 2003/04. This is due to a reduction in the number of temporary educators over time, and also an extensive rationalisation through voluntary severance packages in the provincial education departments with the amalgamation and formulation of new education departments in the mid- to late- nineties. While the number of permanent educators has remained stable, the overall size of the educator work force declined.
 - i) The most significant and consistent provincial decline in educator numbers was in the Western Cape where the average number of educators decreased by 13% in this period (compared to a national decline of 4.7%), followed by Limpopo Province and the Northern Cape. The only province to register any noticeable increase in educator numbers was Mpumalanga.
 - j) Gross attrition in the educator workforce fluctuated in the period under review: The national rate in 1997/98 was 9.3%, dropping to 6.4% the following year and declining to 5.5% in 2000/01 before beginning to rise again to 5.9% in 2002/03. However these rates vary significantly by province and have to be seen in light of the large numbers of educators that left the departments during the years of amalgamation and rationalisation, peaking in 1997/98 and 1998/99.
 - k) This fluctuation in attrition suggests that the 'composition' of educator attrition changes over time: The early years of this study were characterised by high numbers of severance packages and dismissals whereas more recent years have seen rising proportions of mortality, medical retirement and resignation.
 - l) The largest proportion of contract terminations was due to contract expiry, immediately followed by reinstatement (i.e. a new contract being signed). This phenomenon was analysed, but was not included in the gross attrition calculations. It was established that the third largest cause of attrition, after contract terminations and resignation, was mortality.
 - m) Most significantly, *the proportion of attrition due to mortality (excluding contract terminations) increased from 7.0% in 1997/98 to 17.7% in 2003/04*. Similarly, the proportion of terminations due to medical reasons has grown from 4.6% to 8.7% over

the same period while the number of severance packages and transfers declined considerably; by 2003/04, resignations accounted for 53% of all educator terminations excluding contract terminations.

- n) By triangulating the PERSAL mortality data with the Death Register data, MTT was able to calculate both in-service mortality (i.e. an educator who died whilst still in the employment of the education department) and post-service mortality (i.e. an educator who dies after leaving the service of government).
- o) The total number of in-service deaths grew from 1 425 in the year 1997/98 to 1 856 in the year 2003/04, an increase of 30%. The 'reduction' of in-service deaths between 2002/03 and 2003/04 (from 2 086 to 1 856) is due to the time lag between actual deaths and the date when they are finally reflected in PERSAL, which on average is 3 months and in 30% of all cases, more than 4 months.
- p) Home Affairs identified 3 853 post-service deaths for educators amongst the data that was provided to them (where the recorded date of death was later than the resignation date shown in PERSAL). *However, almost one third (31%) of the non-death terminations that Home Affairs reported as a subsequent death occurred within 1 year of the educator leaving the department(s)* (1 202 out of 3 853 Post-Service deaths).
- q) A total of 12 990 educators died in-service over the period, comprising some 12 560 deaths reported in PERSAL and a further 430 discovered by linking Home Affairs National Death Register data to cases where the reported termination cause (i.e. contract termination) was not 'deceased' yet coincided with a date of death the same as, or slightly earlier than the indicated resignation date in PERSAL.
- r) Based on these data and the proposition that in-service mortality per se does not tell the full story, in-service deaths have therefore been combined with those of educators who died within *one-year* of leaving service, to constitute a single, more representative category. Thus, with the addition of 1 202 educators who died within one-year of leaving service, **gross educator mortality for the period 1997/98 to 2003/04 is calculated to be 14 192**. This does not however allow for the undercount of approximately 15% in 2003/04, *which may add close to 300 more deaths for that year*.
- s) Crude mortality rates, expressed in relation to the number of appointments, increased between 1997/98 and 2003/04 from 0.39% to 0.57%; the slight decline between 2002/03 and 2003/04 may be due to the late capture of deaths in PERSAL. The rate of increase in mortality amongst the 20 to 49 year old cohort was almost double that of 50 to 59 year olds, rising from 0.33% to 0.56%.
- t) In terms of gender-specific mortality rates, while these have increased considerably for both sexes since 1997/98, the highest proportional increase was amongst females aged 20 to 49, where they grew from 0.23% to 0.45%. By 2003/04, mortality rates for younger female educators (aged 25 to 29 and 30 to 34) were higher than those for older female educators.
- u) Comparative race-specific mortality rates in the 20 to 49 age bands are highest for Black African educators, increasing from 0.40% in 1997/98 to 0.66% in 2003/04. A higher relative rate of increase was experienced among Indian or Asian educators (0.07% to 0.11%), but the actual numbers are *very* small; Coloured educators have experienced a

- small increase (0.17% to 0.21%), while the rate for White educators in the same age band has remained fairly stable (0.11% to 0.09%). The actual number dying each year is distorted by the fact that over 80% of all educators are Black African; in 2002/03 for example, a total of 1 745 Black African educators aged 20 to 49 died in-service or within one year post-service, while the equivalent numbers for educators of other races was 39 Coloured, 16 Indian or Asian and 25 White.
- v) In the group aged 20 to 39, mortality rates were highest amongst Black African *male* educators, climbing from 0.54% to 0.84% in the period 1997/98 to 2003/04. Comparative rates for Black African female educators were lower (0.27% in 1997/98) but the rate of increase between 1997 and 2003/04 was higher, climbing to 0.59%.
 - w) Provincial mortality varied significantly as would be expected: The highest number of deaths overall was in KwaZulu-Natal in 2002/03, where 790 educators died – a significant increase from 1997/98. In 2003/04, Eastern Cape had the second highest total mortality with 419 deaths, followed by Limpopo Province with 224.
 - x) The highest provincial mortality rate by age band was again in KwaZulu-Natal among 25 to 29 year-old educators, at 1.04% (equivalent to 52 deaths amongst 5 008 educators in one year).
 - y) In terms of the gender breakdown in the provinces, the highest increase in mortality rates has been amongst female educators aged 20 to 39 in KwaZulu-Natal: Starting from a relatively low base of 0.36% in 1997/98, it climbed to 0.89% in 2003/04, equivalent to 242 deaths amongst 27 176 educators in one year. High rates of increase were also evident amongst male educators in the Free State and North West provinces.
 - z) The study makes a series of recommendations for PERSAL, in which it identifies eight areas that should be cleaned up in the existing database, nine areas of innovation that could be considered and two areas that might assist in fraud detection. It also identifies four ways that PERSAL data could be used to provide improved management reporting in respect of educator attrition trends over time.

This study has systematically analyzed a very large dataset, but at no stage has it attempted to ascribe any specific portion of the observed mortality to AIDS. This was quite deliberate and underpins the need to understand HIV/AIDS, first and foremost, as an erosive and systemic management problem, exacerbating *existing* stress on teaching and learning. While this study has centred on gross attrition and mortality, it is clear from the PERSAL data that there is a significant and disproportionate increase in mortality among educators, particularly in those age bands usually associated with higher HIV-risk.

Read in combination with the parallel ELRC study, *The Health of our Educators*, conducted by the Human Sciences Research Council (HSRC), the impact of HIV/AIDS is quite simply indisputable.

The real question is, what are the implications for education?

The rate of educator attrition experienced over the period under review translates into hard numbers of trained and experienced individuals who have left the system. These numbers have declined since 1997/98 (following the accelerated process of rationalization) but still run at well over 20 000 on an annual basis, which is by definition also the number of educators that needs to be replaced, all things being equal. Even given the declining number of learners entering the

school system and the fact that some educators re-enter the system after six-months or more, this reflects the *order of magnitude* of a demand that must be satisfied.

It is also fair to say that a *decreasing* number of educators – the ‘out-of-service’ pool as it were – would be available to re-enter the profession, regardless of the incentives or opportunities, and that the pool of temporary, relief and replacement educators may also be shrinking – as evidenced already in some provincial education systems.

There are at least three important reasons for this latter point. First, a growing proportion of these educators are dead; over the same period under review, the proportion of total terminations due to death in-service rose from 7.0% in 1997/98 to 17.7% in 2002/03.

Second, the proportion of educators leaving the profession due to resignation – implying access to alternative employment (or in some cases, apparently, awareness of growing incapacity) – accounted for 53% of all educator terminations by 2003/04. This is important as growing gross mortality in other private and public sectors, fuelled by AIDS impact, is *increasing* the appetite for the recruitment of skilled educators – particularly those trained in, for example, English, mathematics, science and accountancy.

Third, it should be clear that this largely national analysis masks the extent of variation in attrition and mortality in provincial education systems: Figure 16 in this report illustrates this graphically and highlights the fact that some provincial systems are much more vulnerable than others. This analysis is supported by the results of the HSRC prevalence survey reported in *The Health of our Educators* and confirms the need to focus attention on those areas in greatest need – without however stigmatising them in any way.

In summary, this analysis confirms patterns of educator attrition and mortality consistent with the high levels of HIV-prevalence in the wider environment. What might therefore be important to say in conclusion, is that mortality rates amongst educators are lower than might have been expected, relative to a succession of international estimates and projections that may have implied the collapse of education as we know it. Indeed, the indicative comparison between mortality amongst educators 20 to 49 and that for the same age group in the general population, cited above, is welcome news and may challenge the contention that educators are an intrinsically high-risk group.

This said, the good news is limited. The numbers contained in this analysis still translate into the *growing* loss of very many highly trained men and women and will be a source of alarm, particularly in the worst affected provinces. Educators are, by definition, expensive resources and take considerable time to train and locate in the system. The challenge of reducing this loss, through a comprehensive response strategy and effective management of future impact on the system, will be neither easy nor short-term. However, the commission of this multi-faceted ELRC study, the value of the unprecedented management information it has produced and the shared commitment of its principals to action may prove to be a critical watershed in the fight against HIV/AIDS and its erosive impact.

1 INTRODUCTION AND BACKGROUND TO REPORT

The MTT (Mobile Task Team on the impact of HIV/AIDS on education, based at HEARD, UKZN) is a research partner in a series of studies into the impact of HIV/AIDS on school and college-based educators in South Africa. Due to the multidimensional nature of primary and secondary data and the variety of analyses tools and methodologies, these studies have been grouped into 3 research components: Workplace context and policy for educators on HIV/AIDS; Human resources study; and HIV/AIDS profile of educators.

The MTT was commissioned to conduct two research studies: (a) a study into educator attrition and mortality rates; and (b) a study into educator demand and supply as part of the human resources component.

1.1 REPORT PURPOSE

The purpose of this report is to analyse educator attrition rates (Study 2 of Research Component 2). This outcome of this study is required to inform the second study for which MTT is responsible (educator demand and supply), which can only be undertaken once educator attrition rates are known.

The detailed technical descriptions for MTT Study 2 and MTT Study 3, as per the original research proposal, have been included in **Annexure A**.

1.2 AIM OF MTT STUDY 2

The joint research proposal² defined the aim of MTT Study 2 as “the estimation of gross educator attrition rates and trends, including an analysis of the causes of these by age and gender, in the public school system in South Africa”. The **magnitude and dimensions of educator attrition and its components**, including mortality, would be examined. This would include a review of time lags between attrition and entry into the Personnel and Salary Administration System (PERSAL) and an analysis of the various ebbs and flows to calculate the magnitude of attrition causes by category, age and gender.

It was agreed that Study 2 would make use of an archival research methodology; it would analyse payroll and employment records of education sector employees over a period of time in order to estimate gross attrition rates for every year of analysis, as well as determine trends. These records would be obtained from archives of the Government of South Africa’s Personnel and Salary Administration System (PERSAL), which was housed and managed by the PERSAL unit, located within the National Treasury.

1.3 RESEARCH METHODOLOGY FOR STUDY 2

The research methodology for this study included these activities: data gathering from PERSAL unit and key informant interviews (6 month process); data verification and data cleaning (3 month process); understanding the data and developing suitable analysis assumptions and methodology (2 month process); detailed data analysis (3 months); development of recommendations for PERSAL changes and compilation of research report (1 month). A

² Research Proposal on the Impact of HIV/AIDS on Schools and College-based Educators, Page 22

detailed description of the tasks undertaken by MTT within the stages of the research process can be found in **Annexure B**.

1.4 RESEARCH LIMITATIONS AND CHALLENGES

There were a number of limitations associated with this research study that were either outside MTT's control or that could not have been anticipated prior to receiving the various datasets used in the study:

- (a) **Limitation of PERSAL data to State-paid CS Educators³ and Education Sector personnel:** PERSAL is a government-run personnel and salary system. Thus, there are no data on educators employed by School Governing Bodies (SGBs), which means that the research is confined to state-paid CS educators only. MTT assumed that it would be able to gather data on SGB-paid educator terminations from the national EMIS database, but this data is currently not captured in sufficient detail. According to the 2001 Annual Survey database for Schools, 8% of all full-time CS educators were employed by SGBs (see Table 1 below). **Thus this study's results are based on approximately 92% of the total teaching force in South Africa.**

Table 1: Summary of Remuneration Type for Educators from 2001 Annual Schools Survey

Province	Number of Full-time Educators Employed By:		Percentages	
	Governing Body	State	Governing Body	State
Eastern Cape	2 129	62 003	3%	97%
Free State	1 066	21 917	5%	95%
Gauteng	9 188	38 398	19%	81%
KwaZulu-Natal	6 182	68 923	8%	92%
Mpumalanga	1 082	17 551	6%	94%
Northern Cape	328	6 034	5%	95%
Limpopo Province	1 834	52 846	3%	97%
North West Province	628	18 780	3%	97%
Western Cape	5 487	25 963	17%	83%
Total	27 924	312 415	8%	92%

Source: National EMIS 2001

- (b) **Size of PERSAL database:** The PERSAL data, once converted into a SQL database, contained over 42 million records, which led to a considerable amount of unanticipated preliminary data structuring and indexing prior to analysis.

- (c) **Absence of direct supervision during PERSAL data extraction:** Although MTT took all reasonable preparatory steps through a number of meetings and email-based interactions with the South African government's PERSAL unit, it was not in a position to

³ CS (College and School) Educator is an appointment category within the education system and coded by PERSAL. It includes school-based educators and office-based educators such as educators, Heads of Department, principals, subject advisors, psychological and guidance services, district managers, but excludes staff such as personnel officers, administrative officers, regional directors and senior management from chief director level upward.

compare the data extract with actual paper-based records or raw data from the PERSAL mainframe. The PERSAL unit did carry out a number of crosschecks before the data was supplied to MTT.

- (d) **Time-consuming nature of sub-provincial geographic breakdown:** The process of disaggregating data by education district is an extremely time consuming process, due to the lack of connection and integration between PERSAL data and provincial EMIS datasets.

2 RESEARCH CONTEXT

A purposive literature review and key informant interviews were undertaken with a view to uncovering previous research that could add nuance to MTT's work or that could help to explain trends. Please refer to **Annexure C** for an annotated bibliography of the three main research studies that were used to inform the literature review. The following was found:

2.1 PERSAL BUSINESS RULES

- PERSAL is the government's Personnel and Salary Administration System, run centrally by the PERSAL Unit at the National Treasury.
- Every person in the PERSAL system is assigned a unique PERSAL number. The person maintains his/her PERSAL number for life, even if he/she moves between Departments or stops working for the government, and starts working for government at a later stage.
- Most data in PERSAL are coded. There is a complete set of PERSAL field codes in a separate database (the data dictionary).
- PERSAL data capture and maintenance are the responsibility of provinces. There is a PERSAL manager at provincial level, located in the Office of the Premier, and each government Department has provincial PERSAL officers.
- There are a fixed number of appointment categories in PERSAL. Every appointment in the PERSAL system is associated with a contract, and every contract has a unique contract start date and contract termination date. For every contract termination, a reason for termination has been assigned from a fixed list of options.
- A person can have multiple consecutive appointments in PERSAL, with or without a break in service (i.e. more than one contract start date, and contract termination date). This can happen when a temporary employee's contract terminates and the person gets re-appointed immediately on a second temporary contract immediately after the 1st temporary contract expires. Understanding this was of key importance in MTT's research as it prevented a scenario of artificially inflated attrition (which would have occurred if each of these consecutive contract terminations and commencement were counted as attrition).
- There is an appointment category in PERSAL for relief educators. Because the number of relief educators that would be required is an unknown quantity to departments of education when annual budgets are prepared, the Department has to estimate the annual number of relief educators (and use these estimates to allocate money in the budget for their salaries). Reports alluded to the fact that a steady increase in relief educator salaries has been observed in Departments of Education's annual expenditure. With this information in hand, MTT had intended to use PERSAL to analyse trends in relief educators and comment on whether an increase in this category of employment occurred. However, this has not been possible due to the fact that relief educators are often miscoded in PERSAL – the appointment category "Temporary Teacher" has often been used when capturing a relief

educator on PERSAL. This fact reduced MTT's confidence in the relief educator category to such an extent that it decided not to carry out a trend analysis of relief educators.

- There is a specific sequence in the way that deaths are recorded in PERSAL. When an education institution or manager reports a death to the PERSAL office, the person's salary is immediately frozen. However, the death is only recorded on PERSAL as "termination of contract due to mortality" once the provincial PERSAL office receives a death certificate.
- There are often delays in PERSAL data capture, specifically relating to sick leave information.

2.2 PERSAL DATA AND EMIS DATABASE LINKAGE

- There are geographic identifiers in PERSAL, but they are not always up to date. This is due to delays by the departments in reporting changes in sub-provincial structures to PERSAL. This would complicate any sub-provincial breakdowns of data and analysis that MTT intended to carry out.
- The Department of Education conducts an Annual School Survey; the results of which are captured in an Education Management Information System (EMIS) database. This database contains information about educator mortality⁴ and provides detailed geographic identifiers to locate the exact position of a school (including GPS coordinates).
- Due to the obsolete nature of the PERSAL geographic identifiers at sub-provincial level, MTT anticipated that it could link EMIS data to PERSAL data to enable results to be disaggregated at sub-provincial level. However, these two data sources cannot be automatically linked but needed manual linking for over 27 000 schools in South Africa and 42 million records in PERSAL.

2.3 PERSAL DATA AND DEPARTMENT OF HOME AFFAIRS' NATIONAL DEATH REGISTER LINKAGE

- MTT's investigation revealed that this link could determine (i) the date of death of a person, whether they are still in the service of the Department of Education or not; and (ii) the time lag in recording the death on PERSAL for existing employees. This would be possible by cross-referencing the ID numbers of all contract terminations in PERSAL with the Home Affairs Death Register.
- MTT sought and obtained permission from the Department of Home Affairs to do this cross-referencing.

2.4 SICK LEAVE DATA

- There are often delays in the capture of data on PERSAL, particularly in terms of sick leave data
- The sick leave dispensation changed in July 2000 when the number of sick leave days was reduced and two new categories of sick leave were created – temporary incapacity and permanent incapacity.
- Investigation revealed that there is emerging evidence of "non formal", unrecorded sick leave. This phenomenon arises when schools over-report the number of learners in the annual school survey, which then leads an over-supply of educators at a school when

⁴ Since the year 2000, the Annual School Survey has included retrospective questions on deaths of learners and educators

schools being assigned more than the regulated number of educators. Thus, when one educator at a school with such an over-allocation of educators is ill, his or her teaching load can be replaced by one of the other educators without a formal sick leave notification in the PERSAL system⁵.

3 SUMMARY OF DATA RECEIVED FOR ANALYSIS

Three main sets of primary data were used in the analysis: (a) appointment data, contract termination data and sick leave data for educators from the South African Government's Personnel Salary System (PERSAL) for the period April 1997 to March 2004; (b) Department of Home Affairs' National Death Register as of 19 August 2004; and (c) National EMIS database of the National Department of Education for 2001.

3.1 EDUCATION DEPARTMENT DATA FROM PERSAL

3.1.1 Education Department appointments dataset

Three main datasets were used in this analysis, all of which were extracted by the PERSAL Unit, National Treasury and provided to MTT. The first file provided details of the number of appointments by month for all Education Department staff (including educators, administrators and support staff) in all provinces and the National Department for the period April 1997 to March 2004. 'Appointments' in this case refers to all employees of the Education Department in a particular month, not just *newly* appointed staff. This dataset, referred to hereafter as the *appointments data*, was amalgamated from 40 different files, and consisted of just under 42 million records (16 Gigabytes of data – see Table 2 below). The information contained in the appointments data was as follows:

- | | | |
|-------------------------|-------------------------|-------------------------|
| ▪ Province | ▪ Post Class | ▪ Component Description |
| ▪ Department | ▪ Race | ▪ Initials |
| ▪ Organisation | ▪ Gender | ▪ Surname |
| ▪ Salary Effective Date | ▪ Breadwinner | ▪ ID number |
| ▪ PERSAL Number | ▪ Nature of Appointment | ▪ Date of Birth |
| ▪ Appointment Number | ▪ Appointment Date | ▪ Region |
| ▪ Paypoint Number | ▪ Resignation Date | ▪ Rank |
| ▪ Paypoint Description | ▪ Component Code | |

⁵ This information was shared anecdotally, and was uncovered during data audits of the SNAP survey results. When learners at a specific school were asked about the presence of all educators allocated to a school, some learners responded by stating that they have never seen/heard of a specific educator, or that a specific educator "has been ill for a long time".

Table 2: Number of PERSAL records on which analysis was based

Province	Total Number of Records
Eastern Cape	7 311 668
Free State	2 940 875
Gauteng	5 794 680
KwaZulu-Natal	8 271 628
Limpopo	5 629 299
Mpumalanga	2 718 780
North West	3 707 999
Northern Cape	897 088
Western Cape	3 686 629
National departments	422 002
Grand Total	41 380 648

Source: PERSAL

3.1.2 Education Department termination dataset

The second file related to service terminations for all Education Department staff in all provinces for the same period as above. This dataset, referred to hereafter as the *terminations data*, had just over 1 million records, and provided information relating to the dates when terminations took place and the termination reasons. The specific information contained in the terminations data was as follows:

- Salary Effective Date
- Appointment Number
- Resignation Date
- Resignation Reason
- Death Transaction Date
- PERSAL Number
- ID Number
- Service Termination Type
- Death Date

3.1.3 Education Department sick leave dataset

Finally, MTT requested and received sick leave data from the PERSAL system for the two new categories of sick leave (temporary incapacity and permanent incapacity), and for the period July 2000 – April 2004.

