Developing District-Level Early Warning and Decision Support Systems to Assist in Managing and Mitigating the Impact of HIV/AIDS on Education

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1 The Problem:

The impact of HIV/AIDS on Africa's education sector is apparently profound and is assumed to be eroding the delivery of learning, teaching and development to an unprecedented degree. Indeed, the evidence suggests that with fewer entrants into basic education systems and growing numbers dropping out along the way, enrolment is declining and threatening output, graduation and entry to the world of work. Limited data suggests that the ranks of professional educators are thinning too, at a rate that exceeds the decline in demand, and that this may ensure the perpetuation of unacceptably high learner/educator ratios. Gender equity is seen to be particularly at risk and development strides towards this goal seem to have faltered and in fact may be in reversal. These dynamics alone would make redundant almost all international declarations of intent on education reform, access and quality and call into question the basis for monitoring, planning and implementing education interventions in the developing world, in the HIV/AIDS era.

The problem however is that we don't *know* these things and are forced to assume them on the basis of limited evidence. The ability of the education systems in question to monitor and measure input, function and output is extremely limited and precludes any systematic examination of these issues in most cases. The consolidated detective work of research, observation, projection and anecdotal evidence from many quarters, 'reassures' us that reported levels of antenatal prevalence, morbidity, mortality and orphaning *are* mirrored in the education system, but we have a complicating issue to deal with.

The primary impact of HIV/AIDS on education is to exacerbate existing levels of dysfunction and make an already bad situation worse. In other words, we find it difficult to decide where existing high levels of 'normal' dysfunction stop and where the added erosion of HIV/AIDS starts.

Conventional education management information systems (EMIS), even where they are functional, only capture annual or bi-annual snapshots of the system and seldom provide

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analysis of these data soon enough to empower management to react to the 'standard' range of dysfunction and crisis. They certainly do not capture or provide the kind of indicators required to identify HIV/AIDS impact, or even provide data regularly enough to identify trends in that direction. Thus at the heart of the problem is the failure to provide reliable evidence of impact or guide response to this or any other crisis, in time to avert large-scale systemic failure.

2 The Need:

There is patently a need to develop and introduce new, more regular HIV/AIDS-sensitive data gathering systems, competent to capture and monitor key indicators of impact. More particularly, the need is for such systems to be located closer to the point of education service delivery, in light of the failure of centralised EMIS systems to return value-added management information to those gathering the data. This includes the need to empower local institutional and district managers with the information necessary to better manage their system and thus more effectively mitigate the impact of HIV/AIDS on input, function and output.

3 The Response:

To meet this need, a district-level Education Management & Monitoring Information System (DEMMIS) has been developed, to capture a limited number of key management and HIV/AIDS indicators on a *monthly* basis in schools. DEMMIS is designed to facilitate the processing and analysis of these data at the local level and guide immediate management response at the school, circuit and district levels. This system has been piloted for 16 months in just under 200 schools in several school districts of the Ladysmith Education Region, in KwaZulu Natal – the worst affected of South Africa's nine provinces.

4 The System:

DEMMIS, designed by HEARD and EduAction with development funding from DFID, is a purpose-built information system designed to capture statistics on educators, learners, support staff and school governing bodies. These provide data on enrolment; absenteeism and permanent attrition (including reasons for this); loss of contact time; drop out, pregnancy and other rates; incremental orphaning rates; and reduction in school fees – all by gender and grade in the case of learners, as well as age in the case of educators. Relevant HIV/ AIDS impact indicators can be immediately derived from these without compromising the management value of the data.

The data are captured at month-end in the school, using simple forms that provide a one-page summary for submission, via the school circuit inspector (responsible for about 25 schools on average), to the district office. The school retains a copy to reinforce institutional record keeping and management. The summary form is captured in the district office – responsible for about 120 schools on average – on a simple but customised MS Access database application. Experience to date suggests that summaries from 100 schools can be captured in four to six hours, following a one-day training session for the official responsible.

To provide both context and a framework for response, DEMMIS is supported by comprehensive sets of HIV/AIDS FactSheets and a Management Checklist. This

Checklist provides guidance on management options and responses to indicators of irregularity, dysfunction or even crisis in the monthly data, and the trends emerging from these.

