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A systematic review of available information concerning the economic impact of HIV/AIDS on Swaziland

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1.0 BACKGROUND

1.1 Extent of the HIV/AIDS epidemic in Swaziland

Swaziland is the smallest country in Southern Africa comprising of approximately 17,000 square kilometres. HIV[1]/AIDS[2] was first detected in Swaziland in 1986 and a National AIDS Control Programme was established in 1987. The 8th sentinel survey of 2002 put the national adult HIV[3] prevalence at 38.6 percent **(1).** Current UNAIDS estimates put the prevalence at 38.8 percent, the highest in the world, with Botswana second at 37.3 percent **(2)**.

The United States Census Bureau **(3)** projected the adult HIV prevalence to level off and stabilize at 34 percent. However, this has not happened, instead there was a sharp rise in prevalence from 34 percent in the year 2000 to 38.6 percent in the year 2002. The sharp rise was largely due to a 6 percent increase in HIV prevalence amongst the 15-19 year age group. Infections in this age group represent newly acquired infections **(1,3)**.

[1] HIV – Human Immunodeficiency Virus.
[2] AIDS - Acquired Immunodeficiency Syndrome
[3] Adult – Aged 15-49 years

Various factors have been linked to the worsening of the epidemic in Swaziland. First is the high proportion of sexually active youths aged 15-19 **(4,5)**. Secondly, the prevalent pattern of labour migration internally towards commercial agricultural farms and externally to mines in South Africa and, increased population mobility across the borders **(6,7,8)**. The third factor is the prevalent gender inequalities within the Swazi society **(9)**. Lastly, the failure of government to respond adequately to the epidemic has been cited as another major factor **(10)**.

The epidemic in Swaziland is at an advanced stage. This is the stage where a large number of those infected begin to fall sick and die **(1,2,3)**. The prolonged illness of the productive age group, which inevitably ends in death, has negative impacts on the economy. These negative impacts will be discussed next.

1.2 Negative impact of HIV/AIDS

HIV/AIDS predominantly affects the productive age group. Therefore the excess number of chronically sick people and those dying from the disease reduces the number of skilled labour available to the economy. Secondly, the long period of illness is associated with increased expenditure and reduced income as the sick members of society are unable to work **(11)**.

According to Cohen **(11)**, the labour and income supply changes induced by the epidemic cut across all sectors and levels of any economy. Cohen **(11)** has classified the economy into three sectoral levels. The first is the micro-level, which covers the households and community. The second is the meso-level. This level covers institutions and organisations that include private and public sectors. The third level is the macro-level, also referred to as the national level. The next section briefly discusses the impacts at these three levels of the economy.

1.2.1 Impact of HIV/AIDS at the micro-level

HIV/AIDS affects a household's ability to produce food and earn income in four major ways:

- Reducing labour for farming due to illness, death and additional care-giving responsibilities **(12)**.
- Depleting food reserves, savings and productive assets such as livestock **(13)**.
- Increasing household expenses due to costs of caring for chronically ill members of the household or children orphaned by HIV/AIDS **(14)**
- Loss of remittances from death of working members of the household **(15)**.

1.2.2 Impact of HIV/AIDS at the meso-level

HIV/AIDS affects business productivity and profitability in three major ways:

- Reduction in availability of labour due to increased absenteeism as sick employees seek health care, take time off to care for sick relatives and attend funerals of colleagues dying from HIV/AIDS **(11)**.

- Reduced productivity of workers due to reduced morale as they lose their colleagues and relatives to HIV/AIDS **(16)**.

- Increasing expenditure on operations due to increase in healthcare utilisation and costs, payout of death benefits, recruitment and training of replacements **(17)**.

1.2.3 Impact of HIV/AIDS at the macro-economic level

HIV/AIDS has the potential to reduce economic growth and the level of Gross National Product (GNP) per capita. First, through the reduction in available labour force due to increased death of productive age group and, decline in life expectancy and population growth rates. The replacement of skilled employees who have died by less skilled workers reduces productivity leading to reduction in economic growth **(18)**.

Further, government diverts scarce resources to implement HIV/AIDS programmes and care for the increased number of people seeking healthcare. This reduces levels of resources saved by government.

These net savings could have been used to invest and create jobs. HIV/AIDS therefore can reduce the level of job investment and job creation **(18, 19)**.

1.3 Objectives of the review

Swaziland is facing a high prevalence of HIV/AIDS and the epidemic is in an advanced stage with already large numbers of people falling sick and dying **(1,2,3)**. This is the stage when the negative impacts described in Chapter 1.2 above begin to manifest. The impact of HIV/AIDS on the Swazi economy is therefore diverse and there is need to collate data and document this impact in order to inform decision makers and planners.

A systematic review of available literature on the impact of HIV/AIDS on Swaziland was, therefore, undertaken to explore and collate data on the socio-economic impact of HIV/AIDS in Swaziland.

The main objectives of this systematic review were:

Objective 1: To identify completed research conducted on the economic impact of HIV/AIDS in Swaziland;

Objective 2: To make a preliminary assessment of the quality of existing research so far done on the socio-economic impact of HIV/AIDS on Swaziland, identify trends and gaps in the research and identify methods of dealing with these gaps;

Objective 3: Determine the ways and extent to which HIV/AIDS has affected the various sectors of the Swazi economy.

The literature search covered all the three levels of the economy outlined above, but, given the available literature, particular issues were specifically considered in relation to each level. These issues are discussed in the next section.

1.4 Description of the three levels of the economy covered in the systematic review

As discussed earlier, Cohen **(11)** has divided the economy into three major levels – the micro-economic, meso-economic and macro-economic sectors. The coverage of these sectors in the review is discussed below.

1.4.1 Micro-economic level

At micro-level, the systematic review focussed on the rural households and their farm systems. Whereas rural household agriculture contributes only 1.2 percent to Swaziland Gross Domestic Product (GDP), it is practiced by over 70 percent of the Swaziland population. It is also the main source of maize, which is the staple food for the Swaziland people **(20,21**). Rural households and their farm systems are one of the major sectors in the Swazi economy.

1.4.2 Meso-economic level

At meso-level, the review covered the private and public sector organisations. The private sector is the largest employer in Swaziland accounting for over 70 percent of total labour force. At the end of 2002, the private sector employed 63,598 of the 92,152 total number of Swaziland population in paid employment **(22)**.

Secondly, the private sector contributes over 50 percent of Swaziland's GDP. This is largely from commercial agriculture and the export of manufactured goods **(21)**.

Thirdly, the private sector contributes 10 percent of government revenue **(22)**; only second to the revenue from the Southern African Customs Union (SACU) that provides over 50 percent of state revenue **(23)**. SACU comprises of five southern African countries, namely, Botswana, South Africa, Lesotho, Namibia and Swaziland. Its aim is to maintain the free interchange of goods between member countries.

In the public sector organizations, the review covered the central agencies of government and education. Amongst the central agencies of government were the Ministries of Agriculture and Co-operatives; Finance, Economic Planning and Development, Public service and Information.

The public sector is the second largest employer, employing over 30 percent of the total labour force, only second to the private sector **(22)**. Moreover, the social services offered by the public are key to survival of all the other sectors of the economy. A typical example is the agricultural extension officers that provide technical advice to rural farmers. Breakdown of continuity in such services could have major downstream effects to rural farming and so have a negative impact on food security.

1.4.3 Macro-economic level

The impact of HIV/AIDS on individuals, households, companies, government, political and legal institutions collectively impact negatively on the macro-economic performance and economic development. This is referred to as the macro-economic impact of HIV/AIDS **(24)**.

Several studies done in the early 1990s addressed the link between HIV/AIDS and macro-economic growth **(24)**. This was when the full scale of the epidemic had not been recognized. Since then, there has been little research in this area. Most of the studies are economic projections based on economic modelling. These studies have been used by this review to determine the impact at macro-level.

1.5 What is a systematic review?

A systematic review is a summary of all past research on a topic of interest **(25)**. Data from multiple studies is synthesized, in the event the synthesis yields comparable effects, the effect is reported **(26)**. In the event the effect varies across studies, the source of variations is tracked down **(27)**.

1.5.1 Rationale for a systematic review

This systematic review was done with the major aim of synthesising data from multiple studies on the socio-economic impact of HIV/AIDS on Swaziland in order to yield comparable results on the impact across the various sectors of the Swazi economy. The review explored the variations in impact across sectors and provided insight into the source of these variations.

Secondly, the review identified sectors that have been heavily affected by HIV/AIDS. The review provided reasons why these sectors were heavily affected. This is information is critical to planning. The information feeds into discussions on the design and implementation of effective intervention to the epidemic. According to Mulrow **(28)**, systematic reviews efficiently integrate valid information and provide a basis for rational decision-making and planning.

Thirdly, there have been debates in both technical and political circles that have cast doubt on the extent of the HIV/AIDS epidemic and the level of impact to the Swazi economy. The prolonged drought of 2001/2002 that left many rural Swazis famine stricken raised debates on the impact of HIV/AIDS. Technical reports pointed to HIV/AIDS as the major underlying

factor. However, government was convinced this was a mere famine brought about by prolonged drought **(29,30)**. These debates have created uncertainty amongst planners about the extent of the impact of the HIV/AIDS epidemic. Light and Smith **(31)** have suggested that whenever there is a substantive research question, with disparate findings and substantial uncertainty, systematic reviews should be done to clarify the evidence.

Earlier studies on the impact of HIV/AIDS on Swaziland projected a huge negative socioeconomic impact on the country **(32)**. The systematic review was therefore done to collate and synthesise information from various studies on the impact of HIV/AIDS on Swaziland. The systematic review would therefore provide reliable results on which to draw conclusions on the impact of HIV/AIDS on Swaziland and provide information for planning.

Wolf **(33)** lends further support to the value of a systematic review for planning by suggesting that even in cases where the review fails to provide definitive information, it can yield vital information that could be used to plan new research.

1.5.2 Advantages of a systematic review over traditional literature review

Because of the limitations of a single study, researchers have long recognised that data from multiple studies must be synthesised to yield definitive results. Prior to systematic reviews, the synthesis took the form of narrative reviews. However, these narratives were at best subjective and at times misleading **(34)**. This necessitated the use of systematic reviews. Unlike the traditional approach to reviewing literature, systematic reviews utilise the same principles and rigor that is expected of primary research **(35)**.