3.2 NATIONAL DEATH REGISTER DATA FROM DEPARTMENT OF HOME AFFAIRS

A third data source was the Department of Home Affairs Death Register, which was used to identify deaths that occurred *after* people had left the Education Department (defined as *Post-Service* deaths). This data was amalgamated with the terminations data to provide a consolidated picture of mortality.

MTT used the Department of Home Affairs' ID validity algorithm to verify all ID numbers in PERSAL. After this, MTT prepared a list of ID numbers for persons whose contracts with the Department of Education terminated for the last time, and sent this to the Department of Home Affairs. MTT requested the Department of Home Affairs to check these ID numbers against the death register and flag all matching records. The following table summarises the data that MTT received from the Department of Home Affairs:

Table 3: Data Descriptors for Department of Home Affairs death data as at 19 August 2004

Data Descriptor	Number of records
Total Number of Records checked on death register	428 251
Total Number of Invalid ID Numbers ⁶	46 115
Total ID Numbers Not Found	3 507
Total Deceased	13 533
Total Alive	365 096

Source: National Death Register

3.3 EMIS DATA FROM NATIONAL DEPARTMENT OF EDUCATION: EMIS SECTION

The MTT also received a copy of the 2001 EMIS database for possible triangulation purposes and to ensure that it had a better and more flexible set of geographic identifiers. The 2001 EMIS database was the latest cleaned dataset that the national EMIS unit could provide.

4 RESEARCH ASSUMPTIONS AND DEFINITIONS

Based on information gathered during the literature review and key informant interviews, it was possible to develop a list of research assumptions. These assumptions guided the research that commenced with the data analysis:

4.1 ANALYSIS OF DATA BY FINANCIAL YEAR

The Education Department financial year runs from 1st April through to 31st March of the following year. **The PERSAL data that were supplied to MTT were for the period April 1997 to March 2004, which allowed for seven complete financial years to be grouped and analysed.**

The start and end of each financial year is shown in **Table 4** below:

⁶ The high number of invalid ID numbers was due to the fact that the ID numbers on the PERSAL system were captured in the old ID format (i.e. non-bar coded). MTT changed these invalid (old) ID numbers on the PERSAL data that it used for analysis after receiving new ID numbers from the Department of Home Affairs.

Table 4: Financial years used for analysis and reporting purposes

Financial Year	Start of Year	End of Year
1997/98	1 st April 1997	31 st March 1998
1998/99	1 st April 1998	31 st March 1999
1999/00	1 st April 1999	31 st March 2000
2000/01	1 st April 2000	31 st March 2001
2001/02	1 st April 2001	31 st March 2002
2002/03	1 st April 2002	31 st March 2003
2003/04	1 st April 2003	31 st March 2004

4.2 UNDERCOUNT IN FINANCIAL YEAR 2003/04

The financial years from 1997/78 to 2003/04 are included in the analysis that follows, although it should be noted that **mortality data for the final year (2003/04) are estimated to undercount mortality by approximately 15% due to the time lag between an educator death and when this information is captured on PERSAL**. This delay is partly a function of the time it takes for information to travel from schools to districts, regions and finally provincial offices. The average delay of three months means that many deaths only appear in PERSAL several months after they actually occurred. Although the date of death allows for mortality to be correctly allocated to the year in which it occurred, it still requires two years of data 'ahead' of each year to identify all the deaths that occurred in that year.

PERSAL provided terminations data for three months beyond the end of the 2003/04 financial year - up the end of July 2004. Deaths attributable to 2003/04 that occurred in this period were included in the analysis, but data for earlier years revealed that 2 years of data would be required beyond March 2004 for all the deaths attributable to 2003/04 to appear in PERSAL. The extra 3 months of data only account for 23% of the estimated 38% undercount of mortality in 2003/04. Hence the net undercount in the analysis is approximately 15%.

Table 5: Time lag between when Deaths actually occur and when they are reflected in PERSAL

Year when Death actually occurred	Year Death was reflected in PERSAL							
	1997	1998	1999	2000	2001	2002	2003	2004
1997/98	928	397	20	10	1	4		
1998/99		1 189	470	35	2	3		
1999/00			1 220	523	29	8	4	2
2000/01				1 141	713	67	14	4
2001/02					1 286	616	72	7
2002/03						1 267	723	32
2003/04							1 275	497

 = Death captured in PERSAL in years subsequent to when it actually occurred

Source: PERSAL

4.3 EXCLUSIVE FOCUS ON EDUCATORS

MTT received PERSAL data about **all** education department employees at national and provincial level, not only educators. This was requested partly because it was difficult to accurately distinguish persons at schools from persons working on an educator post grade who are not based at schools. For the purpose of this report, only data on the *educator workforce* were analysed.

4.4 DEFINITION OF EDUCATOR WORK FORCE

The *educator workforce* is defined as CS Educators⁷ with a PERSAL Rank Code of between 50000 and 69999. This range of Rank Codes is consistently used by all provinces to identify educators in PERSAL. Abnormal Appointments and Periodical Remunerations have been omitted, since these normally refer to one-off and ad-hoc appointments. The majority of the selection involved (83%) are defined in terms of their Nature of Appointment as 'CS Educator Permanent'. An additional 11% are 'CS Educator Temporary' and 4.5% 'CS Educator on Probation'.

4.5 CATEGORISATION OF EDUCATORS INTO AGE BANDS

All persons on the PERSAL database were grouped into specific age bands. The age of a person on 1 August 2004 was used as the reference date for grouping persons into 5-year age bands.

4.6 PROCESS FOR ESTIMATING THE ANNUAL NUMBER OF EDUCATORS IN THE EDUCATION SYSTEM

Since gross attrition and mortality rates are expressed as a percentage, MTT needed to calculate a *denominator* (i.e. an indication of the annual size of the employee workforce) so that attrition and mortality could be expressed as a percentage of this figure. Given that there are monthly fluctuations in the number of employees, there are several ways of approaching the problem. One would be to use the number of employees in the system in a specific month. Another would be to identify the month in which the highest or lowest number of appointments occurred and use that figure. Neither of these approaches fully captures the month-by-month and seasonal variations in the size of the education sector labour force.

For the purpose of this analysis MTT developed the following procedure for calculating the denominator: (a) calculate the total number of appointments in the education system on a month-by-month basis, (b) calculate an annual average, based on the 12 monthly totals, and (c) use the annual average as a denominator of the size of the labour force for that year.

⁷ CS (College and School) Educator is an appointment category within the education system and coded by PERSAL. It includes school-based educators and office-based educators such as educators, Heads of Department, principals, subject advisors, psychological and guidance services, district managers, but excludes staff such as personnel officers, administrative officers, regional directors and senior management from chief director level upward.

4.7 DISTINGUISHING EDUCATOR CONTRACT TERMINATION FROM EDUCATOR ATTRITION IN THE PERSAL DATASET

The major focus of this study was to analyse historical educator attrition trends on a year-to-year basis. Annual educator attrition is defined as the number of educators that leave the education system every year. With the PERSAL dataset supplied, the MTT had data on all contract terminations. However, a contract termination is not necessarily equal to attrition. This is because there are numerous temporary educators whose contract terminates after 3 months (the maximum period for a temporary appointment contract) and who are simply re-appointed immediately or soon after their 1st contract is terminated. In practical terms, there is no break in service for these temporary educators. Thus, it was necessary to filter out of the Education Department terminations dataset all of those terminations that could be seen as REAL attrition. This was done as follows:

Four categories of contract terminations were identified and all terminations in the termination data set were classified according to one of these four categories. Programmatically this involves identifying each Resignation (termination) in the appointments file and searching forward to see if that person was re-employed within a specific pre-defined period of time.

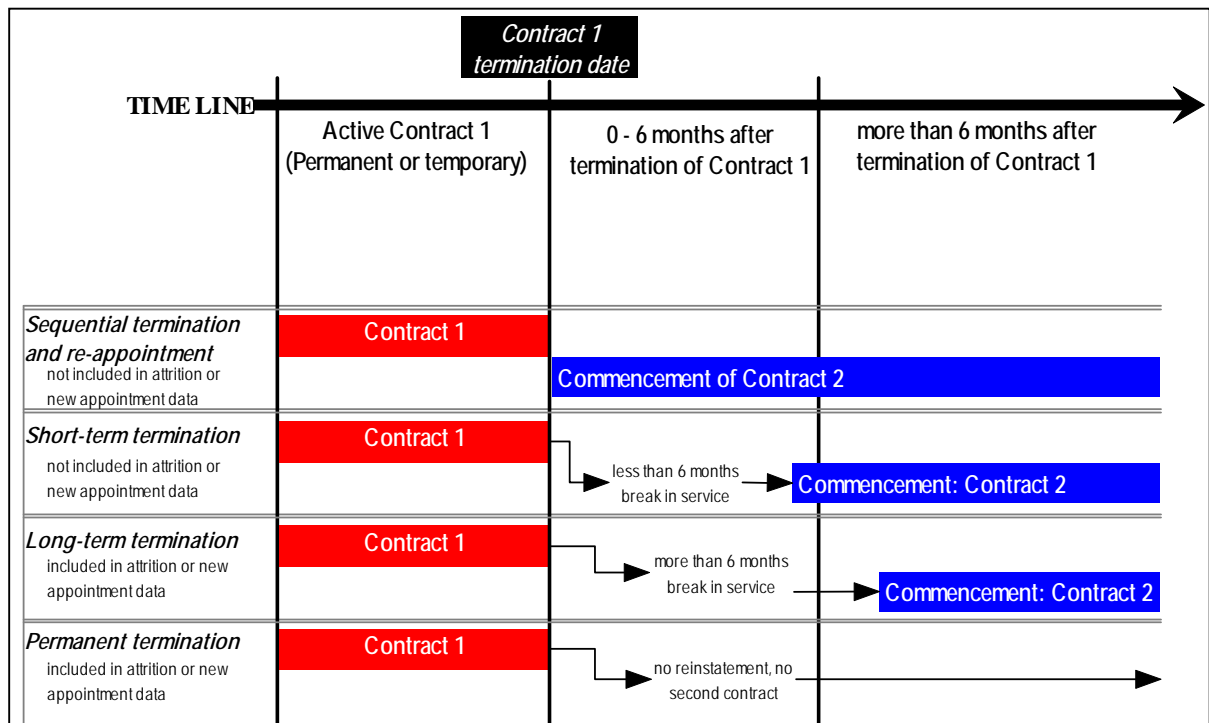
Please note that these four categories allow for the inclusion of Maternity Leave under the category 'short-term' termination, which is a common form of 'medium term' attrition after which the person would normally rejoin the Department. The following four categories were defined:

- A. *Permanent termination of contract (no reinstatement)*. These are persons whose contracts have terminated and for which no further contract start dates exist. **This category of termination was included in the attrition calculation.**
- B. *Long-term termination of contract (reinstatement only after more than 6 months)*. These are persons whose contracts were terminated, and who were re-appointed by the Department of Education, but only after MORE than six months. These employees, when re-appointed, were counted as new employees. **This category of termination was also included in the attrition calculation.**
- C. *Short-term termination (reinstatement in less than 6 months)*. These are persons whose appointments were terminated, but who were re-appointed by the Department after a break in service of less than six months. For the purposes of this analysis these employees were **not** counted as 'new' on re-appointment and **not** included in the attrition calculation.
- D. *Sequential termination and reinstatement (no time lag between end of 1st contract and start of 2nd contract)*. These are persons whose appointments were terminated, but were immediately re-appointed. One example of this is employees whose contracts end and are immediately renewed with no break in service. Another example is the case where an employee is promoted, leading to a different salary scale or where the nature of appointment changes from Temporary to Permanent. This type of termination was **not** included in the attrition calculation.

Thus, the total attrition at any given point in the dataset was calculated by finding all terminations of termination category A and termination category B and adding them to determine the total attrition.

These four categories of terminations have been illustrated on a time line in Figure 1 below:

Figure 1: Types of Terminations



4.8 IDENTIFYING NEW PERSONS JOINING THE DEPARTMENT

This was done by searching back chronologically for each appointment to see if that person (PERSAL number) occurred in the previous month, and within the previous 6 months and year, and coding accordingly. All those appointments with a matching appointment in the previous month are stable employees, all those with no matching earlier appointment at all are treated as completely new (this did not work for the first half of 1997/98, due to the inability to search far enough back) and all those who only have an appointment within the the last 6 to 12 months are intermittent new (the same mid-type as the terminations category).

4.9 DISAGGREGATING DATA SUB-PROVINCIALY (I.E. BY EDUCATION REGION AND DISTRICT)

The intention is to use the 2001 National EMIS Database to provide improved (sub-provincial) geographic identifiers. This involves a labour-intensive process of linking the PERSAL and EMIS databases, which is currently underway.

4.10 THE "YEAR" OF ATTRITION

The year in which attrition occurred was noted, and was based on the government's fiscal year, which runs from 1st April to 31st March of the following year and *not* the calendar year.

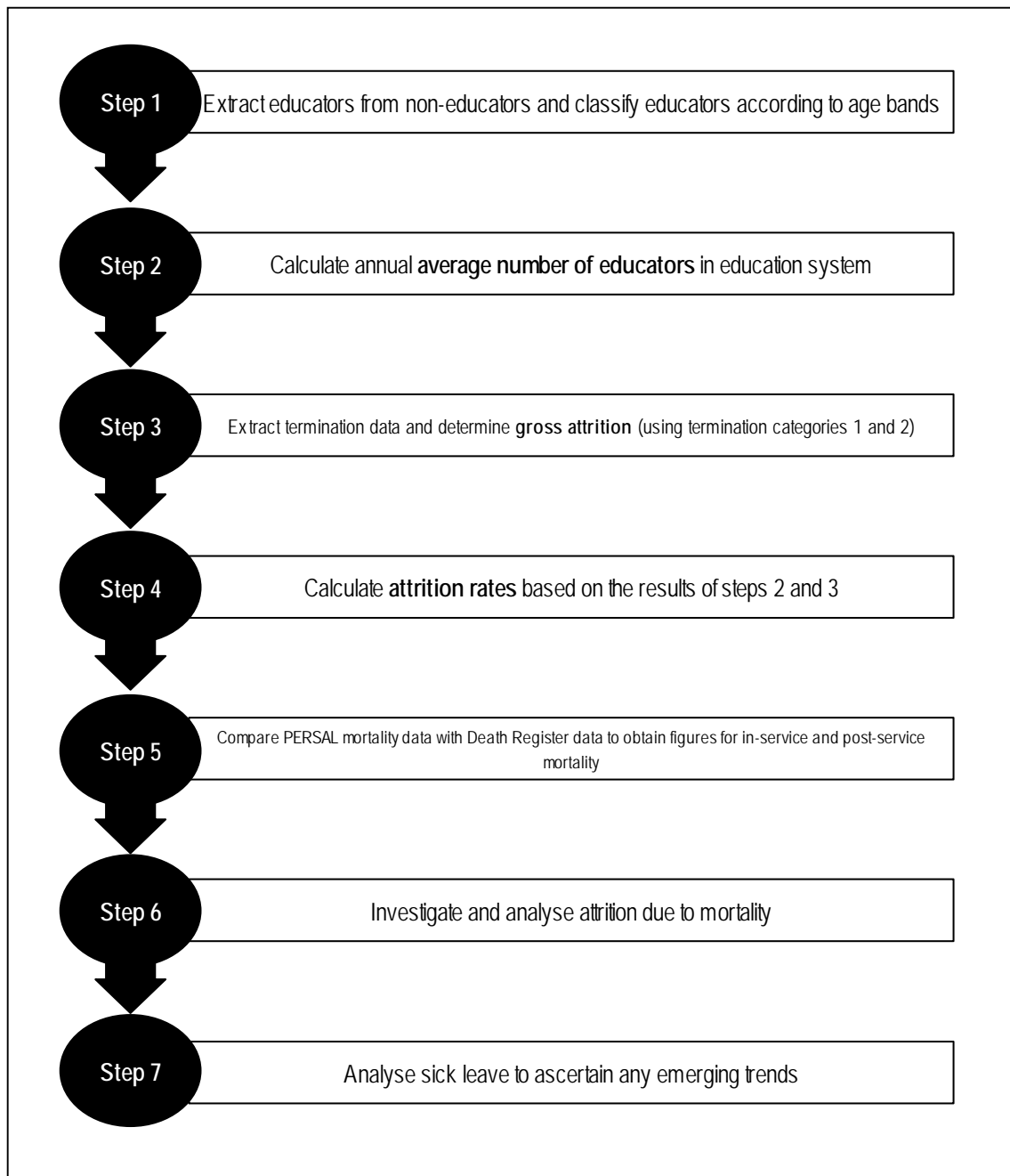
4.11 RACE CATEGORIES USED IN THE ANALYSIS

PERSAL brings with it the legacy of a series of race categories which can no longer be considered acceptable. These included Non-white, Coloured, Asian and White. For this reason, this study has defaulted to the same categories that are used by Statistics South Africa for the purpose of census and demographic analysis; Black African, Coloured, Indian or Asian and White.

5 DATA ANALYSIS PROCESS

The research assumptions and definitions alluded to above provide an indication of the data analysis process that MTT executed in order to analyze actual historical educator attrition trends in the Department of Education from 1997/98 to 2003/04. Before presenting the analysis results in Sections 6 to 9 of this report, **Figure 2** below summarizes the data analysis process:

Figure 2: Data Analysis process for calculation of actual historical educator attrition trends



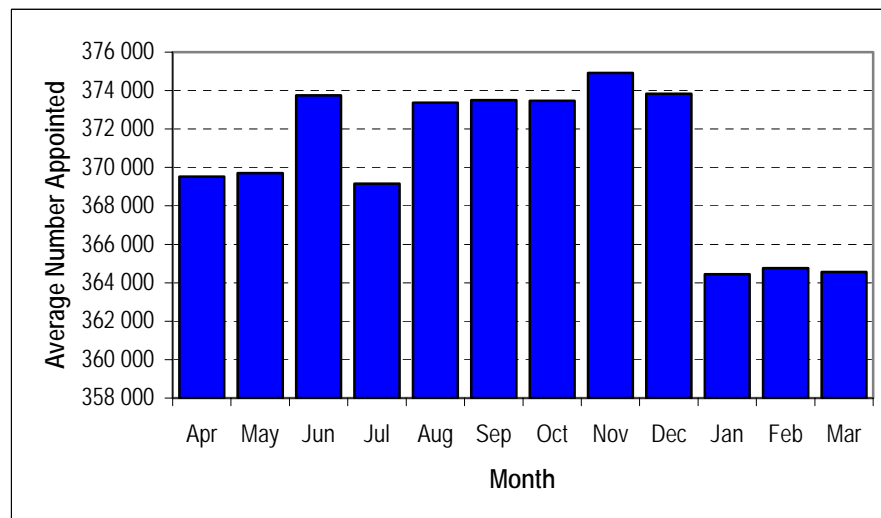
6 RESULTS AND INTERPRETATIONS PART A: EDUCATION DEPARTMENT APPOINTMENTS (1997/98 – 2003/04)

6.1 CALCULATING THE NUMBER OF EDUCATORS IN THE EDUCATION SYSTEM ON AN ANNUAL BASIS

Educator attrition and mortality rates are calculated by expressing educator attrition or mortality (numerator) as a percentage of the total number of educators in the education system in any given year (denominator). Thus, the first step in MTT’s analysis was to calculate an annual number of state-paid educators in the education system so that these could be used as the denominators in attrition and mortality rate analyses. However, this is not a straightforward calculation since there are monthly fluctuations, particularly at the end of the year. These are largely due to relief and contract appointments, which are terminated and can take a while to be renewed.

A peak in the number of relief and contract educator appointments often occurs in November, declines in January to March of the following year and picks up again during the course of the year. By contrast, the number of ‘Permanent’ appointments generally remains stable from month to month. Another reason for fluctuations in the number of appointments is due to the nature of planning and provision of educators and of appointment processing, which takes place at the end of the year. Teachers also tend to leave at the end of an academic year or term. **Figure 3** below illustrates this trend graphically - note that the Y axis has been set at 360 000 to emphasise the monthly difference, but the *real* difference in the average number of appointments from the lowest month to the highest (Jan – Nov) is 2.9% or 10 469.

Figure 3: Average Number of Appointments⁸ of Educators per month on PERSAL, during the Financial Year period April 1997 to March 2004

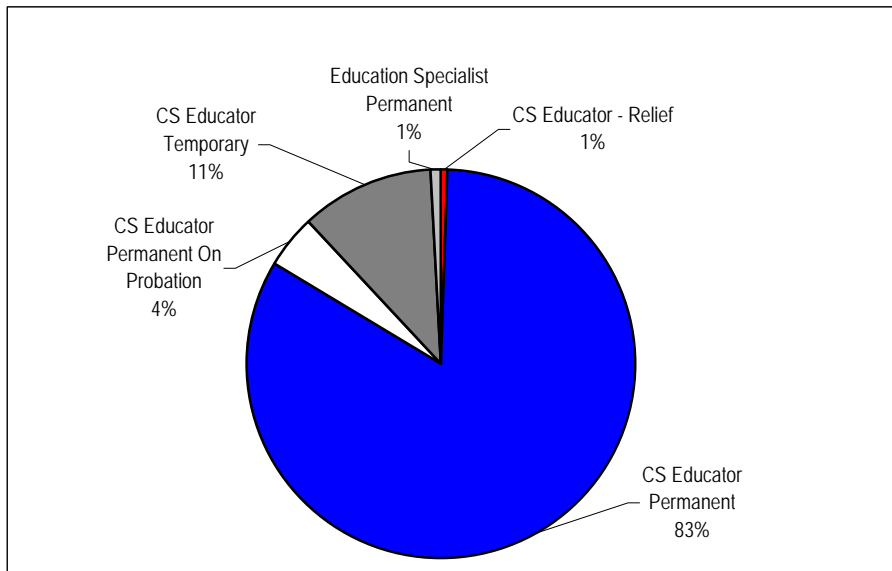


Source: PERSAL

⁸ Note that this refers to all educators employed by the Education Department in a particular month, not just *newly* appointed staff

As stated earlier, since the number of permanent appointments tends to remain fairly stable throughout the year, it would be easiest to use only permanently-appointed educators as the denominator for mortality and attrition rates. However this does not tell the whole story as **Figure 4** below shows: only 83% of educators are classed as 'Permanent' and the remainder are defined as 'Temporary', 'On Probation', 'Relief' and 'Education Specialist', which together represent a sizable additional proportion of all educators (17%).