5 The Pilot:

The pilot districts in the KwaZulu Natal province were selected on the basis of their rural/peri-urban/informal settlement mix and the preparedness of local district and regional officials to participate. The pilot was initiated in 95 schools in the Dannhauser District, but other schools and districts elected to join the pilot incrementally as news of its utility spread. Although just under 200 schools are now involved sixteen-months on, we have only analysed data for the 32 schools in the Dannhauser District which have provided consistent returns for a 10-month period, February to November 2001. Of these 32 schools, 20 were Primary, 6 were Secondary, 5 were Combined and 1 was Pre-Primary. Using available school GIS data, the pilot sample can also be accurately geolocated in relation to population, infrastructure and key socio-economic indicators and provide information to guide related social service delivery.

As far as can be established, this represents the first systematic time series of school data in Africa, designed to capture specific indicators of HIV/AIDS impact in education. It should be noted that no additional or extraordinary management support was provided for the pilot sites, in order to replicate as closely as possible routine operating conditions. The pilot also avoided undue emphasis on the collection of HIV/AIDS indicators, positioning it as a school district management and monitoring system, designed to inform and empower local decision-making.

Return rates in the sample were excellent, although an expected decline was observed in the examination and holiday month of December; it is for this reason that the following analysis ends in November 2001. The 32-school sample had an average enrolment of 13 177 learners and 371 educators over the 10-month period, providing a crude learner/educator ratio of 36/1 that mirrors the KwaZulu Natal Provincial average.

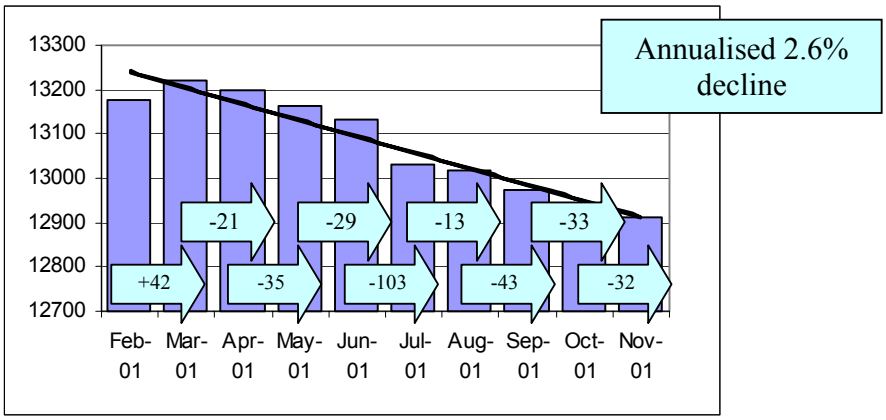
6 Preliminary Analysis: The Findings

In the sample of 32 schools, with an average enrolment of 13 177 and educator staff of 371 over the 10-month period, the preliminary analysis generated the following findings:

- Enrolment Decline:

  Enrolment was seen to fluctuate significantly over the period, with a peak in February (probably occasioned by the stabilisation of enrolment after the commencement of the school year) and a sharp decline in July (perhaps coinciding with the flu-season, vacation and the tendency of educators to leave to write qualification enhancing exams). A net cumulative decline of 2,2% in enrolment was measured over the period, equivalent to an annualised decline of 2,6%. Decline was significantly greater in some schools, illustrated by one in which enrolment fell from 636 to 584 over 10 months, equivalent to an annualised decline of 9,8%. To place these data in a wider context, it should be noted that there has been a 24% decline in entry into

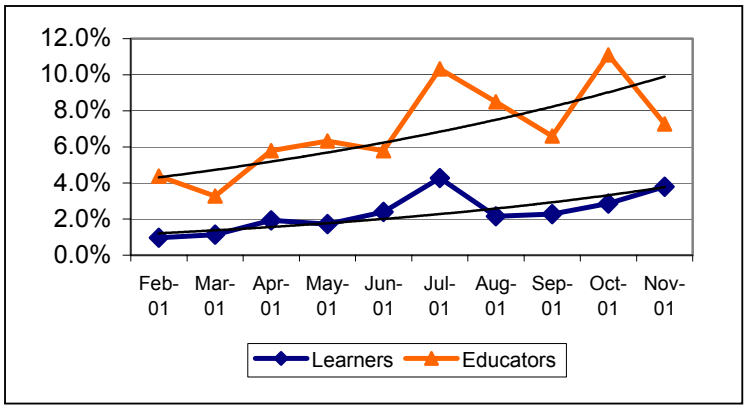
Grade 1 across the Province of KwaZulu Natal, 1998 to 2001[4]. Reasons for this decline are unclear but it seems probable that reduced general fertility rates, reduced HIV-related fertility, infant and child mortality, policy change (limiting entry of children under 7 in 2000, which was substantially but not entirely responsible for a decline of 24% in that year alone) and household-level economic stress are the major contributory factors.