Systematic reviews are systematic in approach and use methods that are pre-planned and documented in a systematic review protocol. On completion of the review, the methods used are documented in the review report, to allow users the opportunity to appraise the quality of the systematic review **(36)**.

Secondly, systematic reviews take great care to find all relevant studies published and unpublished, assess each study, synthesise the findings from individual studies in an unbiased way and present a balanced and impartial summary of the findings with due consideration of any flaws in the evidence **(25, 37)**.

Thirdly, by synthesising data from multiple studies and in a systematic approach, systematic reviews limit systematic errors and reduce chance errors **(38, 39)**. One is able to report more precisely on the result thereby providing more reliable results upon which to draw conclusions and make decisions.

2.0 Methodology

The methodology for the systematic review was based on the guidelines described by Alderson, Green and Higgins **(36)** in the Cochrane Reviewers' handbook. The methodology included seven steps, namely:

- Identification of research question for the review,
- Development of a review protocol,
- Identification of a well established search strategy to identify the studies for inclusion
- Pre-determined inclusion and exclusion criteria
- Critical appraisal of the included studies
- Extraction of data to be synthesised
- Synthesis of the data

Details of the methodology for the systematic review are described below.

2.1 Identification of research question

The research question was identified based on the author's experience and involvement in the prevention and control of HIV/AIDS in Swaziland. The initial research question was: "The social-economic Impact of HIV/AIDS on Swaziland". This was modified by the Post-Graduate Committee of the School of Public Health, University of Witwatersrand to read as: "The systematic review of available information concerning the economic Impact of HIV/AIDS on Swaziland". This was aimed at broadening the review to allow coverage of a broader set of literature.

2.2 Protocol

A protocol was developed to guide the review and ensure that the review was conducted with the rigour expected of all research. The protocol fulfilled the same role as a research proposal and was approved by the University of Witwatersrand University, School of Public Health Post-Graduate Committee. The protocol set out the reviewer's intentions with regard to determining the socio-economic impact of HIV/AIDS on Swaziland. The protocol further set out the methods that were used in carrying out the review.

2.3 Search strategy

Deville, Buntix, Bouter, et al., **(41)** insist that a systematic review should include all available evidence. To achieve this, the author designed a strategy to ensure a systematic and comprehensive search of the literature. The search strategy was based on clear and explicit description of the indicators of the impact of HIV/AIDS and the country – Swaziland. The search was done in four phases, namely:

- Search of electronic databases.
- Reference checking for additional studies missed during database searches
- Search for unpublished studies by consulting researchers and organisations and; searching conference abstracts.
- The titles and abstracts of identified citations were screened based on the inclusion criteria.

2.3.1 Phase I – Search of electronic databases

The first phase consisted of a computer-aided search of electronic databases. The Cochrane Library was searched first looking for existing reviews, followed by searches of MEDLINE, Embase, AIDSLINE, EBSCOnet and Popline databases.

The search of electronic databases was based on a list of database specific words and text that describe the impact of HIV/AIDS on Swaziland and the various sectors. The keywords and text words that were used in various combinations include:

social, economic, socio-economic, impact, HIV, AIDS, household, rural household, family, business, private sector, education, health, human immuno-deficiency virus, acquired immunodeficiency syndrome, teaching, schools, macro-economy, macroeconomic, national level impact, Swazi, Swaziland, absenteeism, AIDS cost, funeral costs, cost of AIDS, sick leave utilisation, orphans.

2.3.2 Phase II – Reference checking

The second phase concentrated on the reference sections of the primary studies and narrative reviews identified from the electronic databases. This was aimed at identifying additional primary studies that could have been missed by the electronic search. Following Dickersin, Scherer and Lefebvre **(42)**, studies found only in the reference sections of retrieved reports but missed by the electronic search were pursued in the database using the articles' title and the first author's name. If a study was found in the database, its keywords were added to the search strategy. The approach increases sensitivity of the search strategy in identifying all available studies on the impact of HIV/AIDS on Swaziland. Twenty-seven websites that were

identified in the reference checking were added to the list of electronic databases to be searched. These are detailed in **Appendix A**

2.3.3 Phase III – Consultation of agencies, researchers and conference abstracts

The third phase consisted of searching conference abstracts, higher degree dissertations and ethics committee registers at the Ministry of Health and University of Swaziland. This was aimed at locating unpublished studies on impact of HIV/AIDS on Swaziland. In addition, Swaziland based research agencies, organisations and academic centres as well as experts in the field of economics of HIV/AIDS were contacted.

Lastly, several key informants at International and local organisations and; NGOs involved in HIV/AIDS in Swaziland were interviewed. The organisations included UNDP, UNAIDS, WHO, National Emergency Response Committee on HIV/AIDS (NERCHA), and The AIDS Support Centre.

2.3.4 Phase IV – Criteria for inclusion of studies.

The fourth phase consisted of screening titles and abstracts of the identified citations using specific pre-specified inclusion and exclusion criteria to identify studies to be included in the review. The criteria were applied on studies that were identified from the search strategy. The details of the criteria are discussed below.

2.3.4.1 Inclusion criteria

- Primary research studies that evaluate the impact using well defined indicators, methods of data collection and time frame.

  Primary research on the impact of HIV/AIDS on Swaziland was the central focus of this review. This is research that involved data collection and fieldwork and had a specific HIV/AIDS focus and generated outcomes in terms of the indicators of the impact of HIV/AIDS.

  The three levels of the Swazi economy were covered ranging from households to the public sector.

- Studies that model the impact on the various sectors using valid epidemiological data

2.3.4.2 Exclusion criteria

- Articles not based on Swaziland.
- Secondary literature especially writing involving anecdotal theorisation on the impact of HIV/AIDS on Swaziland.
- Articles not based on primary data collection or modelling of the impact.

2.3.4.3 Ethical clearance for information used in the systematic review

It is important to note that this review only includes material that was in the public domain at the time when the review was conducted. The post-Graduate committee ruled that ethics clearance should be obtained if any information not available in public domain was used in the review. All research studies that were included in the systematic review were in public domain. The author of this report did not therefore need to approach the Ethics committee for ethics clearance.

Consultations with the business sector and the Swaziland Business Coalition on HIV/AIDS indicated that even those reports drawn from this sector are public domain documents. This is in sharp contrast to earlier periods when businesses placed a blanket of secrecy on information and studies on the

impact of HIV/AIDS on their firms. The situation has changed with the formation of the Business Coalition against HIV/AIDS. The coalition has appealed to businesses to share information on the impact of HIV/AIDS on their firms and work together to implement interventions.

2.4 Critical appraisal of research studies included in the review

A critical appraisal of all studies included in the systematic review was done to assess the quality of the studies. According to Evans **(25)** and Miser **(43)**, critical appraisal of research studies included in a systematic review enables exclusion of papers that are of too poor a quality to inform policy and practice. Secondly, it provides the methodology through which those studies that pass for inclusion are systematically evaluated.

The importance of considering the quality of primary studies has been highlighted further by Naylor **(44)**: *'….in some respects, the quantitative methods used to pool the results from several studies in a meta-analysis are arguably of less importance than the qualitative methods used to determine which studies should be aggregated.'* In addition, Dickersin and Berlin **(45)** have pointed out that one of the roles of a systematic review should be to clarify weaknesses in existing data on a research question and encourage better quality in future.

A chapter has been devoted to discussing the quality of the research studies and identifying areas in which future research would be improved.

To facilitate the appraisal process checklists were developed for quantitative and qualitative studies.

2.4.1 Checklist for critical appraisal of quantitative studies

The design of the checklist for critical appraisal of quantitative research was based on the approach as described by Crombie **(46)** and the three basic stages of critical appraisal as described by Greenhalgh **(47)**. The elements of the checklist included the following:

- **The message**

  In the message the checklist looked at the aims of the study, the findings and what these findings mean. The message further looked at how findings compared with previous reports.

- **Validity of study**

  Validity looked at whether the conclusions were justified by the description of the methodology, description of data and the findings.

- **Utility and relevance of results**

  Utility and relevance looked at whether the findings were justified and could be generalised.

2.4.2 Checklist for critical appraisal of qualitative studies

Whereas methods to assess quantitative research are widely known and accepted, it has been debated whether the quality of qualitative research can be legitimately judged and how this could be done **(48,49)**. It is now widely agreed that qualitative research can be judged on three key areas: methodological design, validity and relevance of findings **(50)**. These three key areas are captured extensively in a checklist developed by Bromley, Dockery, Fenton, et al., **(51)**. This checklist was used to appraise qualitative research. The checklist covered six key areas namely: theoretical issues, study design, sampling and data collection, description of procedure for analysis of data, relevancy and trustworthiness and; discussion of the implications and limitations of the study.

2.5 Data extraction

In order to determine the impact of HIV/AIDS on Swaziland, a data extraction form based on Boaz, Hayden and Bernard **(52)** was designed to extract indicators for the impact. Data extraction was done simultaneously with, but

separately from critical appraisal of the studies. The data extraction form is attached in **Appendix B**. The data extraction form identified the:

- Citation of the study,
- Research question and study design,
- Study participation and research tools used,
- Theories on which study was based
- Analysis of data and results, and Indicators of impact from the study
- The reviewer's decision on whether to include the study in the review.

2.6 Synthesis of quantitative data

Common sets of indicators were compiled from the data extracted from the studies. This was done in a standardised format to avoid extractor bias **(36, 53).** The common sets of indicators were then synthesised to collate the impact of HIV/AIDS on Swaziland. The synthesis was done in two phases. The first phase dealt with quantitative data, and the second phase with qualitative data. This section deals with synthesis of quantitative data.

Following the guidelines for synthesis of quantitative data described by Alderson, et al., **(36)** and McClish **(54)**, indicators extracted from the studies were synthesised in five steps, namely:

- Presentation of the results of individual studies in a Forrest plot.
- Searching for heterogeneity amongst the studies.