Figure 4: Breakdown of Nature of Appointment (NOA) Categories for the Educator Workforce in PERSAL, April 1997 to March 2004



Source: PERSAL

Given the fluctuation in numbers of educators throughout the year and the fact that mortality and attrition figures needed to be expressed as a proportion of this, a rational approach had to be adopted to determine what figure to use as the denominator. Several approaches were considered, including using the *highest* number of appointments in a year, the *lowest* number, the *median* or the *average*. After the relative merit of these approaches was considered, it was decided that the *average* number of appointments for the 12 months would be most appropriate. This involved calculating the number of appointments for educators in each month in a specific financial year, summing them and dividing by 12. The resulting figure was the denominator used for mortality and attrition calculations. **Table 6** shows the calculated average for each of the financial years under study.

Table 6: Average number of State-paid educator appointments 1997/98 to 2003/04

Year	Average Number of Appointments	Year on Year Change (%)
1997/98	386 735	
1998/99	380 311	-2%
1999/00	368 281	-3%
2000/01	362 521	-2%
2001/02	360 203	-1%
2002/03	366 320	2%
2003/04	368 548	1%

Source: PERSAL

When the data is disaggregated by Nature of Appointment (see **Table 7** below) it can be observed that the number of permanent educators has apparently remained stable during the period, but that there has been a big decline in the number of Temporary Educators, from a monthly average of 61 206 in 1997/98 to just 34 110 in 2003/04.

There are many possible reasons for the 4.7% decline in the total number of educators and the major decline (44%) in the number of temporary educators. One is that in terms of labour legislation, provincial education departments were obliged to make long-term temporary educators permanent – there has therefore been an ongoing process of appointing temporary educators as permanent during the period under review and a trend for advertised permanent posts to be filled with temporary educators.

Temporary educators would thus have been appointed to replace those permanent educators who left as part of normal attrition (resignation, death, retirement etc). In addition to this, Voluntary Severance Packages originally offered to educators in the early years of integration will have resulted in an early decline in the number of posts - this was part of the effort to rationalise the Civil Service.

These factors have a significant bearing on the subsequent calculation of mortality and attrition rates, since even with a stable level of mortality and attrition, a decline in the total number of educators would mean a rise in overall rates.

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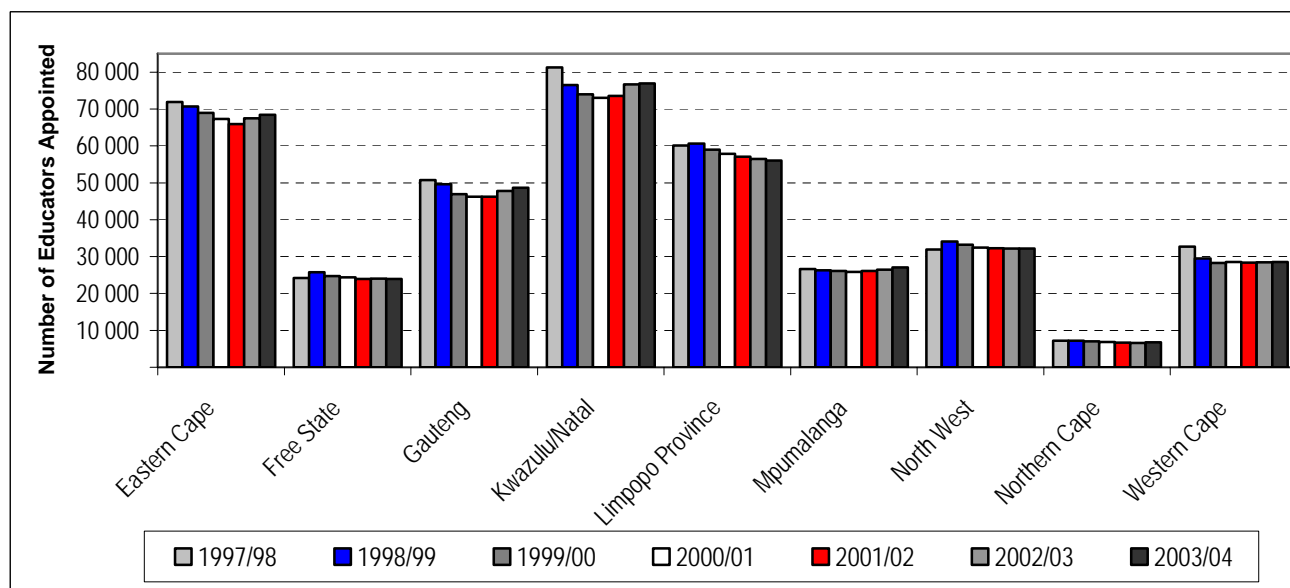
Table 7: Average number of Appointments by Nature of Appointment: State-paid educators 1997/98 to 2003/04

Nature of Appointment	Average number of Appointments						
	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04
CS Educator - Relieve	2 721	1 350	1 852	1 940	2 229	2 745	3 037
CS Educator Permanent	300 800	311 617	312 137	308 282	304 810	306 274	304 470
CS Educator Permanent On Probation	18 756	12 257	12 903	13 577	15 757	20 714	21 983
CS Educator Temporary	61 206	52 096	38 375	35 738	34 334	32 650	34 110
Education Specialist On Probation	363	195	105	130	145	279	321
Education Specialist Permanent	2 483	2 538	2 719	2 672	2 764	3 512	4 466
Part Time Teacher	364	230	166	157	140	127	124

Source: PERSAL

The provincial breakdown of average number of appointments, shown in **Figure 5** below, shows that there has been a decline in almost all provinces in South Africa. The notable exception is Mpumalanga, where there has been a slight increase, after a marginal dip in the year 2000/01. The most significant and consistent decline was in the Western Cape where the average number of educators appointed decreased by 13% during the period. Other provinces with relatively large reductions were Limpopo Province and the Northern Cape.

Figure 5: Average Number of Educators Appointed by Province on PERSAL by Year: 1997/98 to 2003/04



Source: PERSAL

A summary of the key data relating to change in the characteristics of the workforce is presented in **Table 8** below.

Table 8: Demographic characteristics of the educator workforce 1997/98 and 2003/04

	Average number of appointments of educators			
	1997/98		2003/04	
	Number	%	Number	%
Total	386 735		368 548	
Sex				
Male	136 260	35%	127 956	35%
Female	250 476	65%	240 592	65%
Race				
African	286 591	74%	288 891	78%
Coloured	34 910	9%	29 304	8%
Indian	12 778	3%	10 382	3%
White	52 457	14%	39 971	11%
Age				
under 25 years	7	0.002%	752	0.2%
25 to 29 years	3 575	1%	15 044	4%
30 to 34 years	52 235	14%	62 356	17%
35 to 39 years	94 168	24%	91 766	25%
40 to 44 years	83 834	22%	77 747	21%
45 to 49 years	68 060	18%	61 158	17%
50 to 54 years	43 053	11%	37 188	10%
55 to 59 years	22 452	6%	16 513	4%
60 years and above	19 352	5%	6 025	2%

Source: PERSAL

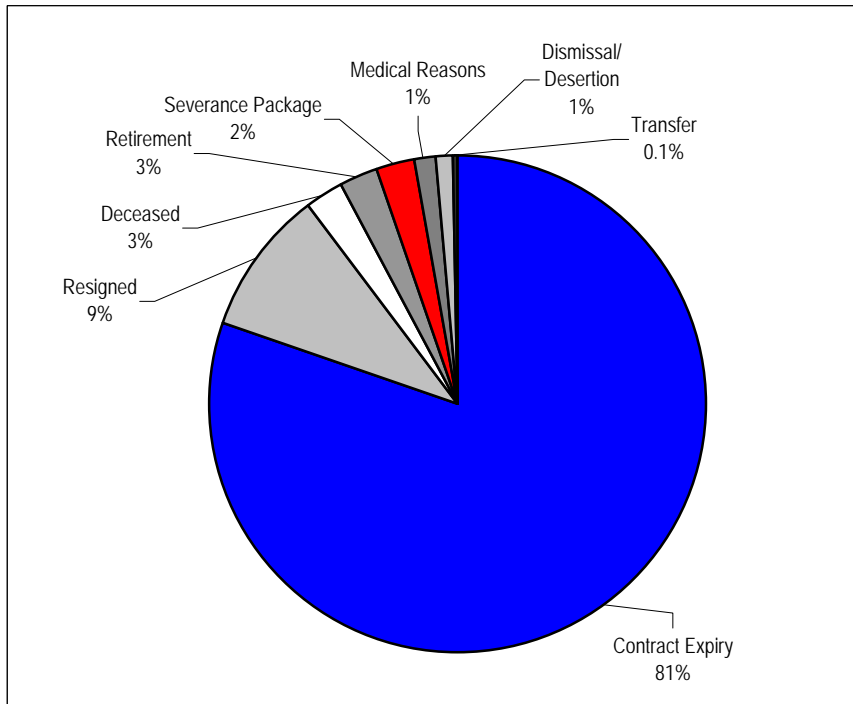
7 RESULTS AND INTERPRETATIONS PART B: GROSS EDUCATOR ATTRITION AND EDUCATOR ATTRITION RATES (1997/98 TO 2002/03)

7.1 PERSAL TERMINATIONS DATA

The PERSAL terminations data that were supplied to MTT provided details of all cases where employees had either left the education system or their employment status had changed. It included information on resignations, retirements, deaths, transfers and dismissals as well as contract expiries. The largest number of terminations for educators consisted of either 'Contract Expiry' or 'Service Period Expired', which together accounted for 81% of all records. However, *in most cases*, these terminations were followed by immediate contract renewal (the next month), *so were equivalent to continuous employment*.

After Contract Expiry, Resignations were the next most common form of termination, accounting for 9%, followed by Death, accounting for 3% of records during the period April 1997 to March 2004 (see **Figure 6** below). The fourth largest form of termination was Retirement, which accounted for 3%, followed by Severance Packages with 2%.

Figure 6: Proportion of Terminations by Type for State-paid Educators as reflected in PERSAL from April 1997 to March 2004



Source: PERSAL

7.2 GROSS ATTRITION

Gross attrition refers to the number of employees of the National and provincial education departments in South Africa who leave the department, for whatever reason. Educator attrition for a given time period is defined as the number of educators that have left the employment of the department(s) of education within that time period. This can be measured by analysing the employment termination data in PERSAL, which records the date that an educator's employment commenced, the date that it ended (terminated), as well as the reason for termination.

Determining the educator attrition rate is not as clear-cut as might be imagined, due to the fact that (as discussed above) there are a large number of Temporary Educators whose services are terminated and reinstated either the following month or within a short period, as their contracts are being renewed. For this reason, only the Permanent (no re-instatement)

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and Long-term (more than 6 months before re-instatement) termination categories have been included in attrition calculations (see Section 4.5 for a comprehensive definition).

Permanent and long-term attrition totals and rates are shown in **Table 9** below, which reveals that there have been fluctuations in gross educator attrition during the period under review. The national attrition rate in 1997/98 was 9.3% (accelerated by rationalisation), dropping to 6.4% the following year and declining to 5.5% in 2000/01 before beginning to rise again to 5.9% in 2002/03. However these rates vary significantly by province.

Table 9: Educator Attrition and Educator Attrition Rates based on permanent and long-term termination

Financial Year	Average Number of Educator Appointments	Attrition			Educator Attrition Rate
		Permanent Termination (No Reinstatement)	Long-term Termination (Reinstatement only after 6 months or more)	Total Termination	
		Column A	Column B	C = (A) + (B)	
1997/98	386 735	23 893	12 184	36 077	9.3%
1998/99	380 311	15 719	8 549	24 268	6.4%
1999/00	368 281	12 552	8 425	20 977	5.7%
2000/01	362 521	12 449	7 505	19 954	5.5%
2001/02	360 203	13 809	6 984	20 793	5.8%
2002/03	366 320	15 232	6 400	21 632	5.9%

Source: PERSAL

7.3 REASONS FOR EDUCATOR TERMINATION

The data in **Table 9** suggest that while fewer educators left the system around the turn of the century, there is limited cause for optimism as the rates have shown an increase since that point. The large number of educators that left the Department during the early years of amalgamation and as part of the process of rationalization has been discussed above. This had the effect of inflating attrition rates during 1997/98 and 1998/99. In 1997/98 alone, 5 931 educators were listed on PERSAL as having taken a 'Mutually Agreed Severance Package'. A further 2 232 were shown in 1998/99 as having taken a Severance Package, together with 6 241 who 'Resigned'. Attrition therefore needs to be viewed in terms of its changing *composition* over time: The early years were characterized by high numbers of Severance Packages and Dismissals, whereas more recent years have seen rising proportions of Deaths, Medical Retirement and Resignations.

Table 10 and **Figure 7** illustrate this trend. *The relative proportion of terminations accounted for by Deaths (excluding Contract Expiries) has risen from 7.0% in 1997/98 to 17.7% in 2003/04. Similarly, the proportion of terminations due to Medical Reasons has grown from 4.6% to 8.7% over the period. By contrast, the number of Severance Packages and Transfers has declined considerably. By 2003/04 resignations had accounted for 53% of all educator terminations.*

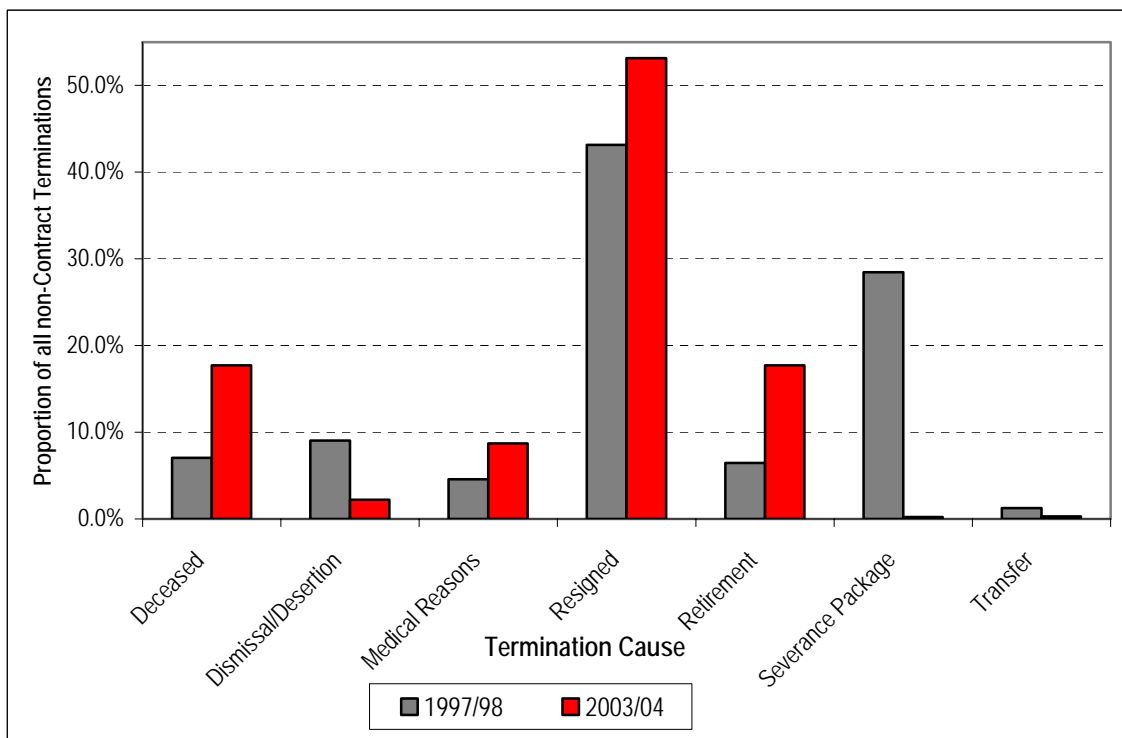
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Table 10: Percentage Terminations by Cause for Educators in PERSAL excluding Contract Expiries, 1997/98 to 2003/04

Year	Termination Cause excluding Contract Expiry						
	Deceased	Dismissal/Desertion	Medical Reasons	Resigned	Retirement	Severance Package	Transfer
1997/98	7.0%	9.1%	4.6%	43.1%	6.5%	28.4%	1.3%
1998/99	12.7%	3.4%	7.5%	44.3%	13.0%	15.8%	3.3%
1999/00	15.5%	4.6%	9.9%	48.2%	15.9%	4.9%	0.9%
2000/01	15.9%	3.6%	9.5%	51.1%	16.7%	2.5%	0.6%
2001/02	15.6%	3.4%	8.6%	48.3%	14.1%	9.4%	0.5%
2002/03	17.4%	3.2%	8.3%	53.6%	16.1%	0.9%	0.4%
2003/04	17.7%	2.2%	8.7%	53.1%	17.7%	0.2%	0.3%

Source: PERSAL

Figure 7: Percentage Terminations by Cause for Educators in PERSAL excluding Contract Expiries, 1997/98 versus 2003/04



Source: PERSAL

A summary of key attrition data is presented in **Table 11** below.

Table 11: Summary of attrition data for the educator workforce 1997/98 and 2003/04

	Educator Attrition (Permanent + Long Term ⁹)			
	1997/98		2002/03	
	Number	%	Number	%
Total	36 077		21 632	
Sex				
Male	12 335	34%	7 006	32%
Female	23 742	66%	14 626	68%
Race				
African	18 524	51%	13 798	64%
Coloured	4 097	11%	1 936	9%
Indian	2 761	8%	1 010	5%
White	10 695	30%	4 888	23%
Age				
< 25 years	6	0.02%	208	1.0%
25 to 29 years	1 759	5%	2 557	12%
30 to 34 years	8 320	23%	4 996	23%
35 to 39 years	6 431	18%	4 304	20%
40 to 44 years	4 131	11%	2 925	14%
45 to 49 years	3 544	10%	2 072	10%
50 to 54 years	3 152	9%	1 365	6%
55 to 59 years	2 991	8%	1 282	6%
60 years and above	5 743	16%	1 923	9%

Source: PERSAL

8 RESULTS AND INTERPRETATIONS PART C: EDUCATOR ATTRITION DUE TO MORTALITY (APRIL 1997 – MARCH 2004)

The mortality data were separated into two main categories: *In-Service* and *Post-Service*. In-Service Mortality was defined as referring to those deaths that occurred whilst the person was employed by the Education Department (Service Termination Type = 2). In this case, a date of death was recorded on PERSAL, as well as a date indicating when the transaction was posted (or reflected) on the system. On average, there was a three-month delay between a person's

⁹ Reinstatement only after 6 months or more

date of death and the date of it being registered on PERSAL. In 4% of cases, it took more than 12 months for the death to be recorded on PERSAL.

It should be noted therefore that **mortality data for the year 2003/04 are estimated to undercount mortality by approximately 15% due to the time lag between an educator death and when this information is captured on PERSAL.**

8.1 DEFINITION OF IN-SERVICE MORTALITY

This section of the PERSAL analysis is concerned with those records in the terminations data where the reported cause of termination was 'Deceased' and where the employees were designated as part of the educator workforce. The *apparent* total number of deaths for educators during the period April 1997 to March 2004 was **12 560**. However, linking Home Affairs National Death Register data led to the discovery of an additional **430** In-Service deaths amongst educators: These were cases where the reported termination cause was not 'Deceased' but where the Home Affairs-supplied date of death was the same as, or slightly earlier than the Resignation date in PERSAL. Fifty-five percent (237) of these were contract and periodic employees who, since they were not entitled to any benefits, were simply recorded on PERSAL as a terminated periodic or temporary appointment. This confirms a total of **12 990** of in-service educator deaths over the period

By linking this information to the appointments data it was possible to determine the age, race and gender of the individuals involved, as well as the date of death and the provincial Education Department that employed them. In all cases, the calculation of deaths was based on the year in which the death *occurred*, rather than the year when it was actually reflected in PERSAL.

8.2 POST-SERVICE MORTALITY AMONGST EDUCATORS

Post-Service mortality was defined as deaths that occurred *after* the educator had left the Education Department. There is considerable interest in this issue, since it is unlikely that In-Service mortality tells the whole story. In order to investigate this, an extract of all PERSAL terminations of non-death type for the period 1997/98 to 2003/04 was sent to the Department of Home Affairs. This extract consisted of 430 000 records. The Department of Home Affairs searched their Register of Deaths and identified all post-termination deaths whilst also providing the date and cause of such deaths. The additional 13 533 deaths reported by Home Affairs was reduced by eliminating duplicates, such as the same PERSAL number having different IDs, to 13 169 distinct PERSAL numbers¹⁰. These deaths were then recorded against the non-death terminations without overwriting the original termination type and reason. Since some individuals had many records in the terminations data (due to Termination Types such as 'Contract Expiry') only the most recent non-death termination was listed in the Deaths Report¹¹.