Change in Learner Enrolment

- Absenteeism Rates/Loss of Classroom Contact Time:

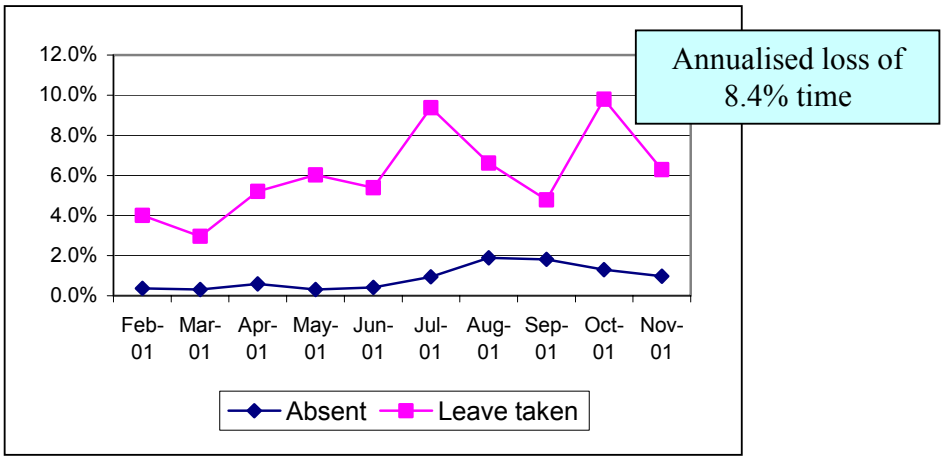
Absenteeism rates for learners and absenteeism (combined with official leave) for educators followed similar trends, although two prominent peaks were evidenced for educators in July and October, as against only one for learners, also in July. While the July peak has already been considered above, the October peak suggests educators being absent or on leave to prepare for or write exams. The net effect of the observed rate of educator absenteeism and leave was a loss of 7% of available classroom contact time over the period.



Learner and Educator Absenteeism rates – Days lost as a percentage of available time

[4] *Where Have All the Flowers Gone?* Preliminary Analysis of Enrolment Decline for the KZNDEC Provincial Education Development Unit; Badcock-Walters, P, 2001

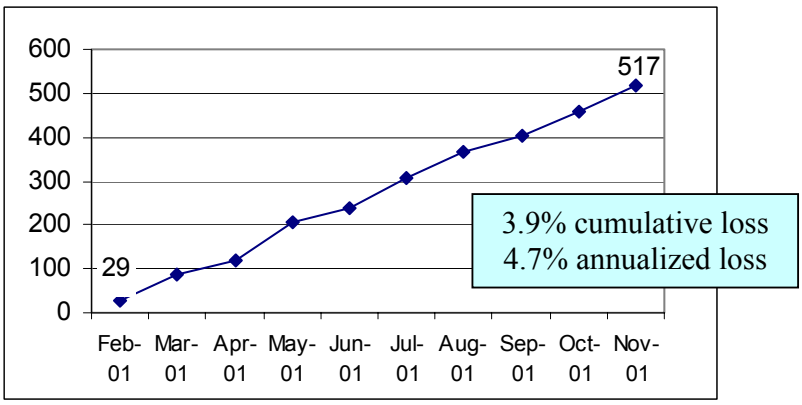
Interestingly, at the point when absence on leave for educators declined (August/September), their absence *without* leave rose correspondingly, suggesting routine abuse of the system and a lack of system monitoring. Most importantly, these monthly dynamics are not evident in conventional annual school census returns or any other form of available school or district record keeping. As a consequence of this data availability, several school principals in the sample group have now instituted school-based leave rosters for the first time.