- Dealing with heterogeneity.
- Deciding which model to be used if statistical pooling was appropriate.
- Statistical pooling and/or qualitative descriptive analysis studies that are not suitable for statistical analysis.

The five steps and the definition of the indicators for the impact of HIV/AIDS are outlined in the next sections.

2.6.1 Presentation of results

The indicators extracted from individual studies were presented in either a graphical form called a Forrest plot or a table. The indicators are defined in section **2.6.3**. The Forrest plot and tables were made for each indicator showing the magnitude and precision at the 95 percent confidence Interval. Lewis and Clark **(55)** have defined a Forrest plot as the: "… *graphical presentation of each study's effect size and precision. It gives the study's effect size and a 95 percent confidence interval for the effect. The plot is a simple visual presentation of the amount of variation between the studies as well as an estimate of the overall result of all studies" .*

The effect size refers to the magnitude of the indicator for the impact. The Forest plot therefore allows readers to see information from individual studies that went into the analysis at a glance.

2.6.2 Construction of the Forrest Plot.

Following Alderson, et al., **(36)** and Bijnens, Collette, Ivanov, et al., **(56)**, construction of the Forrest Plot involved five stages, namely:

- Calculation of the mean and/or the odds ratio for the indicator.
- Calculation of the standard error of the mean and/or odds ratio.
- Calculation of the standard deviation of the mean and/or odds ratio
- Calculation of the confidence interval of the mean and/or odds ratio
- Plotting the means and odds ratios on the Forrest plot.

2.6.3 Definition of Indicators used in quantitative data analysis.

HIV/AIDS predominantly affects the productive members of society who are the major source of labour. The excess morbidity and mortality of this age group leads to labour and income supply changes at all sectors of the economy **(11)**. These labour and income supply changes impact negatively on the various sectors of the economy. The indicators represent the extent of the impact the epidemic has had on the various sectors of the Swazi economy. Six indicators were identified and calculated across the three levels of the economy. These indicators are described in this chapter and illustrated in Table 2.1 below.

Table 2.1 Illustration of indicators for the impact of HIV/AIDS

SECTOR	Impact of HIV/AIDS	Indicator for Impact
Micro-sector Rural Households	Excess morbidity of the adults in the household • Reduced labour on the farm • Increased expenditure on health • Diversion of labour from the farm to care for sick relative • Reduced crop yield per household • Change to crops that do not require a lot of labour	Increased vulnerability of households affected by HIV/AIDS to environmental shocks(In comparison to households not affected by HIV/AIDS) in relation to: Increased burden of children orphaned by HIV/AIDS.
	Death of breadwinners within the household • Increased expenditure on funerals • Loss of remittances • Households with AIDS orphans • Children drop out of school	
Meso-Sector Business and Public sector	Increased illness amongst employees Increased retirement of employees on medical ground Increase in number of employees seeking healthcare	Cost of AIDS as a percentage of total wage bill
	Increased absenteeism as employees seek healthcare, care for sick relatives, attend funerals	Sick leave utilisation rate(absenteeism)
	Increased death of employees due to AIDS Increase in payout of death benefits and Funeral costs for dead employees	AIDS mortality rate per 1000 employees per year Increase in operational costs(Cost of AIDS as a percentage of total wage bill)
Macro-sector	Excess morbidity amongst the adult population • Increased government expenditure on health and social services – reduced level of net savings • Diversion of resources to implement HIV/AIDS prevention and control activities - reduced investments and job creation • Reduced productivity Excess mortality amongst the adult population - Reduced life expectancy - Smaller labour force	Reduction in economic growth – percentage average annual loss in growth of GDP and GDP per capita.

2.6.3.1 Indicators for the micro-level impact of HIV/AIDS.

Indicator 1: Increased vulnerability of on rural households

According to Baylies **(57)** and Stokes **(58)**, households affected by adult morbidity and mortality are significantly more vulnerable to environmental shocks. Some of these shocks include food insecurity, increased poverty and drought. Households use their livelihood assets to cope with these challenges. These assets include human labour, income and remittances from adults in employment, capital assets like livestock and land, and social networks in the community. HIV/AIDS through increased morbidity and mortality of adults in the household and the community decimates these livelihood assets. By doing so, HIV/AIDS exacerbates the vulnerability of the affected households to environmental shocks.

Therefore the impact of HIV/AIDS on rural households is measured as the increase in vulnerability to environmental shocks that the epidemic presents to affected households as compared to those not affected by HIV/AIDS.
The outcome is an odds ratio. Outcomes on the impact of HIV/AIDS on farm productivity, household expenditure, income and children's education were calculated**.**
These outcomes are outline below.

- Impact on rural household farm productivity expressed as number of households who had experienced:
    - Reduction in land area under cultivation
    - Reduction in crop yield and change in cropping patterns
    - Diversion of labour from the farm to care for the sick relative
- Number of households who had experienced an increase in expenditure on health due to HIV/AIDS.
- Number of households who had children dropping out of school.
- Number of households who had lost of remittances due to death of breadwinner from HIV/AIDS.

The odds ratios were calculated using the observed impact amongst households where no deaths had occurred as the reference. This was based on the understanding that if it were not for HIV/AIDS, the productive and younger age group would not have died. Since this data is derived from one study, it was presented in a table (Table 4.1) rather than a Forrest Plot.

Indicator 2: Children orphaned by HIV/AIDS

A child orphaned by HIV/AIDS refers to a child under the age of fifteen who has lost a mother or both parents to HIV/AIDS **(59)**. The burden of children orphaned by HIV/AIDS is the total number of orphans in the country due to HIV/AIDS.

2.6.3.2 Indicators for the meso-level impact of HIV/AIDS.

Indicator 3: AIDS mortality rate

AIDS mortality is defined as the deaths among persons in whom HIV infection had been diagnosed through testing, those that had HIV-related illness or met the clinical definition of AIDS **(60)**. Therefore, the AIDS mortality rate amongst employees is the number of deaths due to HIV/AIDS per one thousand employees per year.

Indicator 4: HIV/AIDS absenteeism

HIV/AIDS absenteeism was calculated as the mean sick leave utilisation rate due to HIV/AIDS. Sick leave utilisation rate is the number of sick leave days due to HIV/AIDS per employee per year **(61)**.

The formula for sick leave utilisation (X) is a/b

Where: a = Total number of sick leave days taken by all HIV-infected employees in the whole year

b = Average number of employees in that year

Indicator 5: Cost of AIDS as percentage of total wage bill

Cost of AIDS as a percentage of total wage bill is given by the formula:

$$= \frac{\text{Total cost due to AIDS}}{\text{Annual total wage bill}}$$

This cost includes healthcare and treatment services provided to HIV infected staff, funeral costs, death benefits and payouts for early retirement, recruitment costs and training costs. Funeral costs benefits cover the coffin, mortuary fees, food to be consumed at the funeral and transport for the hearse and fellow workers to the burial site **(61,62)**.

The annual total wage bill is the amount of money that the organisation spends on maintenance of the workforce. This includes salaries and benefits provided.

2.6.3.3 Indicators for the macro-level impact of HIV/AIDS.

Indicator 6: Impact of HIV/AIDS on Gross Domestic Product(GDP)

Gross Domestic Product (GDP) is the total output of goods and services produced by all resident producers, plus any product taxes (less subsidies) not included in the valuation output **(63**).

GDP growth is calculated from constant GDP data and applying the least-squares growth rate method **(64)**. GDP per capita is the GDP divided by the mid-year population. Therefore the percentage average annual loss in growth of GDP or GDP per capita growth is the reduction in the average annual growth rate expressed as a percentage-point difference when compared to the equivalent result when the effect of HIV/AIDS is removed.

The percentage average annual loss in growth of GDP or GDP per capita represents the additional average annual percentage points by which GDP or GDP per capita would have grown in the absence of HIV/AIDS.

2.6.4 Searching for heterogeneity between studies

Homogenous studies are studies that are sufficiently similar in their design that any difference in results can only be due to sampling error. On the contrary, heterogeneous studies are studies whose variability in results exceeds that expected from sampling error alone **(65,66)**. According to Colditz **(66)**, heterogeneity of study results is fundamental in quantitative systematic reviews and has been a source of much debate as it may leave the reader uncertain about the interpretation of combined results. Glasziou and Sanders **(67)** contend that heterogeneity deserves more emphasis that the summary estimates. Heterogeneity should therefore be looked for in a quantitative systematic review.

Deville, et al., **(41)** have suggested that the most informative method to explore heterogeneity is to produce a graph of the review results. There are four types of graphs that can be used. These include the Forrest plot **(55)**, plot of normalised (z) scores **(65)**, Galbraith diagrams **(68)**, and the L'abbe plot **(69)**. In this systematic review, the author chose to use the Forrest plot as the most appropriate graph. This was because the data handled involved plotting outcomes and the 95 percent confidence intervals.

According to Egger, Davey Smith and Phillip **(70)**, if studies are homogenous, the 95 percent confidence intervals of the indicators from the studies plotted on a Forrest plot will overlap. If the confidence intervals do not overlap, then the studies are considered to be heterogeneous.

2.6.5 Dealing with heterogeneity between studies

For homogenous studies, the indicators were combined to produce a pooled indicator. Of the common indicators identified for the meta-analysis, five indicators were calculated from studies that were homogenous. These were number of orphans due to AIDS, AIDS mortality rate, HIV/AIDS absenteeism, cost of AIDS and annual loss in GDP growth.

Only those studies assessing impact of HIV/AIDS on mortality amongst Swazi employees showed heterogeneity. Following Thompson **(71),** the

analysis was undertaken excluding the outlier. In addition, as recommended by Alderson, et al., **(36)** and Olkin **(72)** a sensitivity analysis was undertaken to explore the effect of including the outliers in the pooled indicator.

Further, Glasziou, et al., **(67),** and Bailey **(73)** recommend that where heterogeneity is detected, reasons and sources of heterogeneity should be sought and explained. This was done for the studies that showed heterogeneity. The reasons and sources for heterogeneity are discussed in section 5 on quality of studies.