Home Affairs identified **3 853** deaths for educators amongst the data that were provided to them where the recorded date of death was later than the resignation date shown in PERSAL.

¹⁰ 'Background to Deaths Report' – Albert Buckle

¹¹ 'Background to Deaths Report' – Albert Buckle

This component of the data under review has been defined as Post-Service mortality, even if death occurred only one month after the person left the Department.

The average time-lag between non-death terminations and the Home Affairs-reported date of death was 27 months. This tends to be skewed by 'normal' post-termination deaths that occur a long time after the educator has left the Department, for example in the case of retirement. *However, almost one third (31%) of the non-death terminations that Home Affairs reported as a subsequent death occurred within 1 year of the educator leaving the department(s) (1 202 out of 3 853 Post-Service deaths).*

The original non-death termination causes for Educators in the Home Affairs supplied post-termination deaths are shown in **Table 12** below. Over a third was originally categorized as educators whose contracts had expired and an additional 16% were for Medical Reasons.

Table 12: Original Termination Causes for Educators in PERSAL subsequently reported as Deceased by Home Affairs, 1997/98 to 2003/04

Original Termination Cause	Percent
Contract Expiry	37%
Retirement	17%
Medical Reasons	16%
Resigned	16%
Severance Package	10%
Dismissal/Desertion	5%
Transfer	0.1%
Total	100%

Source: PERSAL

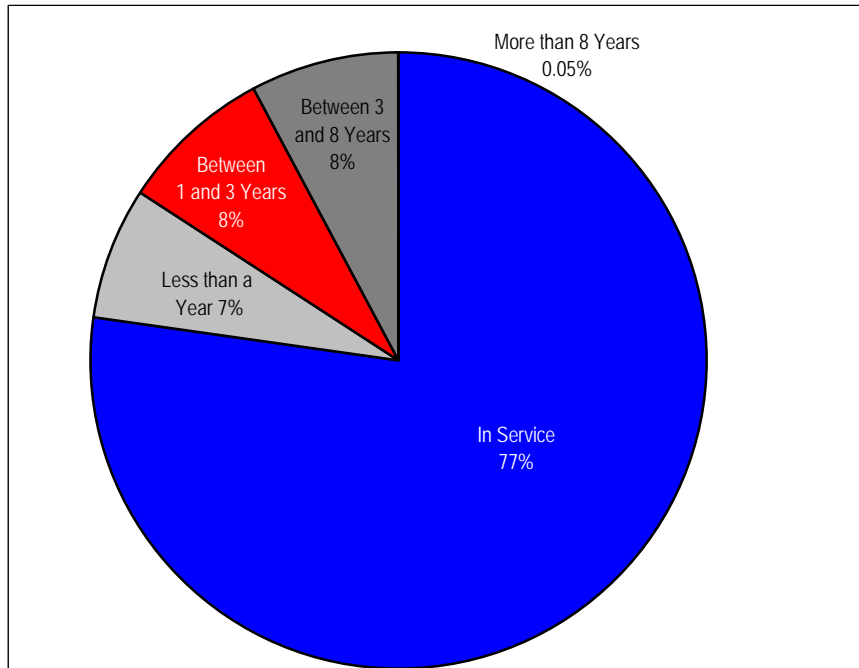
The amalgamated record of In-Service and Post-Service deaths, derived from PERSAL and Home Affairs forms the basis of the mortality analysis below. It has been confined to educators only for the financial years 1997/98 through to 2003/04.

8.3 TOTAL MORTALITY

Figure 8 below shows the composition of the data under analysis and reveals that the bulk (77%) was for educators who died In-Service. This number was supplemented by **an additional 1 202 (7%) who died within a year after leaving**, 1 359 (8%) who died within three years, and 1 284 (8%) who died between three and eight years. A small number died after more than eight years – this number is low since the period of analysis only commenced in April 1997.

Based on these data and the proposition that in-service mortality per se does not tell the full story, this analysis has therefore combined those educators who died within one-year of leaving service with those educators dying in-service to constitute a single category. It may be argued that this definition should be extended to include those educators who died within three-years of leaving service, but those who feel strongly in this regard can simply do the analysis for themselves on the basis of the data provided.

Figure 8: Breakdown of Total Mortality for State-paid Educators as reflected in PERSAL and supplemented by Home Affairs Death Register data, April 1997 to March 2004



Source: PERSAL and National Death Register

Table 13 shows the consolidated mortality data for educators broken down by In-Service and various Post-Service categories. It should be noted that data for the financial year 2003/04 are incomplete. This, as described earlier, is due to the time lag associated with deaths appearing on PERSAL – since MTT were only provided with Terminations data up to July 2004 it is likely many deaths attributable to 2003/04 that would have appeared beyond July 2004 would have been missed. It is estimated that that the undercount is in the region of 15% (see 4.2).

The total number of In-Service deaths has grown from 1 425 in 1997/98 to 1 856 in the year 2003/04, an increase of 30%.

The reduction of In-Service deaths between 2002/03 and 2003/04 (from 2 086 to 1 856) is due to the time lag between actual deaths and the date when they are finally reflected in PERSAL, which on average is 3 months and in 30% of all cases, more than 4 months.

Table 13: Total In-Service and Post-Service Deaths amongst State-Paid Educators, 1997/98 to 2003/04

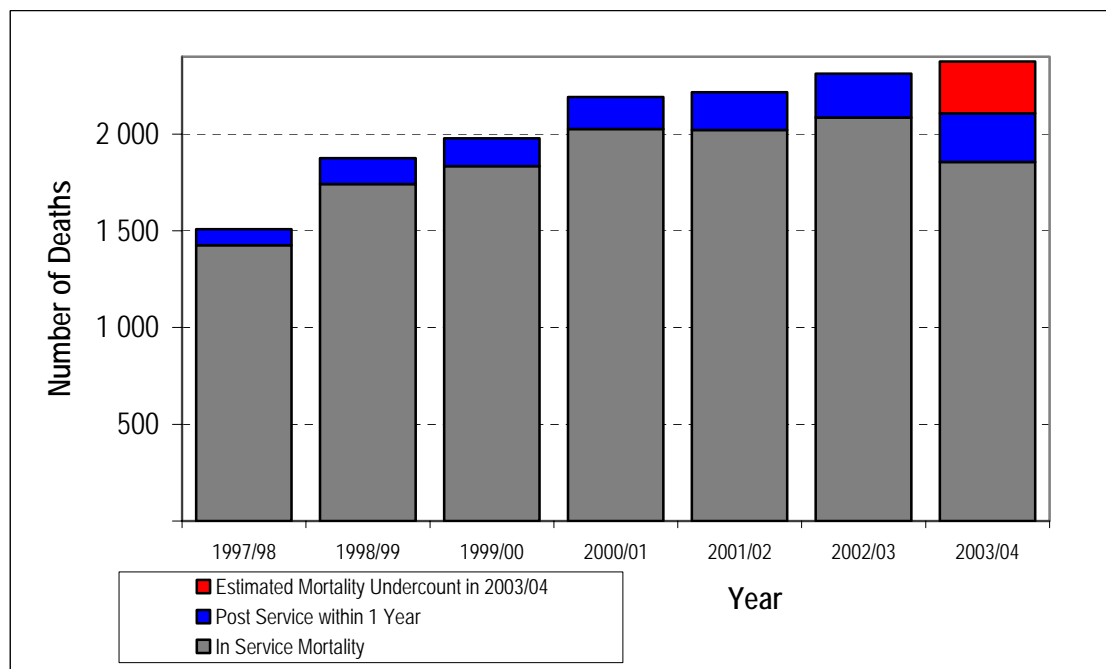
Year	In-Service Mortality	Post-Service Mortality (within 1 year after leaving service)	TOTAL "IN-SERVICE" MORTALITY (In-Service PLUS one year after leaving service)	Post-service Mortality (1 to 3 years)	Post-service Mortality (3 to 8 years)	Post-service Mortality (8 years +)	TOTAL POST-SERVICE MORTALITY
	Column A	Column B	Column C = A + B	Column D	Column E	Column F	G = D + E + F
1997/98	1 425	84	1 509	2			2
1998/99	1 742	134	1 876	101			101
1999/00	1 834	145	1 979	203	5		208
2000/01	2 026	166	2 192	237	93		330
2001/02	2 021	195	2 216	250	246	1	497
2002/03	2 086	226	2 312	249	377		626
2003/04	1 856 ²	252	2 108	317	563	7	887
Total	12 990	1 202	14 192	1 359	1 284	8	2651

Source: PERSAL and National Death Register

² Data an under-estimate of approximately 15%

Total mortality In-Service and Post-Service (within one year after leaving service) has increased from 1 509 in 1997/98 to 2 108 in 2003/04, an increase of 40%. The composition of total mortality is shown graphically in **Figure 9** below, including an estimate of the mortality undercount in 2003/04. It can be seen that Post-Service mortality adds an increasing proportion to total mortality – this is partly due to the cumulative nature of this data – as more time elapses since 1997/98, the greater the chance that those people who left the service in earlier years will have died. The tailing off of In-Service mortality needs also to be viewed both in light of the time lag between deaths occurring and their appearance on PERSAL (discussed above) and the fact that the number of personnel in the system has declined since 1997/98, which changes the denominator for mortality rates (an issue discussed in more detail below).

Figure 9: In-Service and Post-Service Deaths amongst State-Paid Educators, PERSAL 1997/98 to 2003/04

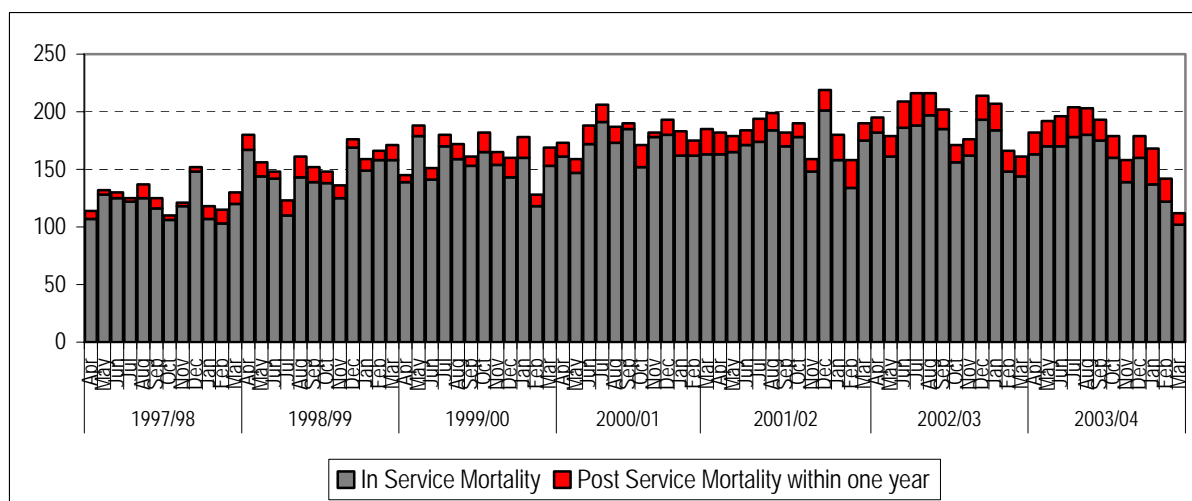


Source: PERSAL and National Death Register

Another way of reviewing the mortality data is in terms of month-by-month trends. This helps reveal whether there are seasonal fluctuations in mortality rates and whether or not mortality peaks in certain months. Since a component of Post-Service mortality might be considered 'normal', particularly when occurring several years after the individuals have left the service, it is more useful to focus on In-Service mortality and only Post-Service mortality that has occurred within one year of leaving.

Figure 10 below shows the month-by-month trends for In-Service and Post-Service mortality for the period April 1997 to March 2004. Although the overall trend is upwards, there are significant variations from month to month. On average, most deaths occur (or are reported) in December and the least in February.

Figure 10: Monthly In-Service and Post-Service (within 1 year) Mortality amongst State-Paid Educators, PERSAL April 1997 to March 2004



Source: PERSAL and National Death Register

8.4 CRUDE MORTALITY RATES

Mortality Rates consider the number of In-Service deaths amongst state-paid educators AND the number of Post-Service deaths *within 1 year*, in relation to the number of appointments. Data have been disaggregated by age, sex, province and qualification level for financial years.

Table 14 below shows the number of In- and Post-Service deaths (within 1 year) for educators in relation to the average number of appointments. The third column in the table indicates the number of deaths as a percentage of appointments, irrespective of age. This is not a mortality rate *per se* owing to the differing age bands of the two groups (the average age of the appointments data is lower), but it is shown for interest. Between 1997/98 and 2003/04 **the proportion of deaths in relation to appointments has increased significantly from 0.39% to 0.57%**. The slight decline between 2002/03 and 2003/04 may be due to late entry of some deaths in PERSAL - note that deaths are reported in terms of the year in which they occur rather than the PERSAL transaction year, which could be much later.

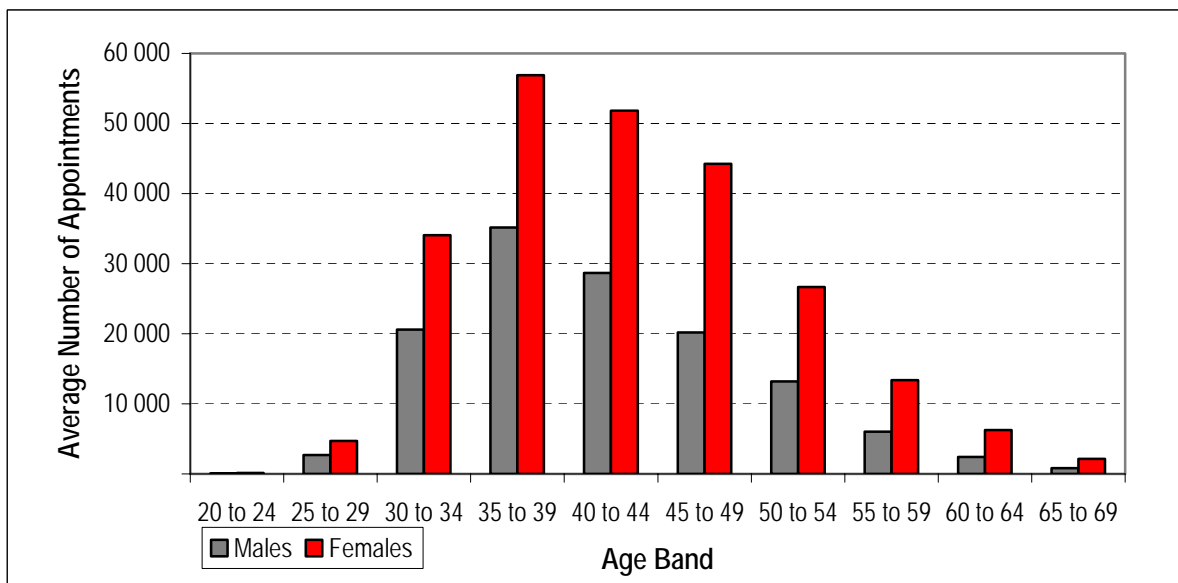
Table 14: Crude Mortality Rates for educators 1997/98 to 2003/04, PERSAL

Year	Average Appointments	Total In-Service and Post-Service Deaths within one year	Deaths as % of Appointments
1997/98	386 735	1 509	0.39%
1998/99	380 311	1 876	0.49%
1999/00	368 281	1 979	0.54%
2000/01	362 521	2 192	0.60%
2001/02	360 203	2 216	0.62%
2002/03	366 320	2 312	0.63%
2003/04	368 548	2 108	0.57%

8.5 AGE-SPECIFIC MORTALITY RATES

The PERSAL appointments and service termination data was coded into 5-year age bands to facilitate age-based mortality analysis, with 1st August 2004 being used as the reference date for the age calculation. This allows for age-specific comparisons to be made and for mortality rates to be compared across age bands. By way of background, **Figure 11** shows the age structure and gender of the educator workforce during the period 1997/98 to 2003/04. The age bands start at 20-24 (although there are very few educators in this category) with a peak in male and female numbers being reached in the age category 35 to 39. The graph illustrates the fact that female educators consistently outnumber males for all age bands – the difference being most marked amongst the 45 to 49 and 55 to 59 age bands, where there are on average 2.2 females for every male. Overall, the average age of educators has declined by two years from 43.3 in 1997/98 to 41.2 in 2003/04. This pattern of mortality by age-band is consistent with the pattern of AIDS impact.

Figure 11: Average number of Educators by Gender and 5-year age band in South Africa, PERSAL 1997/98 to 2003/04



Source: PERSAL

Table 15 below compares the number of appointments and deaths in the 20 to 49 age band to the corresponding appointments and deaths for the age group 50 to 59. In both age groups the mortality rate has increased considerably. The highest increase was amongst the 20 to 49 year olds where it rose from 0.33% to 0.56%. Amongst 50 to 59 year olds it rose from 0.48% to 0.60%.

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Table 15: Mortality Rates for Educators aged 20 to 49 years versus 50 to 59 years, PERSAL 1997/98 to 2003/04

Year	Educators aged 20 to 49 years			Educators aged 50 to 59 years			
	Appoint-ments	Number of Deaths In-Service plus Post-Service within one year of leaving	Mortality Rate	Appoint-ments	Number of Deaths In-Service plus Post-Service within one year of leaving	Mortality Rate	
1997/98	301 879	1 006	0.33%	65 505	313	0.48%	
1998/99	300 952	1 320	0.44%	63 146	385	0.61%	
1999/00	293 775	1 473	0.50%	60 841	331	0.54%	
2000/01	292 013	1 670	0.57%	59 048	373	0.63%	
2001/02	293 590	1 712	0.58%	57 195	397	0.69%	
2002/03	303 317	1 825	0.60%	55 399	392	0.71%	
2003/04	308 821	1 717	0.56%	53 701	320	0.60%	
Increase in Mortality Rate 1997/98 to 2003/04			0.22%	Increase in Mortality Rate 1997/98 to 2003/04			0.12%

Source: PERSAL and National Death Register

A detailed breakdown of Mortality Rates by 5-year age bands is shown in **Table 16** below. These rates are based on In-Service deaths plus Post-Service deaths that occurred within 1 year of the person leaving service. The table shows that although mortality rates amongst the older groups have remained the highest (e.g. 0.72% in age band 55 to 59 in 2003/04) the rates of increase in mortality were much higher in the younger age groups such as 25 to 29, 30 to 34 and 35 to 39. In these age bands, mortality rates increased substantially during the 7-year period, a point illustrated graphically in **Figure 12**.

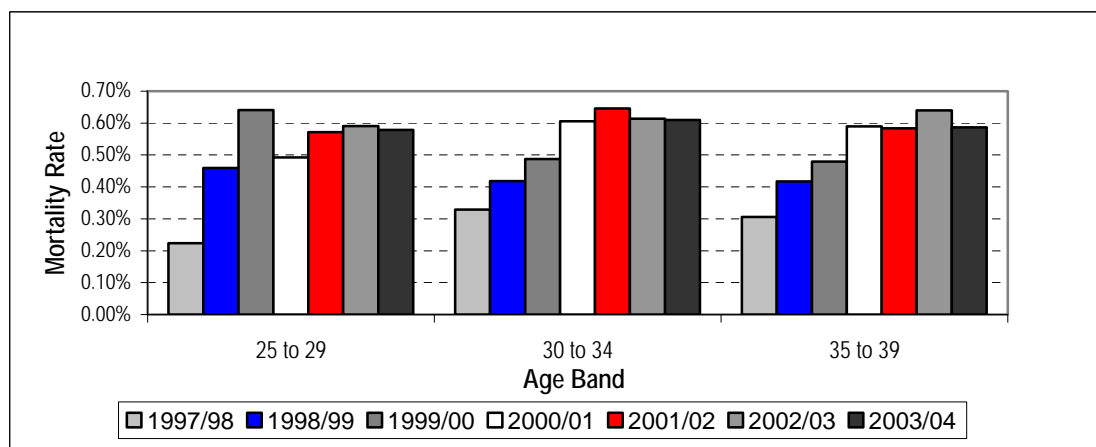
Table 16: Mortality Rates¹² for Educators: 5-year age bands, PERSAL 1997/98 to 2003/04

Year	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59
1997/98	0.22%	0.33%	0.31%	0.36%	0.35%	0.44%	0.55%
1998/99	0.46%	0.42%	0.42%	0.44%	0.48%	0.56%	0.71%
1999/00	0.64%	0.49%	0.48%	0.52%	0.51%	0.53%	0.57%
2000/01	0.49%	0.61%	0.59%	0.55%	0.55%	0.60%	0.71%
2001/02	0.57%	0.65%	0.58%	0.53%	0.60%	0.63%	0.84%
2002/03	0.59%	0.61%	0.64%	0.57%	0.58%	0.62%	0.89%
2003/04	0.58%	0.61%	0.59%	0.51%	0.52%	0.54%	0.72%
Increase in Mortality Rate 1997/98 to 2003/04	0.35%	0.28%	0.28%	0.15%	0.17%	0.10%	0.17%

Source: PERSAL and National Death Register

¹² Based on number of Deaths In-Service plus Post-Service within one year of leaving

Figure 12: Mortality Rates for Educators in 3 key age bands, PERSAL 1997/98 to 2003/04



Source: PERSAL and National Death Register

8.6 GENDER SPECIFIC MORTALITY RATES

The appointments and termination data were provided by PERSAL with a gender breakdown, so it was possible to compare mortality rates for males and females. It should be noted in this respect that in South Africa there are approximately *twice* as many publicly-paid female educators as males¹³. **Table 17** below compares mortality rates for males and females within two age bands, 20 to 49 and 50 to 59. The rates for males are generally twice as high as those for females, the difference being most marked in the 51 to 60 age band. Mortality rates for both sexes in both age bands have increased since 1997/98, although the highest *proportional* increase was amongst females aged 21 to 50, where it almost doubled from 0.23% to 0.45%.