Educators – loss of contact time

- Learner Drop-Out/Attrition:

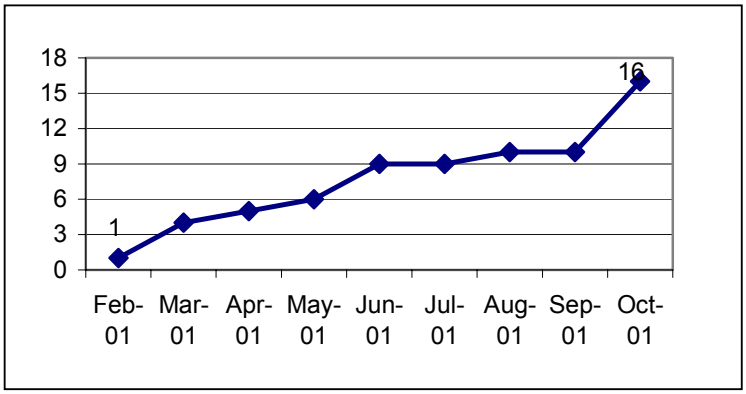
Of greater concern was the cumulative permanent loss of learners from the system. Over the period some 517 learners left school, equivalent to an annual attrition rate of 4,7%, in an almost unwavering upward trend. More female learners (51%) than male (49%) left the system, and the overwhelming reason cited for this loss was drop-out (49%), followed by unknown reasons (21%) and relocation (16%). Pregnancy was responsible for 5% of the total loss and equated to a cumulative annual pregnancy rate of 6,24%. Orphaning was cited as the reason for some 26 learners leaving, or 5% of the total loss, in addition to those orphans retained in the system. There was also loss due to death (3%) and some limited incidence of loss due to financial stress (1%).



Learners that left the system

- Educator Attrition:

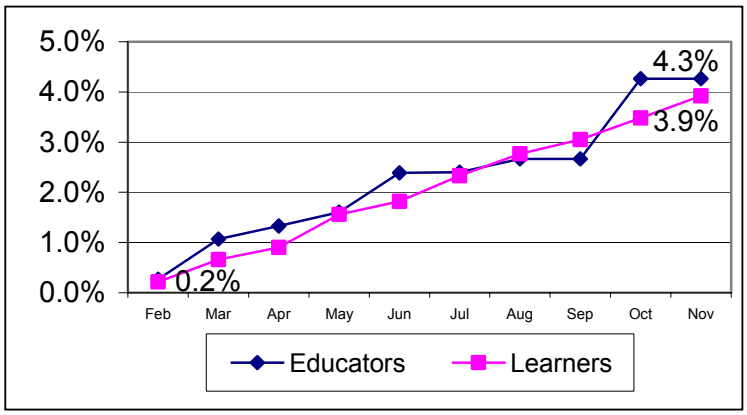
  Of the 371 educators in the sample in February 2001, 16 were lost to the system over the period, for what might be regarded as a largely 'normal' attrition rate, annualised at the equivalent of about 5,1%. Reasons for the loss included promotion (44%), leaving the Department (13%) and the ubiquitous 'other' category (36%). It should be noted that the district officials involved in the pilot insisted that while it was acceptable to record deaths for learners, *educator* deaths had to be recorded under 'other' causes.



Educators lost to the system

This remarkable sensitivity to disclosure is important and is reflected in another, unrelated data gathering exercise: South Africa began to capture annual mortality for learners and educators in 1999/2000, and it is noteworthy that only around 7% of schools in KwaZulu Natal (employing about 8,5% of educators) even answered the question on educator mortality, while about 28% were prepared to do so for learner mortality. These obviously unrepresentative data nevertheless show a mortality rate *due to illness alone* of 6,5% for the educator sample involved (approximately 8,5% of the total number employed)[5]. 92% of these deaths through illness were for educators under the age of 50, and peaked for females between the ages of 30 and 34, and for males between the ages of 35 and 39. These data should also be seen in the context of official payroll data for 1999, which records an educator attrition rate for the whole Province of 6,8%[6], of which about 1% can be said to be directly AIDS-mortality linked, projected to rise to 5% by 2010[7]. The reason for the apparently lower attrition rate in the pilot sample is unknown but it is likely that it stems from its predominantly rural character, distant from the alternative employment opportunities of the metropoles. An important aspect of the DEMMIS approach is that it allows managers and planners to instantly link attrition to a given school and respond accordingly.