2.6.6 Model for statistical pooling results of individual studies

The fixed effect model was used to pool the results of individual studies. The fixed effect model assumes that all studies are homegenous. The assumption therefore is that these studies are a certain random sample of one large common study, and that differences between study outcomes only result from random error **(36, 53)**. The exploratory analysis, which was done by drawing Forrest plots shows that confidence intervals of the results from the studies overlap and are therefore homogenous (Figures 1, 2, 3, 5 and 6). Figure 4.4, shows one heterogeneous study; this study was omitted from the pooled estimate.

2.7 Synthesis of qualitative data

Qualitative data was synthesised across various studies for common indicators on the impact of HIV/AIDS on the various sectors of the Swazi economy. No common indicators for combination across studies were identified but qualitative data provided explanations for sources of variation across studies. Qualitative data was synthesised from the following:

- Focus group discussions on the impact of HIV/AIDS on education and private small –holder agriculture.
- Case studies to on the impact of HIV/AIDS on education, private smallholder agriculture, individual employees, rural households and their farm systems.
- Key informant interviews on the impact on school curriculum and response to the epidemic at the workplace.
- Field interviews of Swazi employees in both public and private sectors.

Qualitative data was extensively used to determine quality of research studies included in the review (Section 5), determine impact of HIV/AIDS on education (Section 4.2.4) and the human resource function (section 4.2.5).

3.0 Description and quality assessment of the studies included in the review.

The search yielded over one hundred fifty articles that cited Swaziland and the impact of HIV/AIDS on its various sectors. One hundred-sixteen articles were eliminated on basis of title and abstract alone, because they were not impact studies.

This left thirty-four articles that were selected for full review. Of these, eighteen articles met the inclusion criteria (Table 3.1). This number was adequate for a systematic review. Alderson, et al., **(36),** and Borenstein and Rothstein **(53)** contend that any number of studies more than two is adequate for a systematic review.

Sixteen studies were excluded from the systematic review (Table 3.2). The major reasons for exclusion were:

- Narrative reports that quoted primary research studies
- Primary research that did not have any indicators for the impact of HIV/AIDS
- Focus of study was not impact of HIV/AIDS on Swaziland.

3.1 Studies Included in the review

Eighteen studies were included in the systematic review (Table1). Nine articles were primary research, one combined both primary research and economic modelling and; eight articles were projections based on economic modelling. The studies included in the review covered the impact of HIV/AIDS on the three levels of the Swaziland economy.

Two studies covered impact on the micro-sector. These are studies by Muwanga (89) and the Vulnerability Assessment Committee **(88)**.

Fourteen studies covered the impact at the meso-level of the economy. Four of these studies covered the public sector, namely Ministry of Education study on Impact of HIV/AIDS on education **(79),** Muwanga **(89),** study that covered Ministry of Agriculture and Cooperatives and Government of Swaziland study on the impact of HIV/AIDS on central agencies **(87)** and Impact on the health sector **(86).**

Ten studies covered the impact on the private sector. These are studies by Gilbertson and Whiteside **(74)**, Whiteside **(75),** Coutinho **(76,78),** Whiteside and Wood **(77)**, Bollinger and Stover **(80)**, Muwanga **(81,83)**, Haacker **(84)** and Fridge Masters **(85)**.

Three studies covered the impact of HIV/AIDS at the macro-economic level. These are Haacker **(84)**, the World Bank study on Swaziland **(90)** and International Labour Office **(91)**.

A description of these studies including sample size, target population, design methodology, data collection methods, focus of study, sampling methodology, sector covered, indicators under study and outcomes is given in Table 3.1 below. The next chapters will therefore only provide a summary of the characteristics of these studies.

Table 3.1 Studies included in the systematic review

Study	Sample size/ target population	Design/ Time	Data collection	Focus	Sampling	Sector(s)	Main result/indicators
Gilbertson & Whiteside (74)	3500 employees	Cross-sectional study	Review of personnel and clinic records	Employee mortality due to AIDS AIDS cost	Purposive sampling	Private sector – agroestate	AIDS as a major cause of increased mortality amongst employees Increased operational costs
Whiteside (75)	3750	Economic modelling	-	Employee mortality due to AIDS	-	Private sector – agroestate	Increased mortality of employees
Coutinho (76)	3750	Economic modeling	-	Employee mortality due to AIDS	-	Private sector – agroestate	Increased employee mortality
Whiteside & Wood (77).	-	Economic modelling	Projections based on demographic and prevalence of HIV/AIDS Using AIM and DemProj software.	Demographic impact Cost of AIDS Macro-economic impact	-	Private sector Macro-economy	Increased employee mortality(>3% per year) Reduction in GDP Reduction in population growth
Coutinho (78)	3295 employees over a five year period	Cross-sectional study Case-control 1995-1999	Review of clinic and personnel records Estimation of cost of HIV/AIDS	AIDS mortality Healthcare utilization Incidence of TB Absenteeism Cost of AIDS	Simple random sampling	Private sector (Agro-estate)	Increased healthcare utilization rate by HIV infected employees Increased Incidence of TB Increased Cost of AIDS as Percentage of total wage bill Increased absenteeism
Government of Swaziland – (79)	36 schools Heads of schools and inspectors Primary and High school children Parents Out of school youth & orphans	Economic odelling 1991-2016 Cross-sectional study for the qualitative part	Economic modelling 137 Focus group discussions 48 Key Informant Interviews Field interviews Case studies	Impact on demand & supply of education Impact on delivery of quality of education Cost of training new teachers Increase in number of orphans	Purposive sampling	Education	Percentage reduction in primary enrollment Increase in pupil:teacher ratio Increased cost of training extra teachers Change in curriculum to accommodate HIV/AIDS needs Reduced demand for education Increased death of deaths Increased payout of sick and death benefits
Bollinger & Stover. (80) .	-	Economic odelling with review of studies	-	Macroeconomic and Sectoral Impact	-	Multi-sectoral	Demographic impact GDP
Muwanga (81)	440 businesses registered with the Federation of Swaziland Employers	Cross-sectional study	Questionnaire on management of the businesses	Businesses that have felt the impact of HIV/AIDS and Workplace Responses implemented	Stratified random sampling – according to number of employees	Private sector	Most businesses had felt the increase in number of deaths of employees, absenteeism due to sickness and increased utilization of healthcare.

Study	Sample size/ target population	Design/ Time	Data collection	Focus	Sampling	Sector(s)	Main result/indicators
UNAIDS (82)	-	Economic modelling	-	Demographic impact	-	Multisectoral	Increase in n umber of AIDS orphans
Muwanga (83)	689 employees	Cross-sectional study 1992-2001	Review of clinic and personnel Records	Absenteeism due to sick leave AIDS Mortality	Simple random sampling	Transport sector	Increased AIDS Mortality rate Increased Sick leave utilization rate
Haacker (84).	-	Economic odelling	-	Economic cost of AIDS	-	Multisectoral	Negative impact on various sectors and the macro-economy
Fridge Masters (85).	1600 employees	Cross-sectional study	Review of personnel records	Employee mortality due to AIDS	Purposive sampling	Manufacturing industry	Increased employee mortality
Government Of Swaziland (86).	Five regional hospitals	Cross-sectional study	Review of Hospital Records	HIV/AIDS bed occupancy	Purposive	Health sector	Increase bed occupancy due to HIV/AIDS
Government Of Swaziland (87).	Four government ministries	Cross-sectional study	Review of personnel records	Mortality Cost of AIDS	Purposive sampling	Public sector	Increase in mortality Increase in cost as percentage of total wage bill.
Vulnerability Assessment Committee (88)	18,528 rural households	Cross-sectional study	Interviews of rural household members	Mortality and morbidity in households Burden of orphans	Simple random sampling	Rural households	Increased mortality Increased dependency ratios and number of orphans
Muwanga (89)	456 rural households 92 private sector companies 120 private commercial farms 34 government commercial farms 53 cooperative societies 92 private sector companies	Cross-sectional study 1992-2001	Population survey Review of company and clinic records Key informant interviews of managers Case studies Focus group discussions In-depth interviews with 300 employees, 24 managers, 10 healthcare workers	AIDS mortality HIV/AIDS absenteeism AIDS orphans Farm productivity in infected households Changes in household expenditure Risk factors at the various workplaces	Stratified systematic sampling (rural households) Multistage sampling(commercial farms and co-operative societies). Simple random sampling(private sector). Random sampling(qualitative research)	Private sector Rural households Public sector Commercial agriculture – private and government Co-operative societies	Increased employee mortality due to AIDS Increased sick leave utilization by workers Increase in number of AIDS orphans Increase in dependency ratios Reduced productivity of household farms by Reduced food security Increase in children dropping out of school Reduced farm area cultivated by Reduction in household income
Macro-economic technical group (90)	-	Economic projectiona	Modelling using the growth model	GDP growth	Modelling	Macroeconomy	GDP growth GDP per capita
International Labour Office (91)	-	Economic projections	-	GDP growth	Modelling	Macroeconomy	GDP growth GDP per capita

Table 3.2 Studies excluded from the review

Article	Design	Focus	Indicators	Reasons for Exclusion
Nkurlu & Samat, **(92)**	Narrative	Cost of AIDS	AIDS mortality amongst teachers	Narrative
Southern African Economist. **(93)**	Narrative	Macroeconomic Impact	Impact on education	Narrative
Whiteside, et al, **(94)**	Review of literature	Drivers of the epidemic		Focus not on impact
UNDP **(95)**	Narrative	-	-	Focus not on Impact
UNICEF – Swaziland. **(96)**			-	No HIV/AIDS specific data
UNDP. (97)	Narrative	-	-	Narrative
Government of Swaziland, HIV Surveillance reports. **(98)**	Narrative	HIV/AIDS prevalences	-	Sentinel surveys – not impact studies
AIDS analysis Africa **(99)**	Narrative	Commentary	-	Narrative
Whiteside, et al., **(100)**		Review of death notices in the print media	Adult mortality	No specific indicators
Loewenson and Whiteside **(101)**	Directory of studies	Impact studies	-	No indicators
Government of Swaziland **(102)**	Population survey	Childhood mortality, education	-	No HIV/AIDS specific indicators for impact
SAfAIDS **(103)**	Narrative	HIV/AIDS prevalences	-	Not on impact
AIDS Analysis Africa **(104)**	Cross sectional	Cost of AIDS to business, mortality	AIDS mortality, absenteeism, cost of AIDS	Excerpts from a study already included.
David. **(105)**	Risk assessment	Risk factors for HIV/AIDS	-	Focus not on impact
Mushala **(106)**	Narrative	Subsistence agriculture	Reduced farm productivity	Narrative
Muwanga **(107)**	Survey	Business response	-	Not on impact

3.2 Design methodology of studies included in the review

Eight studies projected the impact of HIV/AIDS using economic models **(75, 76, 77, 79, 80, 82, 84, 90, 91)**. One study combined economic modelling and a cross-sectional study design **(79).** Seven studies were cross-sectional studies **(74, 81, 83, 85, 86, 87, 88)**. Two studies combined the cross-sectional and case-control study designs **(78, 89)**.