Table 17: Mortality Rates for Male & Female educators aged 20 to 49 and 50 to 59, PERSAL 1997/98 to 2003/04

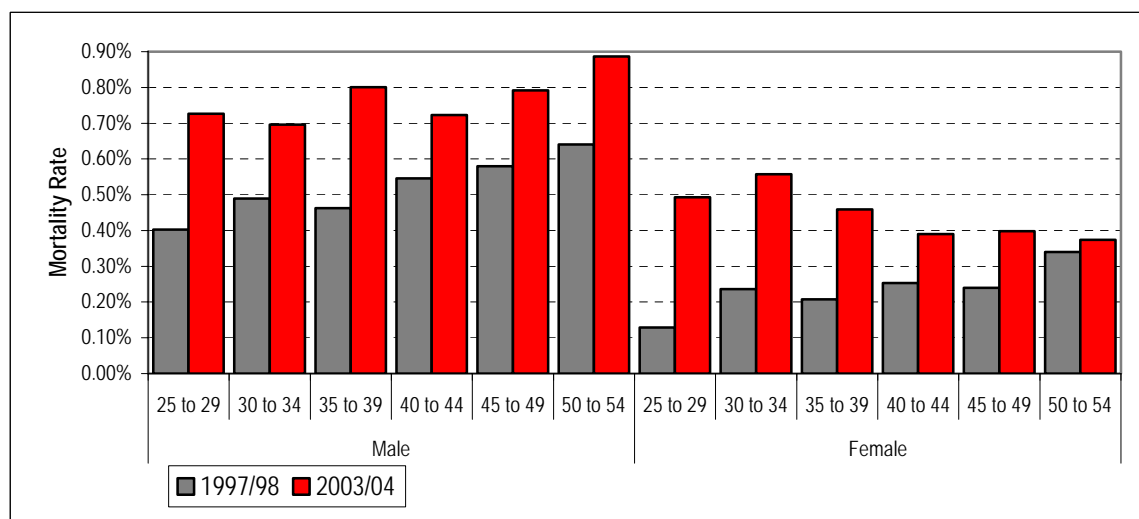
Year	Educators aged 20 to 49		Educators aged 50 to 59	
	Male Mortality	Female Mortality	Male Mortality	Female Mortality
1997/98	0.51%	0.23%	0.78%	0.33%
1998/99	0.61%	0.34%	1.00%	0.42%
1999/00	0.68%	0.40%	0.75%	0.44%
2000/01	0.79%	0.45%	0.94%	0.48%
2001/02	0.77%	0.48%	1.09%	0.51%
2002/03	0.78%	0.51%	1.04%	0.55%
2003/04	0.75%	0.45%	0.97%	0.42%
Increase in Mortality Rate 97/98 to 03/04	0.24%	0.22%	0.19%	0.09%

Source: PERSAL and National Death Register

¹³ Of the 368 000 publicly-paid educators in 2003, 240 000 were females

The increase in mortality rates for Educators from 1997/98 to 2003/04 has been significant. As Table 16 illustrated, these were most marked in the younger age groups, which came from a lower base in 1997/98 but by 2003/04 were reflecting similar mortality rates to much older age groups. When age and gender are taken into consideration, female educators in the youngest age categories have shown the highest increase in mortality. This trend is illustrated in **Figure 13** below, which compares mortality rates by age and gender in 1997/98 with those in 2003/04. By 2003/04, mortality rates for younger female educators (aged 25 to 29 and 30 to 34) were higher than for older female educators.

Figure 13: Comparison of Mortality Rates by age and gender for Educators in 1997/98 versus those in 2003/04



Source: PERSAL and National Death Register

8.7 RACE SPECIFIC MORTALITY

The PERSAL system has included race as a classification since 1997, the defined racial categories being used in this analysis are Black African, Coloured, Indian or Asian and White. This classification allows for disaggregation of mortality rates for educators by race, and within race by age and sex.

Table 18 below compares mortality rates by race for educators aged 20 to 49 and 50 to 59 years from 1997/98 to 2003/04. Mortality amongst Black African Educators is the highest in both age bands, but it is immediately apparent that the differences in mortality *between* races are much more marked in the 20 to 49 age band.

The rate for Black African educators aged 20 to 49 has increased from 0.40% per annum in 1997/98 to 0.66% in 2003/04. A higher relative rate of increase was experienced amongst Indian or Asian Educators, but the actual numbers are very small with the mortality rate only reaching 0.11% in 2003/04. Coloured Educators aged 21 to 50 experienced a moderate increase in mortality, while amongst White Educators for the same age band the rate has remained fairly stable.

Educator Attrition and Mortality in South Africa

The differences in mortality rates for educators aged 50 to 59 by race are less marked. They started from a higher base in 1997/98 (the lowest rate being 0.21% for White educators) and peaked at 0.72% for Black educators, with the lowest rate of 0.25% being amongst White educators.

The high rate of increase amongst Indian or Asian educators aged 50 to 59 is based on *very* small numbers (the number of deaths in 2003/04 was 8 out of a total of 1458 educators aged 50 to 59).

Table 18: Mortality rates¹⁴ by Race for State-Paid Educators aged 20 to 49 and 50 to 59, 1997/98 to 2003/04

Year	Educators aged 20 to 49				Educators aged 50 to 59			
	Black African	Coloured	Indian or Asian	White	Black African	Coloured	Indian or Asian	White
1997/98	0.40%	0.17%	0.07%	0.11%	0.60%	0.38%	0.24%	0.21%
1998/99	0.53%	0.13%	0.09%	0.12%	0.75%	0.29%	0.34%	0.33%
1999/00	0.60%	0.16%	0.16%	0.10%	0.67%	0.34%	0.29%	0.25%
2000/01	0.68%	0.17%	0.20%	0.11%	0.78%	0.52%	0.12%	0.28%
2001/02	0.70%	0.19%	0.11%	0.09%	0.89%	0.37%	0.19%	0.26%
2002/03	0.72%	0.16%	0.18%	0.09%	0.88%	0.37%	0.73%	0.28%
2003/04	0.66%	0.21%	0.11%	0.09%	0.72%	0.47%	0.55%	0.25%
Increase in Mortality Rates 1997/98 to 2003/04	0.26%	0.04%	0.05%	-0.02%	0.13%	0.09%	0.30%	0.04%

Source: PERSAL and National Death Register

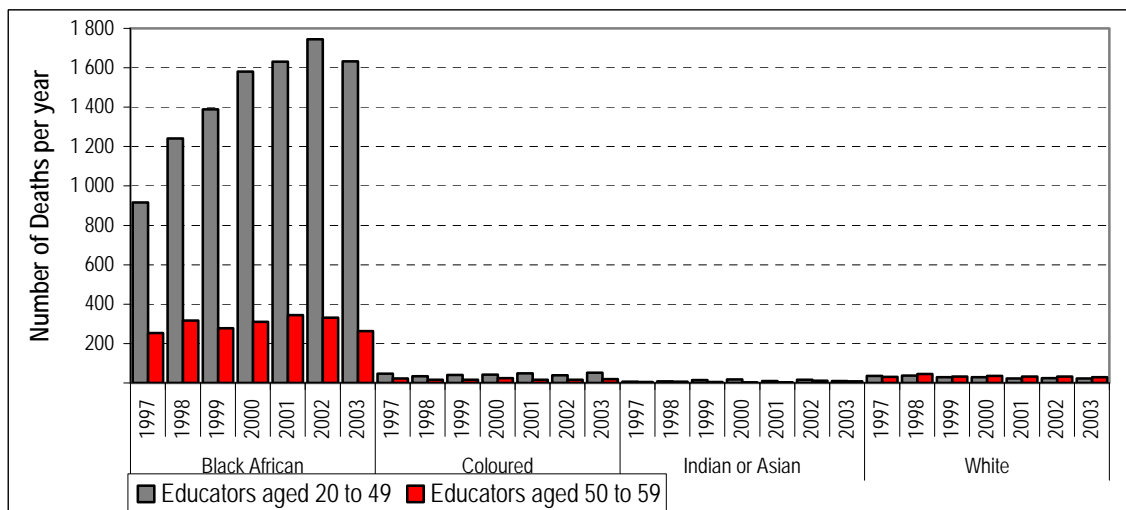
Figure 14 illustrates the actual number of educators that died each year by race and age category. **Since it is showing numbers and not rates it exaggerates the impact amongst Black African educators, who represent 80% of the entire teaching force.** Nevertheless it provides an important indication of the number of educators that would need to be replaced through recruitment from the pool of existing educators not currently in-service and the intake of new teachers via educator training colleges.

It should be noted that mortality is only one component of educator attrition (others include resignation, retirement, medical boarding etc.) but it represents permanent loss to the stock of educators, unlike resignation and maternity leave, where there is scope for re-appointment.

The chart shows that at the peak in 2002/03, a total of 1 745 Black African educators aged 20 to 49 died while either In-Service or within one year of leaving the Education Department. The equivalent figure for Coloured educators was 39, and for Indians or Asians and Whites 16 and 25 respectively.

¹⁴ Based on number of Deaths In-Service plus Post-Service within one year of leaving

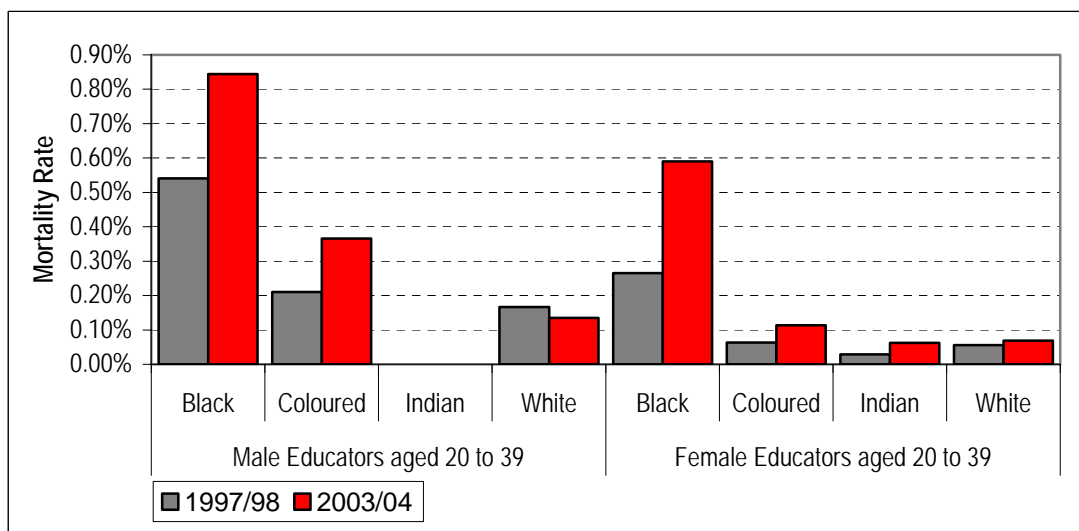
Figure 14: Total Mortality by Race for State-Paid Educators 20-49 and 50-59, 1997/98 to 2003/04



Source: PERSAL and National Death Register

Figure 15 focuses specifically on mortality by race amongst educators aged 20 to 39, comparing rates in 1997/98 with those in 2003/04. Mortality amongst this age group is particularly serious since, given normal conditions; these educators would be expected to teach for another 20 years or more, so the loss in human capital is severe. Mortality rates were highest amongst Black African males aged 20 to 39, which were 0.54% in 1997/98 and increased to 0.84% in 2003/04. Comparative rates for Black African females were lower (0.27% in 1997/98) but the relative rate of increase between 1997/98 and 2003/04 was higher, climbing to 0.59% in 2003/04.

Figure 15: Mortality rates by Race for State-Paid Educators aged 20 to 39 in 1997/98 and 2003/04



Source: PERSAL and National Death Register

8.8 PROVINCIAL MORTALITY OVERVIEW

The appointments and termination data include a Province identifier, so it was possible to calculate and compare mortality rates between the nine provincial education departments. The provinces vary considerably in terms of the relative sizes of the educator workforces (see **Table 19** below). The largest Department in terms of educators was KwaZulu-Natal, which employed an average of 76 968¹⁵ educators in 2003/04, followed by Eastern Cape with 68 391. The smallest was Northern Cape, with an average of 6 755 employed in 2003/04, followed by Free State with 23 969. These figures represent only State Paid employees: In provinces such as Gauteng and Western Cape (particularly in urban areas), there is a significant number of School Governing Body-paid educators not reflected in the Government's PERSAL system.

Table 19: Average number of State-Paid educators by Province from 1997/98 to 2003/04

Year	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo Province	Mpumalanga	North West	Northern Cape	Western Cape
1997/98	71 874	24 242	50 755	81 255	60 083	26 596	31 930	7 160	32 740
1998/99	70 658	25 792	49 571	76 537	60 610	26 288	34 115	7 172	29 447
1999/00	68 981	24 694	46 898	73 951	58 995	26 127	33 228	7 023	28 266
2000/01	67 269	24 366	46 216	73 007	57 842	25 872	32 422	6 863	28 552
2001/02	65 918	23 971	46 245	73 532	57 047	26 066	32 273	6 652	28 376
2002/03	67 470	24 067	47 793	76 681	56 451	26 494	32 172	6 590	28 483
2003/04	68 391	23 969	48 650	76 968	55 995	27 048	32 137	6 755	28 527

Source: PERSAL and National Death Register

¹⁵ Average for 12 months April 2003 to March 2004

Table 20 shows the total number of In-Service and Post-Service deaths within a year for educators in each province. The raw numbers provide an indication of one of the components of educator attrition that provincial education departments have to contend with and the extent to which this has increased over time. The highest number of deaths was in 2003/04 in KwaZulu-Natal, where 638¹⁶ educators died. This was a substantial increase since 1997/98 where it was 441. The province with the second highest total mortality was Eastern Cape, with 419 deaths in 2003/04 and Limpopo, with 224.

Table 20: Total Deaths amongst State-Paid educators¹⁷ by Province from 1997/98 to 2003/04

Year	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo Province	Mpumalanga	North West	Northern Cape	Western Cape
1997/98	328	129	132	441	184	97	106	25	67
1998/99	425	134	154	567	209	170	132	22	63
1999/00	404	163	155	611	200	186	169	23	67
2000/01	428	177	151	800	211	167	160	31	67
2001/02	455	187	180	705	263	184	156	38	48
2002/03	419	203	199	790	248	173	182	22	73
2003/04	419	168	200	638	224	182	176	32	69
% Increase in number of deaths	28%	30%	52%	45%	22%	88%	66%	28%	3%

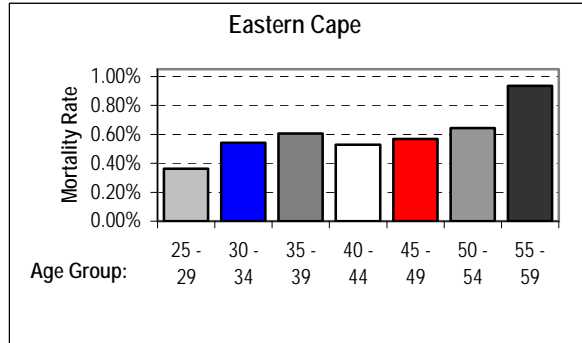
Source: PERSAL and National Death Register

Figure 16 below compares provincial mortality rates for educators by age band for the financial year 2003/04. The same y-axis scale has been used to allow visual comparisons between provinces. The highest mortality rate in 2003/04 was amongst 25 to 29 year olds in KwaZulu-Natal, where it was 1.04% (equivalent to 52 deaths amongst 5 008 educators in one year). Two provinces in particular do not follow the traditional demographic pattern of higher mortality rates amongst older age groups, notably KwaZulu-Natal and Free State, where the highest mortality rates are amongst the younger age bands. There are also several other provinces where mortality rates amongst younger age groups are relatively high such as Mpumalanga and Limpopo provinces.

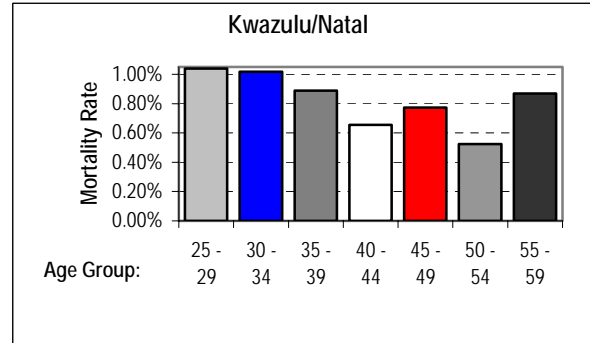
¹⁶ Subject to an undercount of approximately 15%

¹⁷ Based on number of Deaths In-Service plus Post-Service within one year of leaving

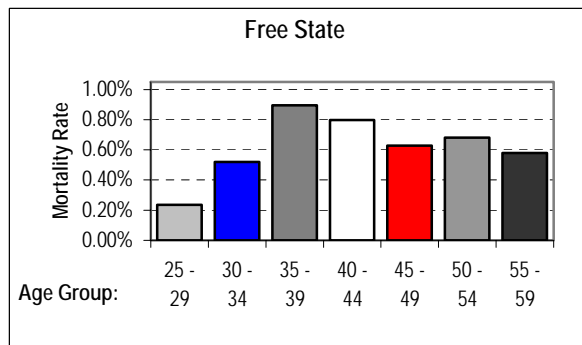
Figure 16: Mortality Rates for State-Paid educators by age band and province for 2003/04



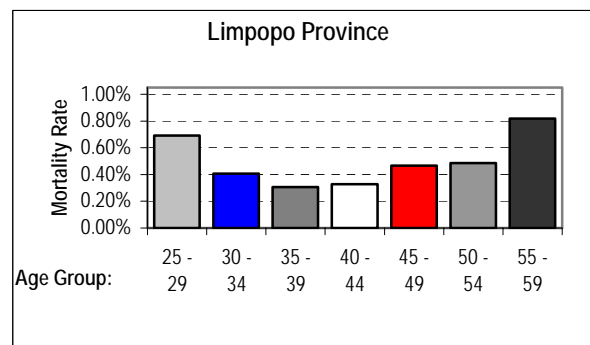
Source: PERSAL and National Death Register



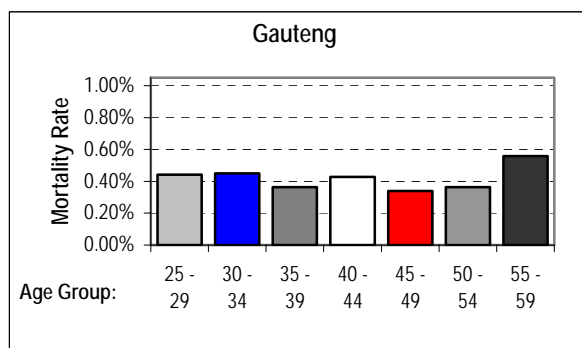
Source: PERSAL and National Death Register



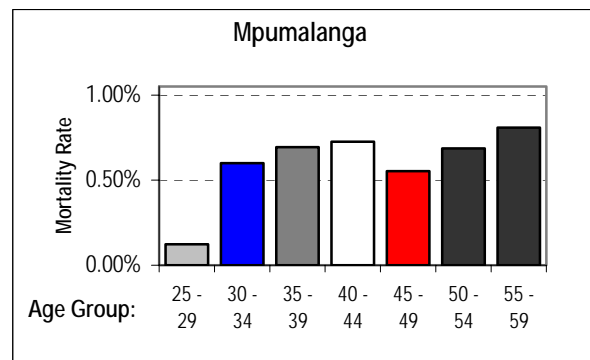
Source: PERSAL and National Death Register



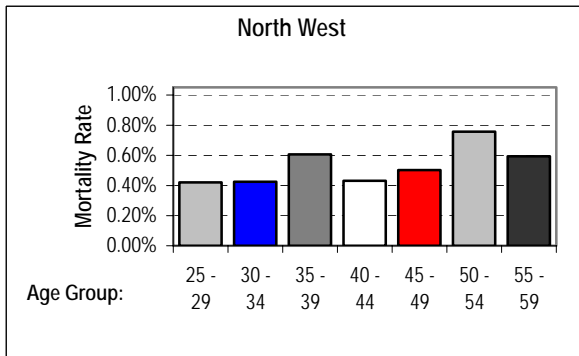
Source: PERSAL and National Death Register



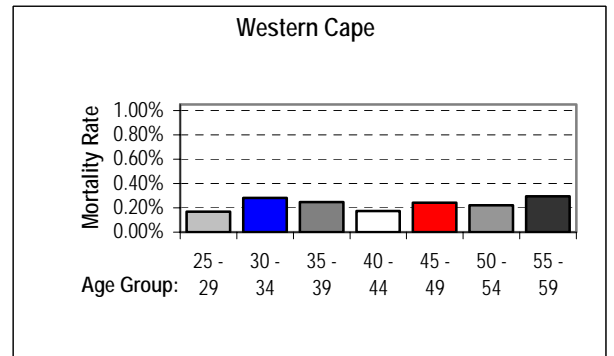
Source: PERSAL and National Death Register



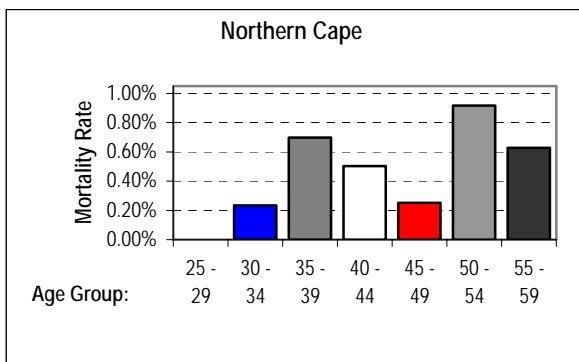
Source: PERSAL and National Death Register



Source: PERSAL and National Death Register



Source: PERSAL and National Death Register



Source: PERSAL and National Death Register

Table 21 shows how mortality rates have increased amongst young educators in each province between 1997/98 and 2003/04. The table provides a breakdown for males and females aged 20 to 39 indicating the extent to which mortality rates have changed for the period. The highest increase in mortality has been amongst female educators aged 20 to 39 in KwaZulu-Natal: starting from a relatively low base of 0.36% in 1997/98, it climbed to 0.89% in 2003/04 (in real terms a figure of 242 deaths amongst 27 176 educators in one year). High rates of increase were also evident amongst male educators in Free State and North West provinces. Female mortality rates started from a lower base relative to male mortality in 1997/98 but have a shown a higher *proportional* rate of increase over the period.