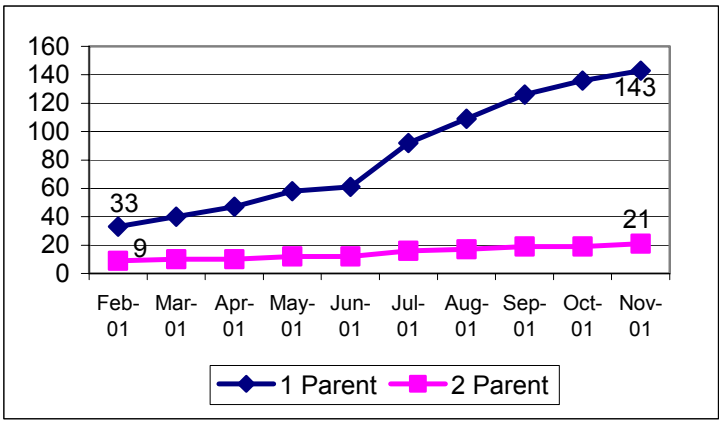
[5] EMIS Unit, KZNDEC and EduAction analysis, 2001.
[6] KwaZulu Natal Educator Demand and Supply model, HEARD & RTI, 2001.
[7] Assuming that educators have the same infection rate as other KZN adults of the same age and gender.



Educators and Learners lost to the system as a percentage

- Orphaning:

  Orphaning was defined in the pilot simply as the loss of one or both parents, as opposed to maternal versus double-parent orphans. Schools were asked to record how many *new* orphans they knew of in the preceding 30 days, providing for a month-on-month cumulative analysis over the period; the trend evidenced confirmed a steady growth in incidence. 143 single-parent orphans were recorded over the period, as against 21 double-parent orphans, for a total of 164 over the period. This equates to an annualised orphaning rate in the 13 177 pilot sample of 1,5%, as might be expected at this stage of the pandemic.

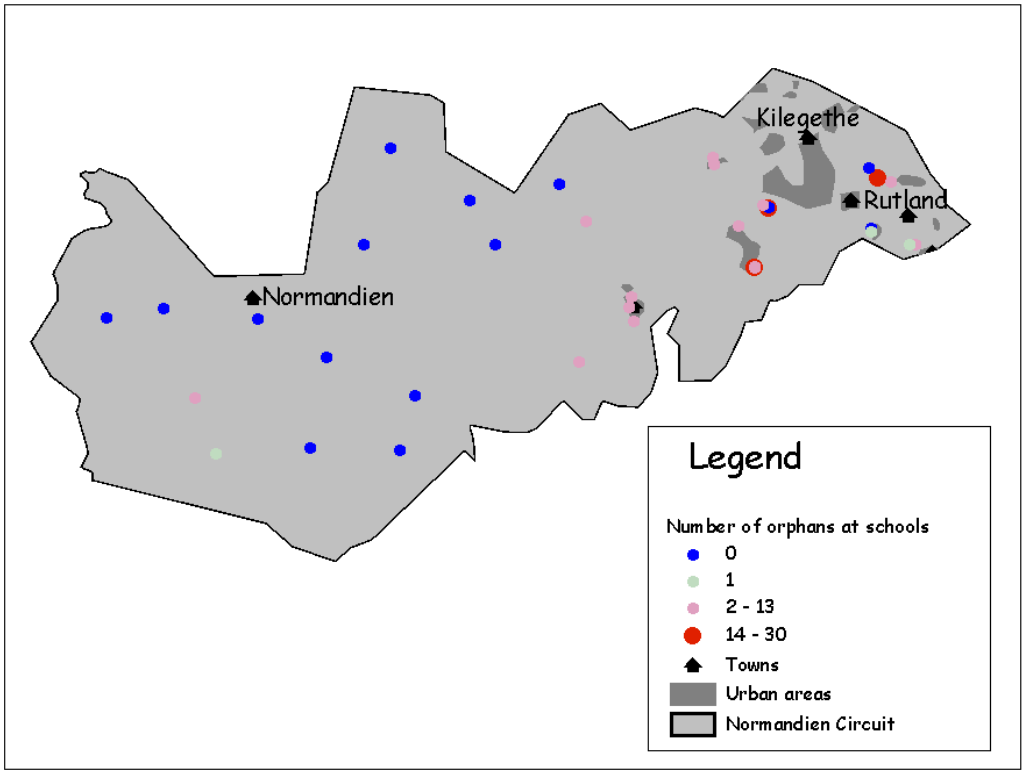


Number of new orphans reported every month

These data were overlayed on a map of the region, using GIS technology and available School Register of Needs data[8]. This geographic analysis clearly demonstrated a clustering of orphans, in larger schools, around peri-urban and

[8] South Africa's 27 500 schools were geolocated, structurally audited and analysed in the 1996 Schools and Colleges Register of Needs Survey jointly conducted by the Education Foundation and Human Sciences Research Council; this survey was updated in 2000.