The observational studies, case control and cross-sectional studies faced difficulties in identifying HIV-infected cases. This was due to the limited number of people attending voluntary counselling and testing in Swaziland. Secondly because of confidentiality, even where HIV-testing is done, this may not be recorded under a specific name. Thirdly, most organisations did not keep records on their expenditure on HIV/AIDS. Finally, there are alternative factors that produce effects similar to HIV/AIDS.

These studies determine the impact due to HIV/AIDS as the impact in excess of what is expected to have happened if there had been no HIV/AIDS. Misclassification and bias in identification of HIV-infected case therefore has the potential to mask the actual impact, and so, the recorded impact may be less than actual impact.

Researchers therefore had to identify these alternative factors and account for their impacts in the analysis. Some of the approaches that researchers used included, randomisation to evenly distribute these factors, participatory appraisal to identify the alternative factors and stratification of the analysis according to the alternative factors.

On the other hand, economic modelling studies base their projections on credible census and demographic data. These data are not readily available for Swaziland. Currently, the only available census and demographic data is from the 1991 Household survey and the 1997 census data. These data have not been updated to reflect the current status. The lack of accurate demographic data could have led to over estimation of the death of teachers from HIV/AIDS in the study on the impact of HIV/AIDS on education. From the heterogeneity assessment, this study[4] was found to be heterogeneous and therefore omitted from the review. It has only been included for purposes of sensitivity analysis.

[4] Teacher mortality due to AIDS was modelled at 34.76/1000 teachers per year **(79).**

3.3 Sampling methods

Primary research studies utilised multiple methods of sampling. Simple random sampling was used by four studies **(74, 76, 77, 84)**. Stratified random sampling was used in two studies **(74,75)**. Purposive sampling was used in four studies **(79, 80,81,87)**. Sample sizes were largely adequate for the questions under study. The studies are therefore not only instructive but a fair representation of the impact of HIV/AIDS on Swaziland.

3.4 Methods of data collection

The studies used both quantitative and qualitative methods of data collection. These methods are described here.

3.4.1 Methods used to collect quantitative data.

Predominantly quantitative data on the impact of HIV/AIDS was collected through review of records and interviewer-administered questionnaires
Sources of records ranged from clinic, financial and personnel records.

The critical and difficult part of the data collection was identifying cases of HIV/AIDS and therefore allocating the data from records to HIV/AIDS. Since HIV/AIDS is still a new disease, little data is kept on this disease. These

studies therefore faced a difficulty in associating the observed impact to HIV/AIDS. Researchers adopted alternative methods of identifying cases of HIV/AIDS and the associated impacts.

Coutinho **(78)** and Muwanga **(89)** used a clinical definition of HIV/AIDS to identify cases. From the clinical records, symptoms were recorded and compared with the clinical definition. Muwanga **(89)** used the signs and symptoms during terminal illness reported by the closest caregiver. Two independent clinicians evaluated the signs and symptoms independently using the clinical definition of HIV/AIDS. For those cases were death certificates were available, the sensitivity and specificity of this approach was calculated.

Secondly, because of stigma, few people go for testing, and even when they do so, do not disclose freely their status. Most of the studies reported this as a major limitation. Records of numbers of employees who have died including, copies of death certificates and cause of death was only forthcoming in the private sector, where records on employees are routinely kept for audit purposes. Therefore, quantitative data for meta-analysis around HIV/AIDS absenteeism, employee mortality and the cost of HIV/AIDS, in this review is largely based on the private sector.

Interviewer administered questionnaires relied on close caregivers as respondents. The respondents were asked about the symptoms that the deceased suffered from in the terminal stages of illness. This approach faces recall bias as respondents may not remember precisely the symptoms the deceased relative suffered from in the terminal stages. Secondly, because of stigma to HIV/AIDS, respondents may not want to associate themselves with HIV/AIDS.

Therefore cases and non-cases of HIV/AIDS could be misclassified either way. This has the potential to reduce the impact recorded by the researchers.

3.4.2 Methods used to collect qualitative data.

Most of the studies complemented quantitative data collection with qualitative research methods. The qualitative methods used by the studies included focus group discussions, case studies, key informant interviews, rapid rural appraisal and field interviews.

Focus group discussions were extensively used by the study on the impact of HIV/AIDS on education **(79)**. The researchers carried out 137 focus group discussions involving parents and guardians. The focus of these discussions was their opinion of the impact of the epidemic on the education sector.

Two studies used case studies to study the impact of HIV/AIDS **(79,89)**. The case studies investigated the impact of death of a breadwinner from HIV/AIDS on children's education and dependency ratios in the household, the impact of increased employee deaths to private smallholder farms and cooperative societies. Muwanga **(89)** resorted to the use of case studies because of lack or poor keeping of records by many of the smallholder farms.

Field interviews and rapid rural appraisal yielded information on alternative factors in the community that produce impacts similar to HIV/AIDS. Qualitative research also identified innovative approaches to identifying households affected by HIV/AIDS.

Key informant interviews were carried out with managers, administrators, workers and out of school youths and orphans. Key informant interviews yielded information on the level of psychosocial stress at the workplace due to workers dealing with HIV/AIDS issues and the stress and problems faced by children orphaned by HIV/AIDS. Interviews of school administrators provided information on changes in curriculum that schools have made to cater for HIV/AIDS needs and challenges amongst the youth.

3.5 Indicators for the economic impact of HIV/AIDS on Swaziland.

A systematic review of the studies, both quantitative and qualitative yielded a list of the indicators that have been used to determine the impact of HIV/AIDS on Swaziland. The indicators covered all sectors of the economy represented in the review . Common indicators across the studies were identified and combined to provide a pooled estimate. Six common indicators were identified, two at the micro-level and three at the meso-level and one at the macro-level. A brief description of the indicators for the impact at the three levels of the economy is given below. Detailed definitions of these indicators are given in **section 2.6.3**.

3.5.1 Indicators for the micro-level impact of HIV/AIDS on Swaziland

Two indicators were used in this review on the micro-level impact of HIV/AIDS. One is the increase in vulnerability of households affected by HIV/AIDS to environmental shocks and the negative impacts of the epidemic itself. This is in comparison to households that have not experienced HIV/AIDS deaths. Whereas these indicators are pooled from the same study, they represent distinct effects of HIV/AIDS that lead to increased vulnerability of the rural households to environmental shocks.

The second indicator is the total number of children orphaned by HIV/AIDS in Swaziland.

3.5.2 Indicators for the meso-level impact of HIV/AIDS

Three indicators were used to determine the meso-level impact of HIV/AIDS. These are mortality of employees due to HIV/AIDS, HIV/AIDS related absenteeism and the increased expenditure of organisations due to excess morbidity and mortality of employees.

3.5.3 Indicators for the macro-economic impact of HIV/AIDS

The macroeconomic impact of HIV/AIDS is measured by the percentage annual loss in GDP growth and GDP per capita that the epidemic imposes on the economy.

4.0 Results of the systematic review

The systematic review synthesised information from various studies on quantitative and qualitative indicators for the impact of HIV/AIDS on Swaziland. The results of the review are presented in this chapter.

4.1 Impact of HIV/AIDS to the micro-sector

The micro-sectoral impact of HIV/AIDS includes the increased vulnerability of Swazi rural households affected by HIV/AIDS, the burden of orphans due to AIDS and the psychosocial stress faced by household members due to loss of members of the household.

4.1.1 Impact of HIV/AIDS on Swaziland rural households

Rural households operate in an environment that involves a number of threats that render them vulnerable. These threats include drought, floods, civil unrest, illnesses, deaths and economic shocks. Households are usually able to survive these shocks without compromising their future ability.

However, HIV/AIDS represents a devastating shock to rural households leading to increased vulnerability to the environmental shocks. The study measured the increase in vulnerability of households to negative

environmental shocks as a result of HIV/AIDS deaths within the household. The measurement is in comparison to households that had not experienced AIDS deaths.

Table 4.1 shows, that HIV/AIDS increases the vulnerability of rural households to environmental shocks by four times (95%CI 4.03-4.35). Areas that are worst affected are the reduction in farm area cultivated and reduction in crop yield. Affected households are seven-times more likely to have a reduction in farm area under cultivation (95%CI 3.79-14.4) and 5-times more likely to have a reduction in crop yield from their farms (95%CI 2.93-9.04). Other severely affected aspects are diversion of labour from the farm and children dropping out of school, with vulnerability increased four-fold.

Table 4.1 Increased vulnerability of Swazi rural households due to HIV/AIDS, affected households compared to non-affected households **(89).**

	Odds ratio with 95% CI			
Impact	**OR[5]**	**95% CI**	**N-total**	**P-value**
Reduction in farm area	7.36	3.79-14.4	80	<0.01
Increase in healthcare costs	2.56	1.30-5.04	63	<0.01
Reduction in crop yield	5.14	2.93-9.04	109	<0.01
Change in cropping patterns	2.93	1.72-5.02	127	<0.01
Increase in children dropping out of school	4.14	2.37-7.22	114	<0.01
Diversion of labour from the farm	4.67	2.41-9.09	60	<0.01
Loss of remittances	2.50	1.45-4.30	64	<0.01
Pooled estimate	4.19	4.03-4.35	617	<0.01

[5] The odds ratio gives the increase in vulnerability of HIV/AIDS affected households compared to households not affected by HIV/AIDS.