Table 21: Provincial comparison of mortality rates for 1997/98 and 2003/04 for State-paid educators aged 21 to 40 by gender

Province	Male Educators aged 20 to 39			Female Educators aged 20 to 39		
	Mortality Rate 1997	Mortality Rate 2003	Increase in Mortality from 1997 to 2003	Mortality Rate 1997	Mortality Rate 2003	Increase in Mortality from 1997 to 2003
Eastern Cape	0.50%	0.82%	0.33%	0.20%	0.42%	0.23%
Free State	0.50%	0.96%	0.46%	0.28%	0.51%	0.23%
Gauteng	0.36%	0.56%	0.20%	0.15%	0.33%	0.17%
KwaZulu-Natal	0.76%	1.09%	0.33%	0.36%	0.89%	0.53%
Limpopo	0.35%	0.42%	0.07%	0.10%	0.28%	0.18%
Mpumalanga	0.42%	0.92%	0.50%	0.18%	0.44%	0.25%
North West	0.31%	0.74%	0.42%	0.15%	0.40%	0.25%
Northern Cape	0.43%	0.54%	0.11%	0.32%	0.37%	0.05%
Western Cape	0.22%	0.44%	0.22%	0.10%	0.14%	0.04%

Source: PERSAL and National Death Register

A summary of the key mortality data is presented in **Table 22** below.

Table 22: Summary of mortality data for the educator workforce 1997/98 and 2003/04

	Mortality: In-Service and Post-Service within 1 year of leaving			
	1997/98		2003/04	
	Number	%	Number	%
Total	1 509		2 108	
Sex				
Male	811	54%	1 020	48%
Female	698	46%	1 088	52%
Race				
African	1 333	88%	1 950	93%
Coloured	77	5%	78	4%
Indian	17	1%	20	1%
White	82	5%	60	3%
Age				
< 25 years	0	0%	2	0%
25 to 29 years	8	1%	87	4%
30 to 34 years	172	11%	380	18%
35 to 39 years	288	19%	538	26%
40 to 44 years	301	20%	393	19%
45 to 49 years	237	16%	317	15%
50 to 54 years	190	13%	201	10%
55 to 59 years	123	8%	119	6%
60 years and above	190	13%	71	3%

Source: PERSAL and National Death Register

9 RESULTS AND INTERPRETATIONS PART D: SICK LEAVE DATA (JULY 2000 – APRIL 2004)

All sick leave entries for the sick leave categories temporary incapacity and permanent incapacity on PERSAL from the period July 2000 to April 2004 were extracted from PERSAL, and analysed. Two main points of departure were conceptualised when the data were analysed:

- (a) analysis using each sick leave record as a basis for analysis (every sick leave record in PERSAL is one period of sick leave taken by one person who is registered on PERSAL, and thus contains a sick leave start date and sick leave end date); and
- (b) persons that took sick leave (one person can take more than one day of sick leave in more than one year of analysis)

Table 23: Total number of sick leave days per province per year

Province	2000	2001	2002	2003	2004	Grand Total	
						Number	Percentage
No Data		23	12	2		37	0.0%
Limpopo		78	165	107	2	352	0.4%
National Departments		41	183	375	2	601	0.7%
North West		182	285	484	2	953	1.2%
Mpumalanga		277	292	489	13	1,071	1.3%
Free State		83	317	731	15	1,146	1.4%
Gauteng		424	731	273	2	1,430	1.8%
Northern Cape	5	504	1,177	1,431	33	3,150	3.9%
Eastern Cape	29	1,854	3,173	2,019	49	7,124	8.7%
Western Cape	4	3,249	5,075	10,511	391	19,230	23.6%
KwaZulu-Natal	98	6,374	16,166	23,557	353	46,548	57.0%
Grand Total	136	13,089	27,576	39,979	862	81,642	100.0%

Source: PERSAL

Comments on Table 23:

- There are a small number of temporary and permanent incapacity sick leave days in 2000 because new sick leave dispensation, with the new categories of sick leave, only commenced in July 2000.
- There are a small number of temporary and permanent incapacity sick leave days in 2004 because of delays in data capture by provinces (also commented on in the PSC sick leave report – See Annexure C). MTT requested PERSAL sick leave data up to April 2004 and actual data extraction took place in May and June 2004 – this did not allow provinces sufficient time to capture temporary and permanent incapacity leave data.

- Despite these outliers, there was a steady increase in sick leave between 2000 and 2004.
- The bulk of sick leave days took place in KZN (57%). The provincial discrepancies could be due to the following:
 - a) KZN misunderstood the instructions for what constitutes temporary and permanent incapacity leave
 - b) KZN could have been the only province that captured the data (problems with sick leave data capture was noted in the 2002 PSC sick leave report)
 - c) Other provinces have stricter approval processes, and thus temporary and permanent incapacity leave could take longer to process and be awarded less frequently
 - d) Incorrect data extraction from PERSAL

Table 24: Total number of sick leave days per age band per year

Age band	2000	2001	2002	2003	2004	Grand Total	
						Number	Percentage
21 to 25		3	11	27		41	0.1%
26 to 30	5	207	802	1 627	11	2 652	3.2%
31 to 35	12	1 070	3 188	5 780	88	10 138	12.4%
36 to 40	20	2 125	5 320	8 950	188	16 603	20.3%
41 to 45	38	2 822	5 876	8 448	181	17 365	21.3%
46 to 50	18	2 748	4 942	6 670	157	14 535	17.8%
51 to 55	31	2 277	3 899	4 787	147	11 141	13.6%
56 to 60	3	1 252	2 503	2 758	76	6 592	8.1%
61 to 65	9	523	935	905	14	2 386	2.9%
66 to 70		62	99	24		185	0.2%
71 to 75				3		3	0.0%
81 to 85			1			1	0.0%
Grand Total	136	13 089	27 576	39 979	862	81 642	100.0%

Source: PERSAL

Comments on Table 24:

- The bulk (75%) of temporary and permanent incapacity sick leave days took place in 2002 and 2003, and took place in the age bands younger than 50.

Table 25: Total number of sick leave days per type of sick leave per year

Type of sick leave	2000	2001	2002	2003	2004	Grand Total	
Permanent Incapacity Leave	35	1 623	1 793	846	55	4 352	5.3%
Temporary Incapacity Leave	101	11 466	25 783	39 133	807	77 290	94.7%
Grand Total	136	13 089	27 576	39 979	862	81 642	100.0%

Source: PERSAL

Comments on Table 25:

- The vast majority of sick leave cases (94.7%) were temporary incapacity sick leave entries, and not permanent incapacity entries

Table 26: Total number of sick leave days per type of sick leave per year

Gender	2000	2001	2002	2003	2004	Grand Total	
Female	93	8 644	18 457	27 139	572	54 905	67.3%
Male	43	4 445	9 119	12 840	290	26 737	32.7%
Grand Total	136	13 089	27 576	39 979	862	81 642	100.0%

Source: PERSAL

Comments on Table 26:

- The majority of persons for whom temporary and permanent incapacity leave was approved, were female (67.3%)

Table 27: Total number of sick leave days per type of post per year

	2000	2001	2002	2003	2004	Grand Total	
Non-Educator	77	5 333	15 134	22 320	272	43 136	52.8%
Educators	59	7 756	12 442	17 659	590	38 506	47.2%
Grand Total	136	13 089	27 576	39 979	862	81 642	100.0%

Source: PERSAL

Comments on Table 27:

- The majority of persons for whom temporary and permanent incapacity leave was approved, were non-educators. This is surprising, as educators constitute the bulk of the work force

Table 28: Total number of leave days per province per type of sick leave

Province	Permanent incapacity leave		Temporary incapacity leave		Temporary incapacity leave - approval pending		Grand Total
Eastern Cape	1 983	27.8%	5 139	72.1%	2	0.0%	7 124
Free State	118	10.3%	501	43.7%	527	46.0%	1 146
Gauteng	45	3.1%	1 384	96.8%	1	0.1%	1 430
KwaZulu-Natal	1 484	3.2%	44 899	96.5%	165	0.4%	46 548
Limpopo Province	5	1.4%	347	98.6%		0.0%	352
Mpumalanga	103	9.6%	963	89.9%	5	0.5%	1 071
National DoE	28	4.7%	570	94.8%	3	0.5%	601
North West	91	9.5%	862	90.5%		0.0%	953
Northern Cape	198	6.3%	2 946	93.5%	6	0.2%	3 150
Western Cape	287	1.5%	18 759	97.6%	184	1.0%	19 230
No Data	10	27.0%	27	73.0%		0.0%	37
Grand Total	4 352	5.3%	76 397	93.6%	893	1.1%	81 642

Source: PERSAL

Comments on Table 28:

- The table confirms that the majority of sick leave was of type temporary incapacity, and that the majority took place in KwaZulu-Natal and the Western Cape

Table 29: Total number of leave days per province per sex

Province	Female		Male		Grand Total
Eastern Cape	4 657	65.4%	2 467	34.6%	7 124
Free State	741	64.7%	405	35.3%	1 146
Gauteng	1 085	75.9%	345	24.1%	1 430
KwaZulu-Natal	30 552	65.6%	15 996	34.4%	46 548
Limpopo Province	249	70.7%	103	29.3%	352
Mpumalanga	778	72.6%	293	27.4%	1 071
National DoE	459	76.4%	142	23.6%	601
North West	693	72.7%	260	27.3%	953
Northern Cape	2 118	67.2%	1 032	32.8%	3 150
Western Cape	13 549	70.5%	5 681	29.5%	19 230
No Data	24	64.9%	13	35.1%	37
Grand Total	54 905	67.3%	26 737	32.7%	81 642

Source: PERSAL

Comments on Table 29:

- This table confirms that there are no significant differences between the provinces in terms of gender distribution of temporary and permanent incapacity sick leave, and confirms that the majority of temporary incapacity sick leave is taken by females (67.3%).

Table 30: Total number of leave days per province per post in education system

Province	Non Educator		Educator		Grand Total
Eastern Cape	1 981	27.8%	5 143	72.2%	7 124
Free State	239	20.9%	907	79.1%	1 146
Gauteng	342	23.9%	1 088	76.1%	1 430
KwaZulu-Natal	35 630	76.5%	10 918	23.5%	46 548
Limpopo Province	142	40.3%	210	59.7%	352
Mpumalanga	250	23.3%	821	76.7%	1 071
National DoE	467	77.7%	134	22.3%	601
North West	74	7.8%	879	92.2%	953
Northern Cape	1 994	63.3%	1 156	36.7%	3 150
Western Cape	1 981	10.3%	17 249	89.7%	19 230
No Data	36	97.3%	1	2.7%	37
Grand Total	43 136	52.8%	38 506	47.2%	81 642

Source: PERSAL

Comment on Table 30:

- This table confirms that non-educators take up the bulk of the sick leave, but also points out that there are significant geographic differences between WHERE the educators and non-educators are based.
- In the Eastern Cape, Free State, Gauteng, Western Cape, Mpumalanga and North West, the majority of persons taking temporary and permanent incapacity leave are educators (all these provinces are over 70%).
- In KwaZulu-Natal, Northern Cape and national Departments, these categories of sick leave are taken mostly by non-educators. This is not surprising for the national Departments, as one would not expect there to be a vast number of educators (rank 50000 – 69999) located at provinces. It is, however, contrary to what one would expect in the provinces in KwaZulu-Natal and the Northern Cape.

Table 31: Total number of leave days per nature of appointment per sick leave type

Nature of Appointments	Permanent Incapacity Leave		Temporary Incapacity Leave		Grand Total
Abnormal Appointment	34	0.0%	596	0.7%	630
Contract	59	0.1%	802	1.0%	861
CS Educator - Relieve	3	0.0%	656	0.8%	659
CS Educator Permanent	2 241	2.7%	27 712	33.9%	29 953
CS Educator Permanent On Probation	112	0.1%	2 615	3.2%	2 727
CS Educator Temporary	91	0.1%	4 308	5.3%	4 399
Education Specialist On Probation	18	0.0%	80	0.1%	98
Education Specialist Permanent	55	0.1%	249	0.3%	304
Education Specialist Temporary	0	0.0%	1	0.0%	1
Fixed Appointment: Officer Permanent	1 517	1.9%	31 222	38.2%	32 739
Fixed Appointment: Officer Permanent On Probation	107	0.1%	5 714	7.0%	5 821
Part Time 5/8	0	0.0%	158	0.2%	158
Part Time 6/8	2	0.0%	37	0.0%	39
Part Time Teacher	0	0.0%	14	0.0%	14
Periodical Remunerations	18	0.0%	208	0.3%	226
Session	0	0.0%	5	0.0%	5
Temporary	85	0.1%	2 886	3.5%	2 971
No Data	10	0.0%	27	0.0%	37
Grand Total	4 352	5.3%	76 397	93.6%	81 642

Source: PERSAL

Note that the percentages indicated in this table, are percentages of the overall total, as opposed to percentages per Nature of Appointment.

Comments on Table 31:

- This table produced interesting results. It is interesting to note that there are part time educators, abnormal appointments and relief educators that are on temporary and permanent incapacity leave.
- Secondly, the vast majority of persons on temporary and permanent incapacity leave are of ranks Fixed appointment: Officer Permanent (38.2%) and CS Educator permanent (33.9%). This originated mostly from the data from the Western Cape and from KZN, respectively.

Table 32: Total number of leave days per province per type of sick leave

Age Band	Female		Male		Grand Total
21 to 25	37	0.0%	4	0.0%	41
26 to 30	1,848	2.3%	804	1.0%	2,652
31 to 35	6,619	8.1%	3,519	4.3%	10,138
36 to 40	10 533	12.9%	6 070	7.4%	16 603
41 to 45	12 000	14.7%	5 365	6.6%	17 365
46 to 50	10 328	12.7%	4 207	5.2%	14 535
51 to 55	7 624	9.3%	3 517	4.3%	11 141
56 to 60	4 390	5.4%	2 202	2.7%	6 592
61 to 65	1 430	1.8%	956	1.2%	2 386
66 to 70	96	0.1%	89	0.1%	185
71 to 75		0.0%	3	0.0%	3
81 to 85		0.0%	1	0.0%	1
Grand Total	54 905	67.3%	26 737	32.7%	81 642

Source: PERSAL

Note that the percentages indicated in this table, are percentages of the overall total, as opposed to percentages per age band.

Comments on Table 32:

- This table confirms that females in the age bands 36 – 50 have been the most frequent in taking these categories of sick leave.

Table 33: Bands of leave days per type of sick leave

Leave Day Bands	Permanent incapacity leave		Temporary incapacity leave		Grand Total
1 - 10 days	968	1.2%	56 162	68.8%	57 130
11 - 20 days	1 154	1.4%	9 323	11.4%	10 477
21 - 30 days	1 243	1.5%	6 001	7.4%	7 244
31 - 60 days	862	1.1%	5 383	6.6%	6 245
> 60 days	125	0.2%	421	0.5%	546
Grand Total	4 352	5.3%	77 290	94.7%	81 642

Source: PERSAL

Note that the percentages indicated in this table, are percentages of the overall total, as opposed to percentages per age band.

Comments on Table 33:

- This table indicates that the most number of leave days that are taken at one time is 1 – 10 days of temporary incapacity leave. This is consistent with the sick leave policy, which states that in any 3 year cycle, up to 30 days temporary incapacity may be taken. Any days higher than 30 days, should have been permanent incapacity leave (green numbers in table)

10 IMPLICATIONS FOR EDUCATION MANAGEMENT INFORMATION SYSTEMS

It is ironic that, in the AIDS era, it has taken very many person-months of expert effort to access and analyze the data required to underpin this study into educator attrition and mortality. No analysis of this kind or extent has been undertaken before, perhaps for this reason. The fact is that PERSAL is a functional salary administration system and was never conceived or designed to act as a strategic management information or planning support system. There is therefore little point in criticising it, beyond the operational proposals listed below, or any other current system for that matter. In short, in the AIDS era, it is time to reconsider the wider management information and decision support system paradigm.

It is not the purpose of this study to attempt to frame such proposals, but the experience of it raises a number of points that are germane to the discussion of these:

First, rather than attempting the overhaul of existing systems and the re-engineering of these to make them 'fit', there is a clear need for a fresh conceptual framework within which strategic information systems can play their interactive part in guiding planning and management at all levels.

Second, such a framework must be guided by *demand* for decision support information. For example, if the education sector was to begin with a clean slate, it is very likely that they would want a system that actually links educator and school data in order to empower planners with the fundamentals. There is little point in attempting to reinvent each of the component systems to achieve this; better by far to design the demand-based framework and then identify each data component and look at the fit with existing systems.

Third, the AIDS era highlights the need for decentralised information systems to enable rapid decision making and monitoring at the local and district levels, capable of generating monthly or at worst quarterly information. The emphasis should be on management and planning needs at these levels to inform, for example, the rapid replacement of educators.

It is suggested therefore that the crisis inherent in the AIDS era should be harnessed to positive advantage by mobilizing energy around a fresh information system paradigm. If this achieves nothing more than agreement to regularize the monitoring of educator attrition and mortality along the lines of this study, it will be a step in the right direction.

11 IMPLICATIONS AND RECOMMENDATIONS FOR PERSAL

Access to clean, accurate and timeous data is essential for performing meaningful reporting and analysis. Should some or all of the recommendations below be considered, notwithstanding the proposals made above, future analysis and the capacity of planners and managers to use it will be greatly enhanced.

11.1 ISSUES WITH EXISTING PERSAL DATA

- (a) Replace all old ID numbers with new ID numbers per the Department of Home Affairs' barcode ID system. The Department of Home Affairs can supply a list of all new ID numbers.
- (b) Consolidate pay-points and component numbers where possible (this will be a very manual task). Following consolidation, in future only allow capturing of previously defined pay-points.
- (c) Link PERSAL component, pay-point and EMIS numbers: This is an urgent action, and should be done in conjunction with the Department of Education's EMIS section.
- (d) Ensure that only one ID number is associated with any single PERSAL number. (Note that the reverse will not be possible because of the erroneous historic allocation of PERSAL numbers).
- (e) Update the province identifier for records where it is missing, using the established link between province and organisation data.
- (f) Find and correct invalid dates wherever they occur (e.g. 29 Feb 1997).
- (g) Change race categories to reflect the Statistics South Africa categories of Black African, Coloured, Indian or Asian and White.
- (h) Clean up the race categories, to ensure that every person is only assigned to one race category.

11.2 INNOVATIONS FOR PERSAL TO CONSIDER

- (a) Open the debate on the role of PERSAL as a central component of an integrated MIS and decision-support system.
- (b) Establish a system-enforced link between nature-of-appointment and rank. Currently it seems that people with different nature-of-appointment codes can have the same rank.
- (c) Establish a system-enforced link between PERSAL number and ID number to ensure (at least in future) that there is always a one-to-one relationship between these fields (i.e. every ID number can only have one PERSAL number associated with it).
- (d) Create a separate file that keeps records that define the non-changing characteristics of a specific PERSAL number, e.g. date-of-birth, race, gender, date first employed, date last employed, etc.
- (e) Enforce constraints and validation on all possible data being captured, e.g. dates, ID numbers, numeric fields, etc.
- (f) PERSAL data capture at provincial level: this should be improved and standardised, with an emphasis on efficiency, in particular with reference to sick leave data.
- (g) Adoption and incorporation of PSC sick leave report recommendations. Based on the key informant interviews and the PERSAL data that were received, it does not seem as if the recommendations in the PSC sick leave report (summarised in Section 7.1 of this report) have been incorporated. Assuming these recommendations are valid, they should be considered for incorporation by PERSAL.
- (h) Linkages to provincial norms and standards for school funding. It would be practical to include mortality rates at district level into calculations for provincial norms and standards (which

determine funding allocations to schools). It is desirable and practical, if PERSAL data can be linked to EMIS data.

- (j) Ensure that data on temporary educators who die whilst in-service should be captured on PERSAL as soon as possible and not merely noted as a “contract termination”.

11.3 POSSIBLE FRAUD DETECTION

- (a) It would seem that a number of records of the same person in the appointments data, and that have the same salary effective date, are associated with multiple component or pay-point codes, and sometimes even multiple provinces. While there might be plausible reasons for this specific example, querying such duplicate entries using other criteria could possibly identify fraudulent activity.
- (b) Using Department of Home Affairs data to determine mortality, situations where deceased employees are still receiving salaries could be identified.