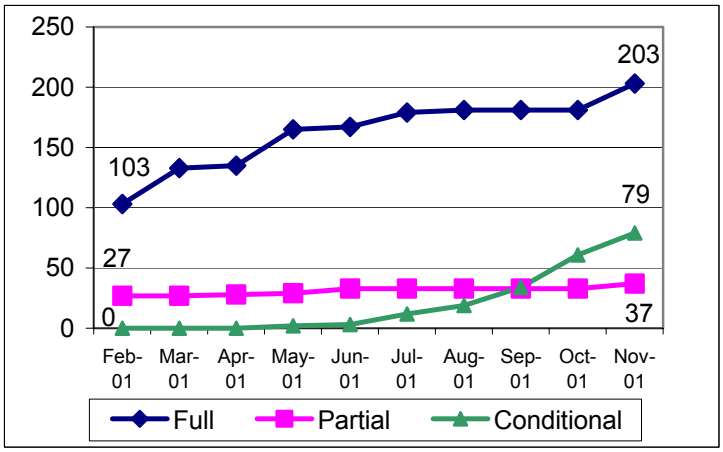
informal settlement areas on the outskirts of the regional business centre and its linked industrial areas. In fact, all three schools with more than 13 orphans, and most of those with between 2 and 13 orphans, were seen to be grouped in comparatively close proximity in these areas. It is likely therefore that the balance of the predominantly rural sample may understate the incidence of orphaning relative to the extent of urban settlement in the Provincial context.



Distribution of schools indicating number of orphans
In relation to urban areas

- School Fee Exemptions:

  A useful indicator of economic impact, linked to the incidence of orphaning, is the decline in school fees measured by the granting of full, partial and conditional school fee exemptions, made at the discretion of the school principal and school governing board. These fees can be significant relative to local income levels and the upward trend in the granting of these exemptions over the period confirms growing household economic stress, the effect of orphaning and, we would argue, the direct and indirect impact of HIV/AIDS. Full exemptions doubled over the period to 203, partial exemptions tripled to 79 and conditional exemptions grew from zero to 37, representing significant losses to school income and the probable need for Provincial or national intervention.



Cumulative number of school fee exemptions granted

7 Lessons Learnt:

In terms of HIV/AIDS impact, the pilot confirmed that a time-series of monthly returns, by grade and gender, can provide an unprecedented insight into rates and reasons for declining enrolment, absenteeism, drop out, orphaning, economic stress, pregnancy, morbidity and mortality by school. The preliminary analysis appears to confirm that HIV/AIDS is exacerbating existing levels of systemic dysfunction and failure. It certainly confirms alarming trends and levels of fluctuation unseen in the annual school census, and may guide remedial management response with a high degree of accuracy.

The data suggest that certain of these rates are lower than those often modelled and projected, but this may be little cause for celebration: These data represent the first systemic measurement of the school system over time and therefore may be seen to variously underpin, reinforce or contradict those assumptions and projections available until now. They remain disturbing however and show that the overlay of HIV/AIDS on existing problems may indeed point to large-scale systemic collapse over time. In short, these data provide the opportunity to ground our assumptions, models and projections and interrogate ineffective policy and practice. They also confirm that it is possible to develop supportable and incremental evidence to guide intervention within a short time, at comparatively little cost and with comparatively little training.

At a management level, the lesson of the pilot is that, in spite of Provincial and National Education Department scepticism about demand and capacity at district level, it *is* possible to capture key monthly indicators from the school level and analyse these at the district to identify systemic problems. Moreover, the pilot confirmed the very real appetite for management information at the school and district levels, and the preparedness of officials to use it to good effect. This confirms the viability of systematizing routine data collection as a means to inform local level management *and* generate key indicators of HIV/AIDS impact. An important dividend has been a heightened awareness amongst principals and district level officials of the impact of HIV/AIDS in a management context, and their use of the Fact Sheets supplied to provide factual information and context. An additional dividend has been the empowerment of

local officials, who are now able to employ Management Checklists to develop effective responses to this new information, interpret, report and monitor trends.

8 Recommendations:

We would argue that DEMMIS should be taken to scale in KwaZulu Natal and the balance of South Africa's eight provinces without delay and piloted in other African countries[9]. The ability to capture and monitor key HIV/AIDS indicators on a monthly basis, at little cost, should open the way to creating a new generation of information-based, HIV/AIDS-sensitive decision support systems and should be shared with all interested parties.

[9] Zambia is planning to introduce DEMMIS nationally by 2003 and other countries have expressed interest.