4.1.2 Increase in number of orphans due to HIV/AIDS

Increased mortality of the productive age group members of society has left many children orphaned. The orphans have to be taken care of by other families.

Figure 4.1 shows that Swaziland at end of 2002 had an average of 44,000 orphans due to HIV/AIDS, with a lower estimate of 34,000 and an upper estimate of 59,3000 orphans.

Seventeen percent of Swaziland rural households (95%CI 14-22) are caring for orphans. On average each of these households had taken under their care two dependants (95%CI 0.7– 4) in addition to their biological children **(88,89)**.

The increase in number of orphans is not only a burden to the households that take care of them, but has also impacted heavily on the education sector. Orphans are frequently away from school either due to illness or because they have to take care of sick relatives at home. Most of these orphans are traumatised and require psychosocial counselling. This counselling is provided by the teachers. The education sector in order to effectively address these challenges has implemented changes in the school curricula **(79, 88, 89)**.

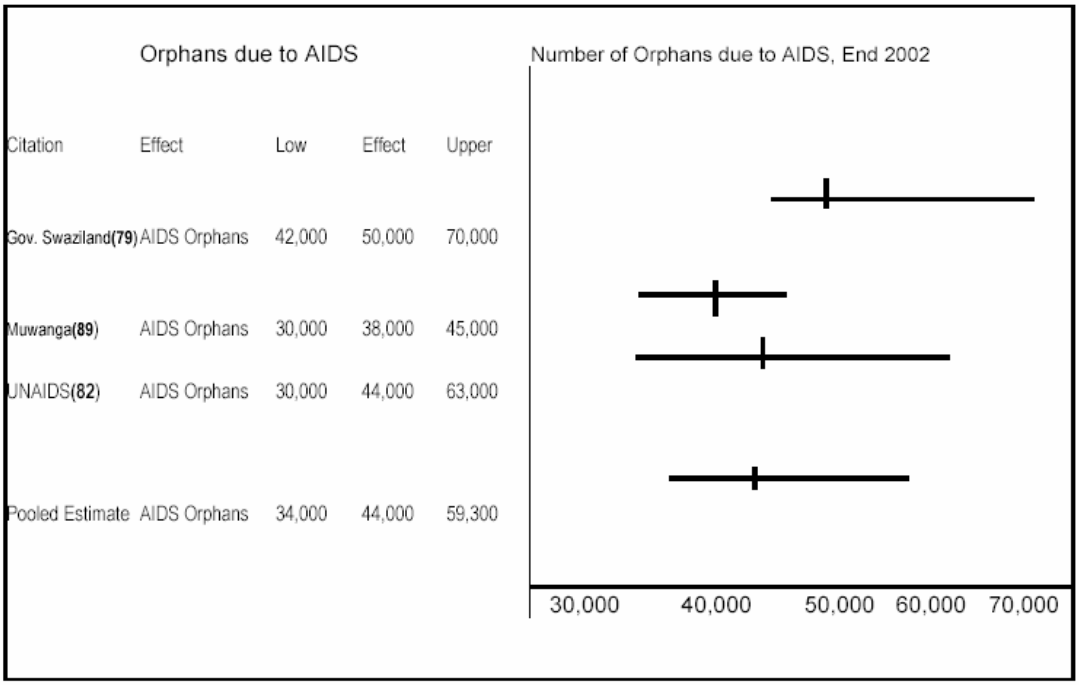

Figure 4.1 Burden of orphans due to HIV/AIDS in Swaziland, end of 2002

4.2 Impact of HIV/AIDS to the meso-sector.

The impact of HIV/AIDS at the meso-level covered organisations in both the public and private sector. Three indicators have been combined across these studies to produce pooled estimates. These include AIDS mortality amongst the Swaziland workforce, HIV/AIDS absenteeism and the cost of AIDS.

The systematic review of qualitative studies looked at the impact of HIV/AIDS on the supply and demand for education and the psycho-social stress faced by employees as their colleagues die of HIV/AIDS.

4.2.1 AIDS mortality amongst the Swaziland workforce

The results in Figure 4.2 show that the pooled estimate for deaths due to HIV/AIDS amongst the Swaziland work force is 10.54/1000 employees per year (95% CI 9.04-12.12). The estimate covers eight homegenous studies and excludes one study that was found to be an outlier. Figure 4.3, shows the pooled estimate with the outlier included. The outlier was included in the sensitivity analysis. The pooled estimate with outlier included escalates to 13.2/1000 employees per year (95%CI 11.84-14.69). The mean crude mortality rate of Swaziland employees was found to be 16.77/1000 per year (Figure 4.2).

Pooled results from nine studies covered the private sector, public sector and smallholder agricultural farms. Under the private sector, the pooled estimate covered transport sector, sugar estate and manufacturing. In the public sector, information on mortality was available from the Ministry of Agriculture and Cooperatives (MOAC) and Ministry of Education. The mortality rate of teachers employed by the Ministry of Education was 34.76 deaths/1000 teachers per year. This was adjudged to be an outlier from heterogeneity tests. It was therefore excluded in the pooled estimate. It is only mentioned here for sensitivity analysis. The sensitivity analysis (Figure 4.3) shows the impact of including the outlier in the analysis.

From Figure 4.2, highest mortality of workers from AIDS were recorded by the Ministry of Agriculture and Cooperatives with 16.75 deaths /1000 employees per year (95%CI 16.06-17.44) and private small farms with 14.01 deaths/1000 employees per year (95%CI 12.64-15.38). The least affected was the Royal Swaziland Sugar Corporation (RSSC).

However, the mortality rate of 4.8 deaths/1000 employees per year (95%CI 4.7-4.9) for RSSC should be interpreted with caution as the company offered voluntary retirement packages to 152 employees in 1999 as part of the company's response to avoid the cost of AIDS. Twenty-three of these employees were terminally ill and only retired to go and die at home **(78)**. This effectively reduces the mortality rate from AIDS, as those deaths were not captured in the company records. If the twenty- three deaths were added to the number of deaths from the company, the mean death rate would increase from 4.8/1000 to 7/1000 employees per year for RSSC.

Tuberculosis was the most commonly reported cause of death for AIDS related deaths in the private sector and rural households. On average tuberculosis was the cause of death in 57%(95%CI 40-65), of AIDS deaths.

From qualitative studies, there was an increase in reported cases of stress at the workplace as workers cared and took over workload from colleagues who were unable to work and later died of HIV/AIDS. **(78, 79, 81,89).**

Smaller organisations with less than fifty employees reported an increased loss of skilled labour due to HIV/AIDS. This was labour that they could not easily replace as they recruited their employees from a limited labour market. **(78,89).**

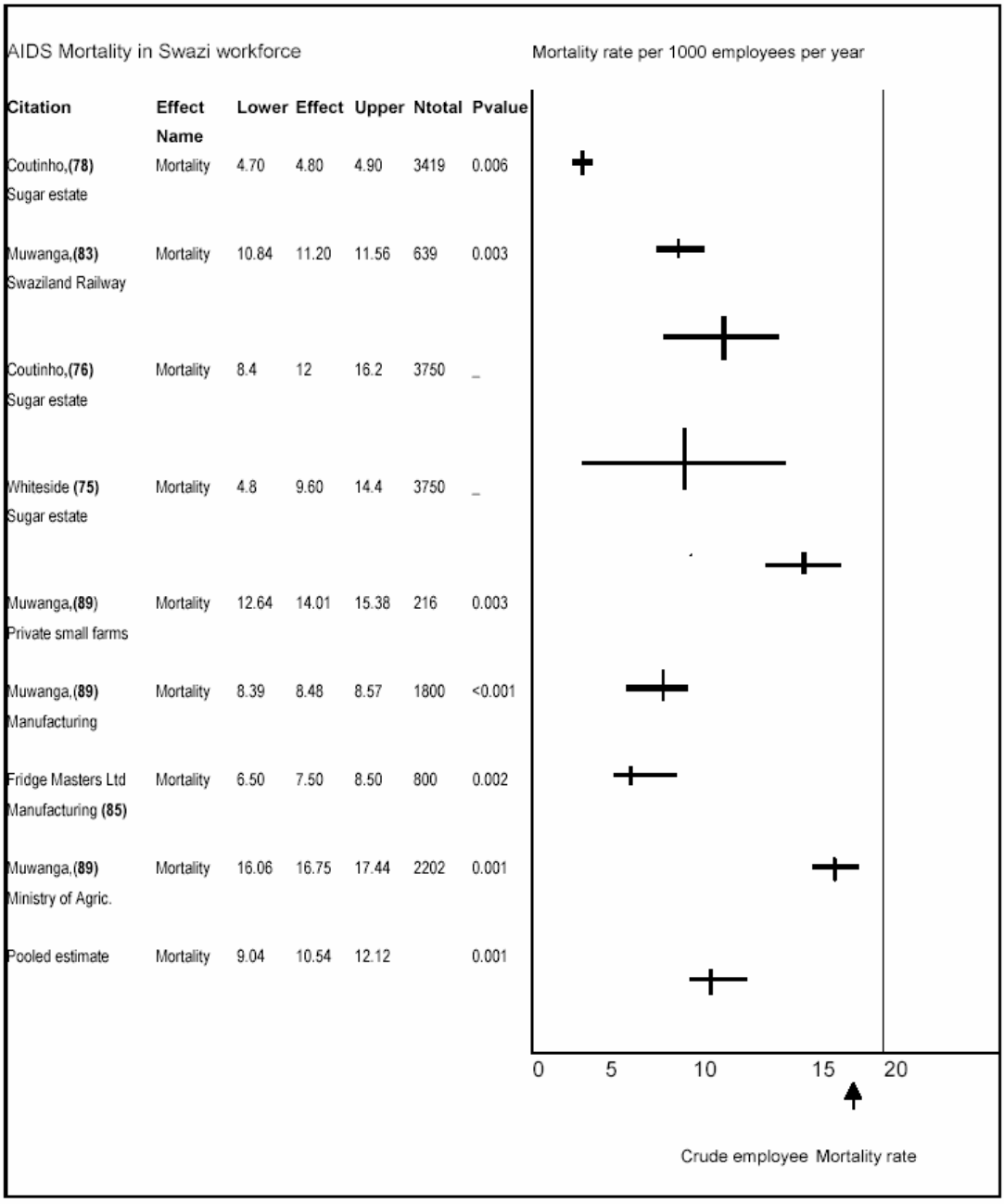

Figure 4.2 AIDS mortality amongst the Swazi workforce.