11.4 USING PERSAL DATA TO PROVIDE MANAGERIAL REPORTS REGARDING EDUCATOR ATTRITION TRENDS

- (a) Now that this study has been undertaken, there is no reason why educator attrition trends should not be reported to education managers on a regular basis; this would however require discussion around a new strategic information framework and is not entirely dependent on PERSAL.
- (b) It is recommended that PERSAL datasets be used by the national and provincial Departments of Education to build on the time series of educator attrition trend data that was provided in this report.
- (c) This can be done through developing a dataset analysis specification and management report using the definitions and analysis tools developed during this study.
- (d) The basic information that should be supplied through such an analysis, would be gross attrition per calendar year, mortality as a percentage of gross attrition, attrition rates per type of attrition

12 NEXT STEPS

As stated in the introductory remarks, this report provides information about gross and mortality-related attrition rates of Education Department employees, as well as recommendations on how PERSAL could be improved to provide improved data in future. These results should now:

- a) Be discussed with provincial PERSAL and EMIS colleagues in a workshop format, preferably after the EMIS linkage has been done. The EMIS linkage will enable mortality rates to be linked at district level, and will make discussions more productive. These discussions should include:
 - a presentation and discussion on the PERSAL results included in this report,
 - a discussion on refinement of analysis for provincial needs,

- feasibility of PERSAL improvement recommendations, as noted in Section 10;
- b) Be compared with the EMIS data, to identify issues, possible undercounts and overlaps;
- c) Interrogate the cost issues associated with the study's findings and provide a preliminary analysis of direct and indirect costs;
- d) Initiate an analysis of new entrants into the educator workforce to establish their characteristics, in association with the analysis of HIV-prevalence already completed by HSRC;
- e) Work together with SACE and other data providers to establish the size of the 'pool' of educators outside the service and analyze its trends and characteristics;
- f) Be used by MTT as input into study 3 (the determination of a new educator supply and demand model).

Detailed technical specifications for MTT Study 2 and MTT Study 3

Study 2: Educator Attrition Rates

Aim

To estimate gross educator attrition rates and trends, including an analysis of the causes of these by age and gender, in the public schools system in South Africa.

Methods

a) Data Gathering

PERSAL downloads for all education personnel will be obtained, for all years since inception and all provinces, which will be consolidated into a national database in MS Access for detailed analysis. An extensive data cleaning, verification and re-coding exercise will be undertaken to check for duplicate educators, data entry errors and other problems that may affect validity of final results and estimates. An approach to dealing with temporary staff will also be developed to address issues such as monthly contract expiry and re-hiring leading to multiple PERSAL entries. This will involve examination of year-on-year trends to determine the *real* attrition rates of temporary educators.

b) Causes of Attrition

The magnitude and dimensions of educator attrition and its components, including mortality, will be examined, based on a pilot exercise in KwaZulu-Natal (Teacher Mortality study). This will include a review of time lags between attrition and entry into the PERSAL system and an analysis of the various ebbs and flows to calculate the magnitude of attrition causes by category, age and gender, including:

- Contact Expiry
- Compulsory Retirement
- Deceased
- Desertion
- Dismissal
- Early Retirement
- Ill-health
- Medical Retirement
- Misconduct
- Resignation
- Retirement
- Severance Package
- Suspension

c) Attrition Rates

Teacher attrition rates, based on PERSAL for at least 4-5 years, will be determined and analyzed by province, age group, gender, region/district, rural/urban, type of school, school size etc. These data will be cross-linked with provincial Annual EMIS Survey data for verification and added dimension; provincial DoE personnel will also be consulted to gain a thorough understanding of their concerns and needs viz PERSAL.

d) Further Analysis and Recommendations

Based on this analysis, a methodology for how PERSAL can continue to be monitored to review trends and series will be outlined. In addition, further recommendations on how the system could be improved for more effective utilisation and improved monitoring of HIV/AIDS impact will be developed.

It would also be possible to examine cost issues in the PERSAL analysis - given concern over the costs associated with the increasing use of temporary/replacement educators and replacement costs due to growing attrition. This examination would require the development/agreement of assumptions and would allow for the review of changes/trends evident in PERSAL over time, in terms of the balance of permanent versus temporary educators, substitute educators, increasing rates of sick leave, early retirement etc. This information could then be assessed in terms of the national and provincial labour budgets.

In other words, in addition to analyzing attrition in numerical/percentage terms, the cost of this attrition in terms of extra financial outlay for labour may be estimated, providing an attractive option for DoE HR and Finance Departments.

This study will also involve discussions with PERSAL staff in Pretoria as well as in all the nine provincial PERSAL offices to clarify and discuss aspects of the database.

Study 3: Educator Demand and Supply Projections

Aim

To model educator demand and supply and develop supportable projections to inform future decision making on recruitment, training and provision.

Method

The archival research method will be used. Three databases will be used during modelling, namely, PERSAL, the 2001 Census and Education College admissions.

Statistical modelling will be done at national, provincial and sub-provincial level to be defined in accordance with the study's final regional structure. The projection model originally developed by Dr Luis Crouch will be used and Dr Crouch will be available as a consultant in the modelling process. The model itself is an interactive, annotated spreadsheet-based demand and supply model, supported by a comprehensive technical manual. Once complete, these projections will be linked to the prevalence and infection data to be provided by the HIV prevalence study in Component 3 of this project. This will provide some insight into the comparative risk profile of educators relative to equivalent groups in the population.

Modelling demand will be based on analysis of historical, current and projected enrolment in light of demographic trends measurable from the 2001 Census; supply will be informed by observed attrition

rates, including mortality, Education College admissions and projected output, as well as prevalence/infection rates. Given the sensitivity of the issues involved, and their financial and other implications, it is assumed that low, medium and high impact scenarios would be modelled to provide some insight to the management options available.

Analysis

Modelling and analysis will commence only once the HIV Prevalence study has been completed and will provide a series of linked outputs. Modelling will utilize the interactive spreadsheet-based model to develop a range of provincial and national scenarios based on agreed and defined assumptions; in addition, the model will generate a series of graphical and tabular outputs. The demand and supply model will provide the ELRC's constituent members (e.g. national and provincial education departments and unions) with an opportunity to *test* a range of intervention strategies for dealing with problems relating to a reduced supply of educators such as:

- reducing the period required to train educators
- increasing the attractiveness of the profession through financial incentives
- reducing the qualifications requirements for entry into the profession
- increasing the teaching/period load
- adjusting learner/educator ratios
- improving flow ratios between grades (e.g. reduced repetition rates) to increase efficiency and reduce class sizes

The model will allow the effect of these interventions to be explored both individually and in combination and will clearly illustrate the results and costs of each, thus providing a scenario-planning tool for stakeholders.

Research Methodology for Study 2

The research methodology for this study could broadly be defined as follows: data gathering; data verification and cleaning; understanding the data and developing suitable analysis assumptions and methodology; data analysis; development of recommendations for PERSAL changes and compilation of research report. A complete description of the tasks undertaken by MTT within these research phases is provided below:

1. Data Gathering Phase

- a) *Nov 2003 - March 2004*: Introduction of MTT team to national PERSAL team
- b) *Feb – April 2004*: Series of key informant interviews with:
 - Mr Riaan Janse van Rensburg: Acting Director, Eastern Cape Department of Education: EMIS section
 - Mr Derek Sole: Finance Directorate, KZN Department of Education
 - Mr Craig Slaughter: PERSAL Manager, KZN Office of the Premier: PERSAL unit
 - Ms Carina Bester: Director of PERSAL, National Treasury: PERSAL unit
 - Messes. Jeanette Breytenbach, Linda Rabie and Hein Versfeld: PERSAL Technical Team, National Treasury: PERSAL unit
 - Mr Hilton Visagie: Director: Databases, National Department of Education: EMIS section
 - Ms Kitty Struwig: Senior Officer, National Department of Home Affairs: Records section
 - Mr Johan Kritzing: Director: Records, National Department of Home Affairs: Records section

2. National Department of Education (EMIS section)

- a) *March 2004*: Agreement to also incorporate post service mortality rates into MTT Study 2, by cross referencing termination data from PERSAL with Death Register data from Department of Home Affairs computer
- b) *March 2004*: Obtained MTT computer for PERSAL data processing and analysis
- c) *March 2004*: Obtained and studied the data dictionary for PERSAL downloads (this is a list of all the field codes and table names captured by PERSAL)
- d) *March – April 2004*: Developed technical specifications for and obtained permission to access Department of Home Affairs data
- e) *March 2004*: Developed and approved technical specification for data download request from PERSAL
- f) *April – June 2004*: Arranged for data download request to be sent from national Department of Education to PERSAL unit
- g) *July 2004*: Received raw data from PERSAL unit

3. Data verification/cleaning phase

- a) July 2004: Loaded all PERSAL data onto MTT computer
- b) July 2004: Loaded all EMIS data onto MTT computer
- c) July 2004: Imported all data into SQL database
- d) July 2004: Created and indexed all data tables
- e) July 2004: Developed data analysis specifications
- f) August 2004: Cleaning of all data, including interaction with PERSAL unit to obtain clarification on anomalies and data that have been extracted
- g) August 2004: Extracted data for Department of Home Affairs analysis
- h) August 2004: Sent data for cross referencing with Department of Home Affairs death register to systems analyst at Department of Home Affairs
- i) August 2004: Received data from Department of Home Affairs
- j) August 2004: Incorporated data from Department of Home Affairs into PERSAL mortality data

4. Developing list of Assumptions for Data Analysis

- a) August 2004: Developed a list of assumptions and sequencing for data analysis
- b) August 2004: Updated data analysis specifications

5. Data Analysis

- a) September – October 2004: Carried out data analysis as per data analysis specifications
- b) October 2004: Developed a series of 4 pivot tables with all summarised data
- c) October 2004: Developed summary tables and trends analysis graphs for MTT Study 2 report
- d) November 2004: Sub-provincial breakdown of data
- e) January 2005: Presented summary analysis to key informants to gauge their perspectives

6. Develop recommendations for Improvements to PERSAL

- a) Throughout the research, notes were kept on how the PERSAL Office could improve their systems to analyse, on a regular and systematic basis, educator attrition rates.

7. Compilation of report

- a) March 2004: Commenced with literature review of relevant research
- b) September 2004: Drafted report outline
- c) October 2004: Finalised and circulated preliminary report for comments and inputs
- d) February 2005: Presentation and circulation of draft Educator Attrition and Mortality Report

Literature Review: Annotated Bibliography

Research Study 1: Sick leave trends in the Public Service, Public Service Commission (PSC)

In March 2002, the Public Service Commission (PSC) published a report entitled "Sick leave trends in the Public Service", which analysed data from October 1999 to September 2000. The purpose of this report was to understand whether a new government policy on sick leave dispensation¹⁸, which reduced sick leave from 120 days in a 3-year cycle to 36 days in a 3 year cycle and introduced in July 2000, has had any positive effect on reducing the number of days of sick leave taken by public sector employees. The report concluded that:

- The amount of sick leave taken reduced when the amount of sick leave taken during the period preceding the new sick leave dispensation was compared to the amount taken during the period superseding the new leave dispensation.
- Sick leave is more prevalent amongst national government officials (63%) than amongst provincial government officials (31%), but is more prevalent amongst persons at a lower salary level and lower grade in government.
- Sick leave data were not always captured accurately and **Mpumalanga, Eastern Cape and Limpopo** were identified as three provinces where data accuracy was of particular concern.
- Data were presented for the number of employees that died whilst in service, or whose service was terminated due to illness. This is reflected in Table 2 below:

Table 34: Number of persons whose contracts were terminated due to death or illness

Level	Number of people who took sick leave	Number of people whose services terminated due to illness	Terminated services expressed as a %	Number of people who died while in service
Provincial	234 610	1 795	0.8%	3 251
National	131 482	1 981	1.5%	1639
TOTAL	366 092	3 776	1.03%	4 890

Source: Sick leave trends in the Public Service, Public Service Commission (PSC), March 2002, p. xiv

- **28%** of all sick leave is taken on Mondays as opposed to other days of the week.

¹⁸ This new leave dispensation was brought into effect after the "Report on the management information required to effectively manage absence due to sick leave" was forwarded to the Standing Committee on Public Accounts (SCOPA) during October 1999. In the report the PSC recommended amendments to the Personnel and Salary Administration System (PERSAL) and committed itself to report to Parliament on trends in respect of sick leave in the Public Service.

- The report also made a number of recommendations regarding how to improve PERSAL better monitoring of sick leave data. The main recommendations were:
 - a) *Improve the sick leave information on PERSAL*, by enabling the compilation of reports for the Public Service as a whole, ensuring consistency in the data obtained from PERSAL and providing details of the nature of illnesses captured on PERSAL;
 - b) *Improve recording of sick leave*, both in manual, paper files and electronically on PERSAL;
 - c) *Communicate sick leave trends* by providing quarterly reports to all line managers;
 - d) *Report every 3 years* on sick leave data to Parliament;
 - e) *Provide information of cases of sick leave abuse and misconduct* to relevant management structures; and
 - f) *Provide information on sick leave data* to individual departments on request.

This PSC report on sick leave was useful to MTT in its preparation of the PERSAL data download request. This report confirmed verbal information that MTT had obtained during the key informant interviews, which illuminated that it would only be useful to analyse sick leave data from 1 July 2000 onwards. This guided MTT's data extraction request for sick leave data. Further, the report also provided information that could be used for triangulation purposes.

Finally, the report provided clear guidance for MTT in terms of the new leave dispensation (PSC report, page 5):

"The new leave dispensation, implemented with effect from 1 July 2000 and contained in Clause 7.4 of Resolution 7 of 2000 of the Public Service Co-ordinating Bargaining Council, specifies that employees are, amongst others, entitled to 36 working days sick leave with full pay, also over a three-year cycle. As was the case with the previous dispensation, public servants are allowed to be absent from work due to sickness for not more than two days without submitting a medical certificate issued by a registered medical practitioner.

"However, instead of capping the number of days without a medical certificate to 10 days, this provision is now limited to a maximum of six days per annum. Employees who have exhausted their 36 days sick leave credit prior to the end of a three-year leave cycle, and who are required by a medical practitioner to be absent due to disability that is not permanent, may be granted a further 30 days sick leave with full pay (captured on PERSAL as temporary incapacity).

"Over and above this 30 days, an additional 30 days can be granted to employees whose degree of disability has been certified by a medical practitioner as permanent, subject to certain conditions (captured on PERSAL as permanent incapacity).

MTT used this information and only requested sick leave data for the category "temporary incapacity" (up to 30 days over and above the 36 days regular sick leave allocation every 3 years) and the category "permanent incapacity" (over and above 66 days in any 3 year cycle).

Research Study 2: Causes of death in South Africa 1997-2001: Advance release of recorded causes of death, Statistics South Africa, 2002

"This study was undertaken by Statistics South Africa to investigate the causes of death in South Africa during the period 1997-2001. It was based on a 12 percent stratified random sample of deaths occurring during the study period. Causes of death were coded by utilizing guidelines contained in the tenth revision of the International Classification of Diseases (i.e. ICD-10)" (Statistics South Africa, 2002).

This report could not be used extensively by MTT for triangulation purposes, but it does point to the fact that overall mortality in South Africa has increased, and that mortality due to HIV in the stratified random sample of 12% has doubled during the study period. It also noted that:

"Results of this study show that the highest prevalence of HIV deaths is among African females (13,5 percent), females aged 15-29 (24,3 percent) and females aged 30-39 (20,5 percent). The lowest prevalence of HIV deaths is among white females, with only 0,7 percent of deaths due to this cause".

Research Study 3: Difficulties in attributing deaths to HIV/AIDS, Statistics SA, P Lehohla, Statistician General

Subsequent to the above-mentioned report on Statistics South Africa's study into causes of death, a presentation was made by the Statistician-General during which he alluded to the difficulty in attributing deaths to HIV/AIDS. In his presentation, he mentioned the following reasons why it is difficult to attribute deaths to HIV/AIDS.

- HIV/AIDS is not a notifiable disease. Therefore it is difficult to trace the disease to its sources of origin.
- There is incomplete registration of deaths in the country, particularly in rural areas.
- Death certificates are often poorly completed.
- Unnatural causes of deaths cannot be fully recorded at present.
- The present rate of capture of natural causes of death is slow.
- Present estimations of the extent of the epidemic are based on sero-prevalence tests in pregnant women. This is not necessarily a representative sample of the population.

Since MTT Study 2 did not investigate causes of death, but rather overall attrition rates, the detailed results of this presentation were not of major interest. It was, however, useful for the follow-up study, MTT Study 3.

Technical Specification for PERSAL data download

1. Background

A consortium consisting of the Human Sciences Research Council (HSRC), the Medical Research Council (MRC) and the Mobile Task Team on the Impact of HIV on Education (MTT) was appointed by the Education Labour Relations Council (ELRC) to conduct an investigation into the impact of HIV/AIDS on the educator work force.

One of the sub-studies to be undertaken as part of this overall investigation, is a study into *educator attrition and mortality rates* in order to improve the educator demand and supply modelling and determinants. This sub-study will be undertaken by MTT. MTT has been given approval by the national Department of Education to utilise PERSAL data for this analysis of educator mortality and attrition. The necessary approvals have been sent to the National Treasury's PERSAL unit, the unit responsible for all PERSAL database issues.

The purpose of this technical specification is to provide a detailed description of the data download required from the PERSAL mainframes. This technical specification will be used as a basis for the national Treasury to prepare a detailed quotation (with costs and time frames) to carry out this work.

2. Description of data sets

After extensive discussion and consultation with a sample of provincial education departments, provincial PERSAL offices and the national PERSAL office, it has been agreed that there is a need for 3 data sets from PERSAL. These 3 data sets are described below.

2.1 Dataset 1: Service termination data (April 1997 to March 2004)

This dataset should contain information about ALL members of the educator work force whose service has been terminated on PERSAL, even if they were re-appointed at a later stage. Members of the educator work force are defined as educators and education managers employed by the national and provincial departments of education, who are classified as a "CS Educator" on PERSAL. These are persons with the following categorisation in their "Nature of Appointment" field.

Code Table 041 (Nature of Appointment) – field types for this study

Field Code	Nature of Appointment
25	CS EDUCATOR PERMANENT
26	CS EDUCATOR TEMPORARY
27	CS EDUCATOR PERMANENT ON PROBATION
28	CS EDUCATOR – RELIEVE
29	EDUCATION SPECIALIST PERMANENT
30	EDUCATION SPECIALIST TEMPORARY
31	EDUCATION SPECIALIST ON PROBATION
32	ABNORMAL APPOINTMENT
33	SERVICES PERMANENT ON PROBATION
34	PARTTIME TEACHER

Reasons for service terminations (Code Table 055 on PERSAL) are as follows.

Code Table 055 (Service Termination Categories) – field types for this study

Field Code	Service Termination Reasons
01	RETIREMENT - SECTION 16(1)(A) PUBLIC SERVICE ACT
02	DECEASED
03	RESIGNATION
04	SECTION 15(5A)(A)
05	MEDICAL RETIREMENT
06	DISMISSAL
07	DESERTION
08	CONTRACT EXPIRY
09	RESIGNING OF POSITION
10	TRANSFER TO STATUTORY INSTITUTION/DEFENCE FORCE
11	PURCHASING DISCHARGE
13	CONVERSION IN NATURE OF APPOINTMENT
14	SERVICE PERIOD EXPIRED
15	DISHONOURABLE DISCHARGE
16	CANCELLING OF APPOINTMENT
17	SUSPENSION
18	SECTION 16(4)
19	TERMINATION OF PROBATION APPOINTMENT
20	POST REDUCTION
21	RESIGN (24 HOURS)
22	SECTION 15(4)
23	SECTION 16(2)(C)
25	SECTION 16(2)(B)
26	SECTION 16(2)(D)
27	SECTION 16(1)(A)
28	SECTION 16(1)(B)
29	PERJURY(FALSE SWEARING)
30	DISMISSAL (DISCHARGED)
31	RETIRE - ARTICLE 16(2)(A) PUBLIC SERVICE ACT 1994
32	COMPULSORY RETIREMENT-SECTION 16(4) PUBLIC SERVICE ACT
33	EARLY RETIREMENT-SECTION 16(6)(A) PUBLIC SERVICE ACT
34	ILL HEALTH - SECTION 17(2)(A) (PUBLIC SERVICE ACT
35	REORGANISING-SECTION 17(2)(B) (PUBLIC SERVICE ACT
36	ECONOMISATION-SECTION 17(2)(C) (PUBLIC SERVICE ACT
37	INEFFICIENCY - SECTION 17(2)(D)(PUBLIC SERVICE ACT
38	MISCONDUCT - SECTION 17(2)(E) (PUBLIC SERVICE ACT)
39	TERMINATION OF PROBATION-SECT 17(2)(F)(PUBLIC SERVICE ACT
40	SECTION 17(2)(I) (PUBLIC SERVICE ACT 1994)
41	DISCHARGE - SECTION 17(4) (PUBLIC SERVICE ACT)
42	DESERTION-SECTION 17(5)(A)(1) (PUBLIC SERVICE ACT)
43	CONDITIONS EXCLUDED OF ACT-SECTION 17(6) PUBLIC SERVICE ACT
44	INEFFICIENCY - SECTION 71(1)(D) EDUCATION ACT
45	ECONOMISATION - SECTION 71(1)(C) EDUCATION ACT

Field Code	Service Termination Reasons
46	NOT OWN INCOMPETENCE/INABILITY
47	MISREPRESENTATION-SECTION 17(2)(G)(PUBLIC SERVICE
48	SECURITY RISK-SECTION 17(2)(H)(PUBLIC SERVICE ACT)
49	RESIGNATION - SPOUSE TRANSFERRED (PSSC DVIII)
50	RESIGNATION - TEACHER TEMPORARY (5YRS SATISF SERVIC
51	TRANSFER (EDUCATION)
52	RETIREMENT-SECTION 10(2) (EDUC EMPLOYMENT ACT 1994)
53	DISCHARGE:ECONOMY:SEC 8(1)(C): EDUCATORS ACT 1994
54	DISCHARGE:INEFFICIENCY:SEC 8(1)(D) EDUCATORS ACT 1994
55	RETIREMENT(EARLY) - S10(3)(A) EDUCATION ACT
56	DISCHARGE:REORGANISATION:SEC 8(1)(B) EDUCATION ACT 1994
57	DISCHARGE:ILL-HEALTH:SEC 8(1)(A)EDUCATION ACT 1994
58	SEVERANCE PACKAGE(SECTION 3(2)(A)(1)&42)
59	CONTRACT EXPIRY (RESOLUTION 3/SEVERANCE PACKAGE)
62	HEAD OF DEPARTMENT-ART.16(5)(A)BEFORE CONTRACT EXPIRY
63	TRANSLATION TO CORE
65	RETIREMENT-SECTION 10(1)(EDUC EMPLOYM ACT 1998)
66	DISCHARGE: ILL HEALTH: SEC 11(1)(A) EDUCATORS 1998
67	DISCHARGE: REORGANISATION:SEC 11(1)(B) EDUCAT 1998
68	DISCHARGE:ECONOMY:SEC 11(1)(C) EDUCATORS ACT 1998
69	DISCHARGE:INEFFICIENCY:SEC 11(1)(D) EDUC ACT 1998
70	MISCONDUCT: SECTION 11(1)(E) EDUCATORS ACT 1998
71	DISCHARGE:TERM OF PROBATION:SEC 11(1)(G) EDU 1998
77	MUTUALLY AGREED SEVERANCE PACKAGE
78	RETIREMENT-PARLIAMENT GENERAL PENSIONS ACT 29/1979
80	HEAD OF DEPARTMENT-ART.16(3)(A)RETIRE:CONTRACT EXP
81	TRANS RESTR PACK (RES7/2002) INTRADEPT(WITHIN DEPT
82	TRANS RESTR PACK (RES7/2002) TRANSFER BETW DEPTS
83	TRANS RESTR PACK (RES7/2002) EXCESS ON APPLICATION
84	TRANS RESTR PACK (RES7/2002) EXCESS COMPULSORY
85	RETIRE EARLY - S10(3)(B) – EDUCATION
86	RETIRE EARLY - S10(4) – EDUCATION
98	MERGE OF PERSAL NUMBERS
99	TRANSFER OUT OF PERSAL

We are interested in ALL reasons for service terminations that have been listed in PERSAL, as per one of the above field codes in Code Table 055.