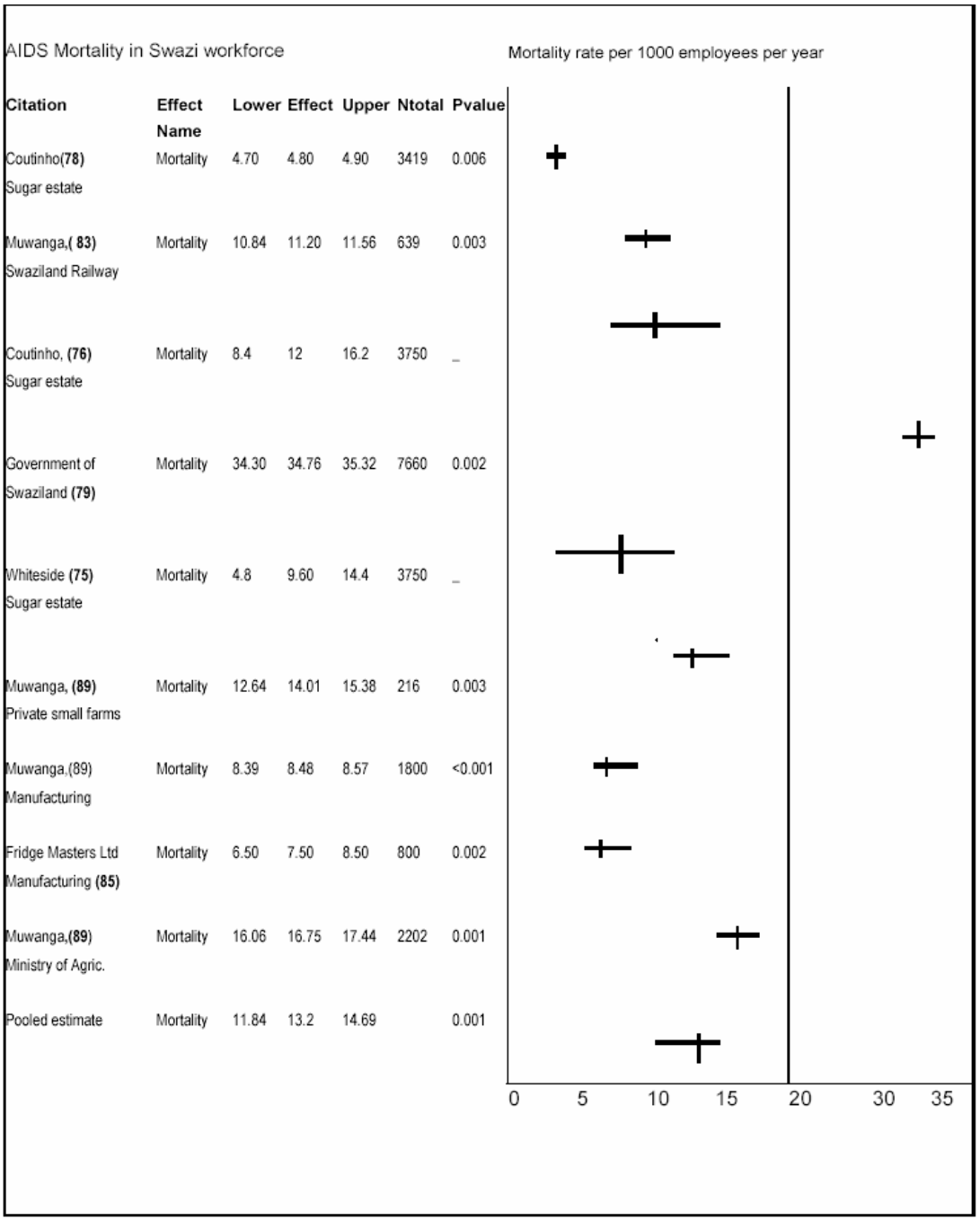

Figure 4.3 AIDS mortality amongst Swazi workforce with the outlier included

4.2.2 HIV/AIDS absenteeism in Swaziland organisations

Increase in sick leave utilization has been noted amongst Swaziland organizations with the advent of HIV/AIDS. Results were combined from five organizations, all from the private sector.

Figure 4.4, shows that on average the private sector organisations lose 2.97 days (95%CI: 2.88-3.06) per employee per year to HIV/AIDS related absenteeism. The worst affected are the Manufacturing sector which loses 4.93 days per employee per year (95%CI 4.24-5.79) and private small-holder farms that lose 3.66 days per employee per year (95%CI 3.27-4.10). The Royal Swaziland sugar corporation was least affected with a sick leave utilisation rate of 1.43 days per employee per year (95% CI 1.4 -1.46). This was attributed to the organisation's implementation of HIV/AIDS workplace responses **(78).**

Tuberculosis was the biggest contributor to prolonged absenteeism in the private sector. Tuberculosis contributed to over 70 percent of sick leave longer than thirty days **(78,89)**.

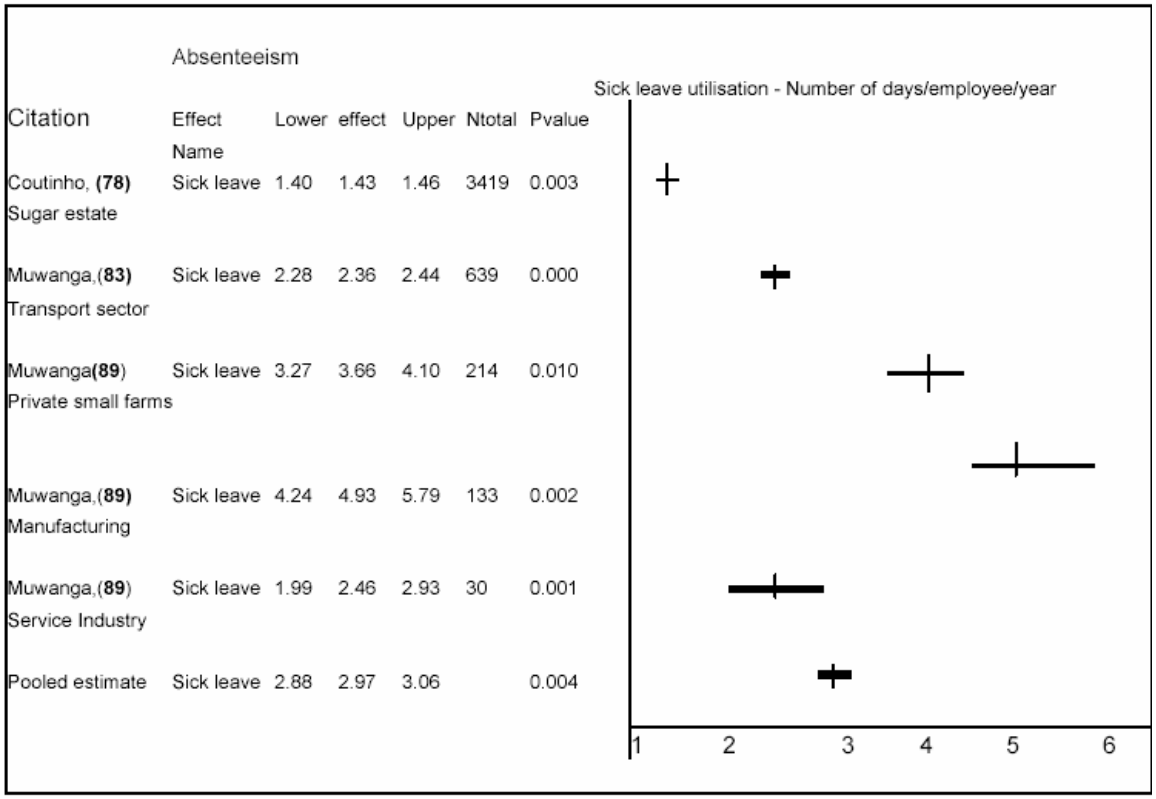

Figure 4.4 HIV/AIDS absenteeism in Swazi businesses

4.2.3 AIDS Cost to the Swaziland organisations

The cost of the AIDS to an organisation arises from increase in utilisation of health care by sick employees, payout of retirement and death benefits and, funeral expenses. In effect it increases the organisation's expenditure on the welfare of its employees. This extra expenditure due to HIV/AIDS is calculated as a percentage of the total wage bill. It has been popularly referred to as the direct cost of HIV/AIDS. This excludes costs due to reduced productivity. Most organisations do not keep accurate records of

these expenses. The pooled estimate therefore combines costs from only four organisations, three of these organisations are from the private sector.

Figure 4.5 shows, that HIV/AIDS cost the Swaziland organisations on average 2.65 percent (95%CI: 2.46-3.03) of their annual total wage bill. Smallholder agricultural farms are the worst affected at 3.46 percent (95% CI 3.27-4.52) while Royal Swaziland Sugar Corporation (RSSC) is the least affected at 1.83 percent (95% CI 1.74-1.92). This again is attributed to implementation of HIV/AIDS workplace responses by RSSC.