2.2 Dataset 2: Sick Leave Data (July 2000 – March 2004)

The second dataset that is required focuses on members of the educator work force who have been on specific categories of sick leave as of 1 July 2000. These categories of sick leave are:

- Temporary incapacity (Field Code 52 in Code Table 089, and Field Code 520 in Code Table 045)
- Permanent incapacity (Field Code 53 in Code Table 089, and Field Code 530 in Code Table 045)

2.3 Dataset 3: Number of persons who are members of the educator work force

The final dataset that is required is a brief listing of all members of the educator work force on a month to month basis. This will provide the basis for a geographicly-based monthly person-count of all educator personnel. This is needed in order to calculate an annual average denominator for the mortality and attrition rate.

3. Detailed specifications for each dataset

3.1 Dataset 1: Service termination data (April 1997 to March 2004)

One dataset per province for the entire period from April 1997 – March 2004 is required. The following fields are required in this dataset (Categories shown are drawn from the current PERSAL data dictionary).

Field Name	Field Type	Code Table Reference	Comments/conditionalities
PERSAL number	Numeric	N/a	Individual's unique number
Appointment number	Numeric	N/a	For all appointment numbers (01 – 05)
Pay point number	Numeric	Prov Code Table 800	Provincial code table Also used to disseminate payslips
Pay point description	Alpha numeric	Prov Code Table 800	Provincial code table
Region	Numeric	Prov Code Table 817	Cross reference with EMIS
Component number	Numeric	Prov Code Table 810	Cross reference with EMIS (intention for these to be = to EMIS numbers)
Component description	Alpha numeric	Prov Code Table 810	Cross reference with EMIS
Initials	Alpha numeric	N/a	Needed for double entry counts
Last name	Alpha numeric	N/a	Needed for double entry counts
ID Number	Numeric	Check against death register	MTT will run ID number algorithm to test validity of ID numbers
Birth date	Numeric	N/a	MTT will use this to calculate the age band
Post class	Numeric	Code Table 038	For all field code values= 60001 – 69999 see note B below
Rank	Numeric	Code Table 040	For all field code values= 60001 – 69999 see note B below
Qualification Type	Numeric	Code Table 30	For all types of qualifications
Race	Numeric	N/a	1 = white 2 = Asian 3 = coloured 4 = non white
Gender	Numeric	N/a	1 = Male 2 = Female
Breadwinner	Numeric	N/a	0 = No 1 = Yes
Didactics subjects	Numeric (up to 10 values)	Code Table 027	All subjects that the educator is qualified to teach
Nature of Appointment	Numeric	Code Table 041	Need all data for NOA field codes equal to 25 – 34 (see Note A below)
Date of change in Nature of Appointment	Numeric	N/a	
Service termination type (also called resignation category)	Numeric	Code Table 055	For all categories of service terminations
Reason for resignation	Numeric	Code Table 054	For all fields where "service termination type" is equal to 03 (Resignation) from Code Table 055
<i>Death Date (this is the date that the person died)</i>	<i>Numeric</i>	<i>N/a</i>	<i>For all fields where the value for Code Table 055 is 02 (Deceased)</i>
<i>Death Transaction Date (this is the date that the death was recorded on PERSAL)</i>	<i>Numeric</i>	<i>N/a</i>	<i>For all fields where the value for Code Table 055 is 02 (Deceased)</i>
Date of appointment (start of	Numeric	N/a	Temporary educators on recurrent contracts will have

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Field Name	Field Type	Code Table Reference	Comments/conditionalities
service contract)			numerous dates of appointment [?? Need to confirm this]
Resignation date (end of service contract)	Numeric	N/a	Temporary educators on recurrent contracts will have numerous resignation dates [?? Need to confirm this]

Notes: Values of Code Table 041 that we are interested in.

Code Table 041 (Nature of Appointment Categories) – field types for this study

Field Code	Field Code Description
25	CS EDUCATOR PERMANENT
26	CS EDUCATOR TEMPORARY
27	CS EDUCATOR PERMANENT ON PROBATION
28	CS EDUCATOR - RELIEVE
29	EDUCATION SPECIALIST PERMANENT
30	EDUCATION SPECIALIST TEMPORARY
31	EDUCATION SPECIALIST ON PROBATION
32	ABNORMAL APPOINTMENT
33	SERVICES PERMANENT ON PROBATION
34	PARTTIME TEACHER

Values of Code Table 038 and Code Table 040 that we are interested in.

Code Table 038 (Post Class) and Code Table 040 (Rank) – field types for this study

Field Code	Field Code Description
60001	EDUCATION SPECIALIST(O)
60002	EDUCATION SPECIALIST SENIOR(O)
60003	EDUCATIONAL SPECIALIST FIRST(O)
60004	EDUCATION SPECIALIST CHIEF DEPUTY(O)
60005	EDUCATION SPECIALIST CHIEF(O)
60006	DIRECTOR(O)
60101	TEACHER(S)
60102	HEAD OF DEPARTMENT(S)
60103	PRINCIPAL DEPUTY(S)
60301	PRINCIPAL(P1)
60302	PRINCIPAL(P2)
60303	PRINCIPAL(P3S3T3SS3)
60404	PRINCIPAL(P4S4T4SS4)
60501	LECTURER(T)
60502	LECTURER SENIOR(T)
60503	LECTURER SENIOR(C)
60504	PRINCIPAL SENIOR DEPUTY(T)
60603	HEAD OF DIVISION(T)
60703	PRINCIPAL DEPUTY(T)
60803	PRINCIPAL(T3)
60903	HEAD OF DEPARTMENT(C)
61005	PRINCIPAL(T5)
61104	HEAD OF DEPARTMENT SENIOR(C)

Field Code	Field Code Description
61201	EDUCATION THERAPIST.
61202	EDUCATION THERAPIST SENIOR
61203	EDUCATION PSYCHOLOGIST
61204	EDUCATION PSYCHOLOGIST SENIOR
69996	CHIEF INVIGILATOR - EXAMINATIONS
69997	ASSISTANT INVIGILATOR - EXAMINATOR
69998	AMANUENSIS - EXAMINATIONS
69999	EXAMINATION REVISER

3.2 Dataset 2: Sick Leave Data (July 2000 – March 2004)

One dataset per province for the entire period from July 2000 – March 2004 is required. The following fields are required in this dataset.

Field Name	Field Type	Code Table Reference	Comments/conditionalities
PERSAL number	Numeric	N/a	Individual's unique number
Appointment number	Numeric	N/a	For all appointment numbers (01 – 05)
Pay point number	Numeric	Prov Code Table 800	Provincial code table Also used to disseminate payslips
Pay point description	Alpha numeric	Prov Code Table 800	Provincial code table
Region	Numeric	Prov Code Table 817	Cross reference with EMIS
Component number	Numeric	Prov Code Table 810	Cross reference with EMIS (intention for these to be = to EMIS numbers)
Component description	Alpha numeric	Prov Code Table 810	Cross reference with EMIS
Initials	Alpha numeric	N/a	Needed for double entry counts
Last name	Alpha numeric	N/a	Needed for double entry counts
ID Number	Numeric	Check against death register	MTT will run ID number algorithm to test validity of ID numbers
Birth date	Numeric	N/a	MTT will use this to calculate the age band
Post class	Numeric	Code Table 038	For all field code values= 60001 – 69999 see note B above
Rank	Numeric	Code Table 040	For all field code values= 60001 – 69999 see note B above
Qualification Type	Numeric	Code Table 30	For all types of qualifications
Race	Numeric	N/a	1 = white, 2 = Asian, 3 = coloured, 4 = non white
Gender	Numeric	N/a	1 = Male, 2 = Female
Breadwinner	Numeric	N/a	0 = No, 1 = Yes
Date of change in leave status	Numeric	N/a	The date that the person was given permission for temporary incapacity and/or permanent incapacity
Leave Category	Numeric	Code Table 089	For all Code Table values equal to 52 (temporary incapacity) and 53 (permanent incapacity)
Leave Sub category	Numeric	Code Table 045	For all Code Table values equal to 520 (temporary incapacity) and 530 (permanent incapacity)

3.3 Dataset 3: Number of persons who are members of the educator work force

Monthly datasets per province for every month from April 1997 – March 2004 are required. The following fields are required in this dataset (Categories shown are drawn from the current PERSAL data dictionary).

Field Name	Field Type	Code Table Reference	Comments/conditionalities
PERSAL number	Numeric	N/a	Individual's unique number
ID Number	Numeric	Check against death register	MTT will run ID number algorithm to test validity of ID numbers
Appointment number	Numeric	N/a	For all appointment numbers (01 – 05)
Pay point number	Numeric	Prov Code Table 800	Provincial code table, also used to disseminate payslips
Region	Numeric	Prov Code Table 817	Cross reference with EMIS
Component number	Numeric	Prov Code Table 810	Cross reference with EMIS (intention for these to be = to EMIS numbers)
Qualification Type	Numeric	Code Table 30	For all types of qualifications
Race	Numeric	N/a	1 = white, 2 = Asian, 3 = coloured, 4 = non white
Gender	Numeric	N/a	1 = Male, 2 = Female

4. Data Format

We agreed that the data would be supplied in pipe delimited format. Data should be burnt onto CDs, and we would like to have a separate file for each of the 3 datasets for each province. This implies that there will be the following numbers of files PER PROVINCE.

Dataset description	Number of files per province	Total number of files for ALL 9 provinces
Dataset 1 (Service terminations from Apr 1997 – March 2004)	1	9
Dataset 2 (Sick leave from July 2000 – March 2004)	1	9
Dataset 3 (month count of personnel from April 1997 – March 2004 = 72 months)	72	648

5. Time period for data download

We have agreed that the time period for data downloads will follow government's financial year. The data download time period for the 3 data sets are listed below.

Dataset 1 (Service Terminations):	April 1997 – March 2004
Dataset 2 (Sick leave):	July 2000 – March 2004
Dataset 3 (Total educator numbers):	April 1997 – March 2004

6. Delivery of data

This study needs to be undertaken as soon as possible. As such, MTT requests that data are made available in batches as they are downloaded from the mainframe. We would collect CDs at different points in time, as data become available.

7. Contracting Party

Due to the agreement with the ELRC and as confirmed in the letter from ELRC to the National Treasury, the costs of this data download will be met by the MTT. The MTT is a multi-disciplinary team of

professionals and operates from the Health Economics and HIV/AIDS Research Division at the University of KwaZulu-Natal. As such, the quotation to be prepared should be addressed to:

Peter Badcock-Walters
The Director: MTT
Health Economics and HIV/AIDS Research Division (HEARD)
University of KwaZulu-Natal:
Durban Campus
Durban 4041

Once the quotation has been completed, it should be emailed to the following persons:

Peter Badcock-Walters
Marelize Görgens

MTT Director
MTT member

peterbw@eastcoast.co.za
marelize@decipher.co.za

Detailed Breakdown of PERSAL Data Sets received by MTT for the analysis

Dataset 1: All service terminations data (April 1997 to March 2004) - WORK FILE: 2629

Table 35: Fields in Service Termination dataset

Field Name	Format	Detail
SALARY EFFECTIVE DATE	N8	
PERS-NO	N8	
APP-NR	N2	
ID-NR	N13	
RESIGNATION DATE	N8	
SERVICE-TERM-TYPE	N2	Code Table 055
REASON	N2	Code Table 054
DEATH-DATE	N8	
DEATH-TRANSACTION	N8	

Dataset 2: Sick Leave Data (July 2000 – March 2004) – WORK FILE 2627

Table 36: Fields in Sick Leave dataset

Field Name	Format	Detail
PERS-NO	N8	
APP-NR	N2	
ID-NR	N13	
LEAVE START DATE	N8	
LEAVE END DATE		
NUMBER OF LEAVE DAYS		

Field Name	Format	Detail
LEAVE CATEGORY	N2	Code Table 089 – CATEGORY 52 OR 53 ONLY
LEAVE SUB CATEGORY	N3	Code Table 045

Dataset 3: Monthly record of all persons who are members of the educator work force (April 1997 to March 2004) – WORK FILE 2626

Table 37: Fields for all Education Appointments dataset

Filed Name	Format	Detail
PROVINCE	A2	Code Table 071
DEPARTMENT	A2	Code Table 823
ORGANISATION	A2	Code Table 069
SALARY EFFECTIVE DATE	N8	
PERS-NO	N8	
APP-NR	N2	
PAY-POINT	N6	Code Table 800
PAY POINT DESCRIPTION	A50	
REGION	N4	Code Table 817
COMPONENT	N6	Code Table 810
COMPONENT DESCRIPTION	A50	
INITIALS	A5	
SURNAME	A25	
ID-NR	N13	
DATE-OF-BIRTH	N8	
POST-CLASS	N5	Code Table 038
RANK	N5	Code Table 040
RACE	N1	1 = WHITE, 2 = ASIAN, 3 = COLOURED, 4 = NON WHITE
GENDER	N1	1 = MALE, 2 = FEMALE
BREADWINNER	N1	0 = NO, 1 = YES
NATURE-OF-APPOINTMENT	N2	Code Table 041
APPOINTMENT DATE	N8	
RESIGNATION DATE	N8	

Dataset 4: Education Department Employee Qualifications - WORK FILE 2628

Table 38: Fields in Education Department Employee Qualifications dataset

Field Name	Format	Detail
PERS-NO	N8	
APP-NR	N2	

Field Name	Format	Detail
QUALIFICATION TYPE	N3	TABLE 030
QUALIFICATION ORGANISATION	N1	1 = SCHOOL, 2 = POST SCHOOL, 3 = COURSE
QUALIFICATION	N5	TABLE 087 IF ORGANISATION = 1 TABLE 029 IF ORGANISATION = 2 TABLE 107 IF ORGANISATION = 3
QUALIFICATION DATE	N8	
DIDACTICS	N5	TABLE 027 OCCUR 10 TIMES

Summary of Data Cleaning and Data Verification

After receiving the PERSAL, Death Register and EMIS data, the MTT study team commenced with data verification and data cleaning. The following summarises the data verification and data cleaning that was undertaken with all data sets.

1. Dataset 1: All service terminations data (April 1997 to March 2004) - WORK FILE: 2629

- Extracted all final terminations from this work file and sent it to Home Affairs for cross referencing on the Death Register
- Verified the ID numbers of persons by checking to see that every person in the Service Termination File had an ID and PERSAL number in work file 2626 (record of all Education Department appointments)
- Updated 364 persons' bad ID numbers with good ID numbers on the database
- Updated 45983 persons' old ID numbers with new ID numbers on the database
- Using the methodology that was agreed upon (see Section 12 below), extracted all "valid" terminations
- Extracted all service termination data due to mortality, combined with work file 2628 (qualifications) and combined with post service mortality data received from Dept of Home Affairs

2. Dataset 2: Sick Leave Data (July 2000 – March 2004) – WORK FILE 2627

- Verified that all persons who have taken sick leave, are Education Department employees by referencing their ID numbers against work file 2626 (record of all Education Department appointments)
- Added provincial codes for all PERSAL numbers without PERSAL codes
- Grouped data according to category of sick leave, gender, province, number of days, type (category 52 – temp incapacity or category 53 – permanent incapacity)

3. Dataset 3: Monthly record of all persons who are members of the educator work force (April 1997 to March 2004) – WORK FILE 2626

1. Data Field: Province

Anomalies: Millions of records have no Province defined

Data cleaning done: Since a relationship exists between the organisation code and the province code, MTT could deduce the province codes and names for all appointments where the province code was not included in the raw PERSAL data that MTT received.

2. PERSAL Number and ID Number

Anomalies: Same ID has different PERSAL numbers associated with it. 16 ID numbers are anomalous for very obvious reasons (e.g. all digits are zero) and some persons were listed with different IDs in different records. For most, this is probably due to the phasing in of the bar-coded ID document.

Data cleaning done: It was ensured that for every person only one correct ID number was listed for all appointments, even if more than one PERSAL number existed. To this end, the following process was followed.

- One record for each PERSAL-ID combination was isolated in a separate table
- Each ID number was tested to see if it was “good” according to the ID testing algorithm and marked as either good or bad
- Each ID number was also checked to see if it was in the new format, i.e. if it ends in 08x.
 - For each bad ID number, the rest of the records in this temporary table were queried for a good, new format ID number where the PERSAL number and surname matched. If a match was found, the bad number was updated and also updated to “good”.
 - The above step was repeated but this time without the need for the number to be in the new format.
 - Eventually all remaining bad numbers were queried individually and corrected where possible, by referencing other workfiles for the same PERSAL number (and surname, to be safe)
 - Finally all duplicate records were removed, i.e. where PERSAL-ID combination was the same
- After cleaning the set of unique PERSAL numbers, it was found that:
 - 756035 individual PERSAL numbers existed
 - 740729 had good IDs of which 667672 were of the new bar-coded type
 - 15306 had bad IDs
 - 4847 IDs in this group had multiple PERSAL numbers associated with them, affecting 9915 accounts
 - After comparing IDs and PERSAL numbers from other files, it was found that no further improvements could be made to this table, i.e. no more IDs could be corrected and no new PERSAL numbers were found in the other files
- The PERSAL numbers that did not have a good ID associated with them were then cross-referenced to EMIS data and a further 284 correct ID’s were obtained
- This cleaned set of ID numbers were then used to update all work file data with the corrected ID numbers for a given set of PERSAL numbers

3. *Field: Region*

Observations: Each record’s region field is populated with a number. However, since no reference data have been supplied, this is unusable for MTT purposes (MTT did request region descriptions from PERSAL in its initial data extraction specification).

4. *Field: Pay-point, Component and Pay-point/Component Description*

Anomalies: One code can have more than one description. The codes are not unique within a file, nor across files. A cleaned-up list of unique combinations of pay-code, pay-description, comp-code and comp-description yields 150,000 records. It was outside MTT’s scope of work to carry out the cleaning of this data.

5. *Field: Date-Of Birth*

Anomalies: 52 records had no Date of Birth.

Data cleaning: All were updated with a value deduced from the ID number. The Date of Birth, and a reference date of 1 August 2004, were used to insert age bands into this dataset.

6. *Field: Gender*

Anomalies: 12 records without gender were found

Data cleaning: The gender was deduced from the id number of the individual (all anomalous records regarded one individual)

7. *Field: Nature of appointment*

Data cleaning: An additional field was inserted to reflect whether the person employed was an educator (i.e. based at a school) or a non-educator (i.e. involved in education management and administration). All appointments = CS Educator Permanent, CS Educator Temporary, CS Educator on Probation and CS Educator Relieve (Codes 25, 26, 27 & 28) were coded as 'Educators'. All other appointments were coded as OTHER. Categories such as Part Time 5/8 and 6/8 were excluded. School admin staff have been included under the category "Other". All appointments of category 99 (abnormal appointments) were excluded from further analysis. This was cross-referenced by using RANK CODES of between 50000 and 69999 which is used to define educators in the PERSAL system. This excludes cases where the Nature of Appointment category was Periodic Appointment and the Appointment Number was 1: these people could be normal Educators who are being back paid to cover late entry onto PERSAL, but there are not many of them on the system.

4. Dataset 4: Education Department Employee Qualifications - WORK FILE 2628

- Data were referenced to ensure that every PERSAL number had a corresponding record in work file 2626.

5. Death Register data From Department of Home Affairs

- An extract was provided to Dept of Home Affairs of all PERSAL terminations of non-death type (circa 430,000 records). Home Affairs then searched their database and flagged all post-termination deaths while also providing the date and cause of such deaths.
- In addition, Home Affairs provided updated ID numbers for all old ID numbers contained in the extract passed to them
- The additional 13533 deaths reported by Home Affairs were whittled down to 13169 by eliminating duplicates (either from old/new IDs both reflecting the same PERSAL number or having different IDs attached to them – to ultimately identify 13169 distinct PERSAL numbers).

6. EMIS data from national Department of Education: EMIS section

- The data were uploaded onto the system, and an attempt is currently being made to link the EMIS numbers with PERSAL paypoint numbers/descriptions and with PERSAL component numbers / descriptions. The results of this work will be detailed in the final MTT report.