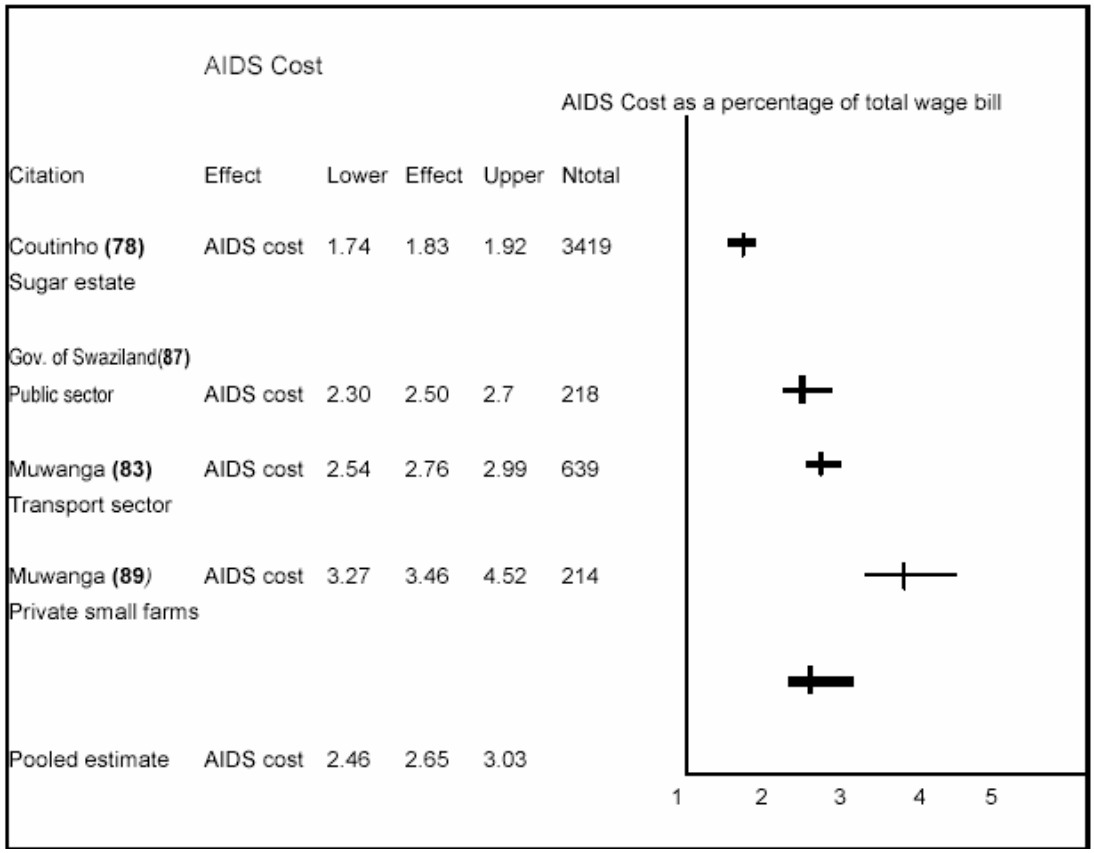

Figure 4.5 Cost of HIV/AIDS to Swaziland organisations.

4.2.4 Impact of HIV/AIDS on supply and demand for education

Excess morbidity and mortality of teachers and administrators has reduced the supply of teachers in the Swaziland education sector. The education sector showed the highest AIDS mortality of 34/1000 employees per year **(79)** (see Figure 4.3). Secondly, rural teachers and administrators living with HIV/AIDS migrated from rural schools to urban schools in search of better healthcare **(79).** The teacher migration from rural to urban schools has depleted the supply of teachers in rural schools.

The second major impact of HIV/AIDS on education has been the change in school curricula to cater for HIV/AIDS education in schools and accommodate orphans and children living with HIV/AIDS who are frequently absent from school **(79, 84)**.

4.2.5 Impact of HIV/AIDS on the human resource function

In an attempt to avoid the cost of HIV/AIDS on their organisations, Swaziland organisations have implemented several responses to the epidemic. The responses have largely been implemented as part of the human resource function in these organisations **(78, 79, 81, 85, 87, 89)**.

Some the responses implemented include:

- Increasing awareness amongst employees to prevent new infections
- Absence management programmes
- Restructuring of employee benefits to reduce costs on healthcare and death benefits,
- Disease management protocols for prevalent diseases in the workforce. This reduces time spent on seeking healthcare for these diseases as there is timely diagnosis and management.
- Targeted retrenchment where sick employees are offered voluntary retirement packages.

There is evidence pointing to the effectiveness of HIV/AIDS workplace responses in mitigating the impact of on organisations **(78, 83, 86)**. In 1997, Swaziland Railway implemented an absence management system and disease management protocols for common illnesses amongst employees. This was in response to increasing absenteeism. There was a significant reduction in sick leave due to non-injury on duty (IOD)[6] cases for the period, 1998-2001 **(69)**. The reduction in absenteeism is shown in Figure 4.6 below.

[6] IOD refers to Injury on duty. Non-IOD sick leave is sick leave due to sickness not arising out of trauma cases from workplace injuries.

In 1999, Royal Swaziland Sugar Corporation (RSSC) offered voluntary retirement packages to 152 employees. Twenty-three of whom were terminally ill **(78)**. This effectively reduced the AIDS mortality of RSSC (See Figure 4.7 below). The company in offering retirement packages avoided the costs of healthcare that the terminally ill employees would have incurred in the last days of their lives, the funeral costs and wages paid for no work done.

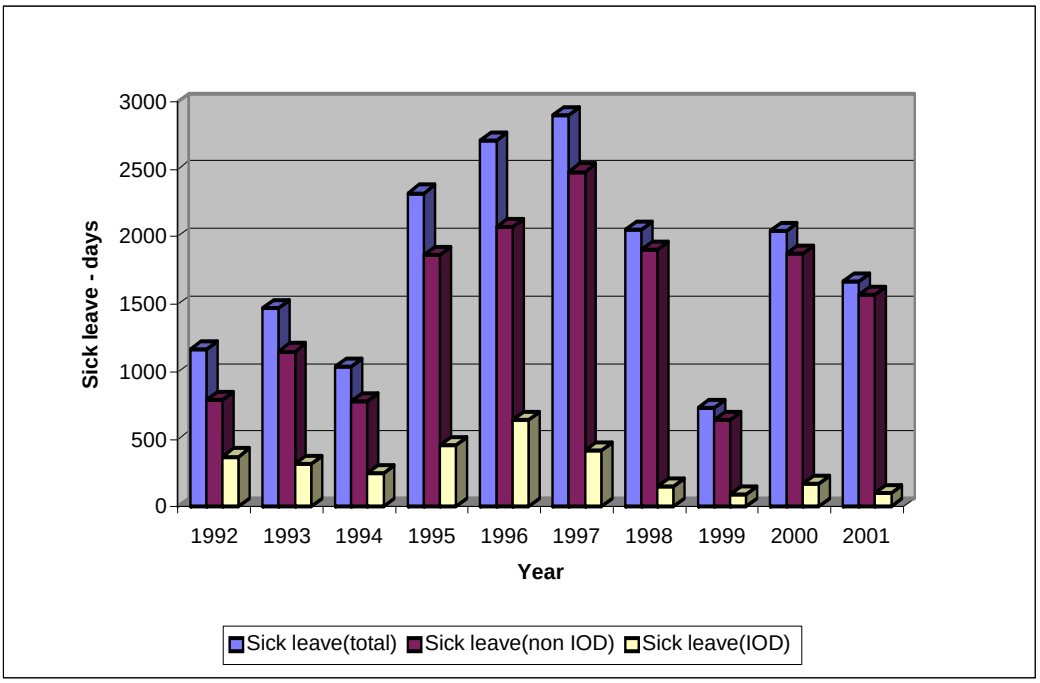

Figure 4.6 Absenteeism at Swaziland Railways, 1992-2001**(83,89)**.

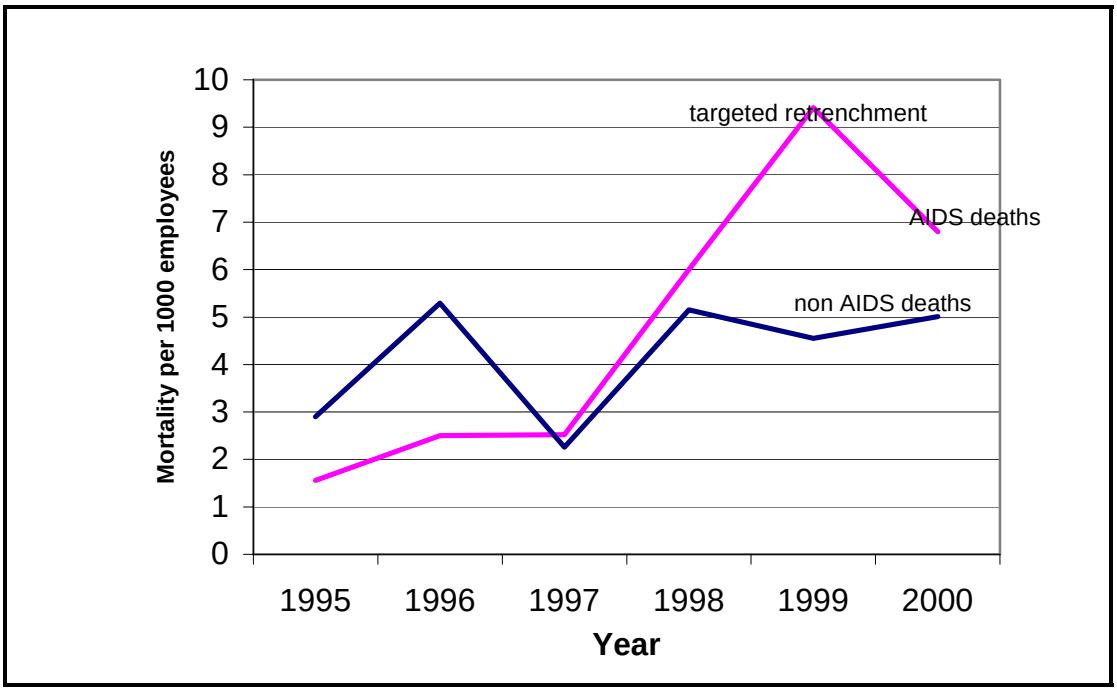

Figure 4.7 AIDS Mortality at Royal Swaziland Sugar Corporation, 1995-2000 **(78,89)**

Figure 4.8 below, shows that whereas RSSC was able to reduce AIDS mortality through targeted retrenchment, Swaziland Railways' absence management and disease management protocols had no effect of AIDS mortality. It could be argued here that incorporating anti-retroviral therapy in the disease management protocols could have reduced both AIDS mortality and absenteeism at Swaziland Railways.

However, from the qualitative studies, it is evident that the HIV/AIDS workplace responses have largely been implemented by the private sector and that the public sector is yet to respond to HIV/AIDS at the workplace **(78, 79, 81, 83, 89).**

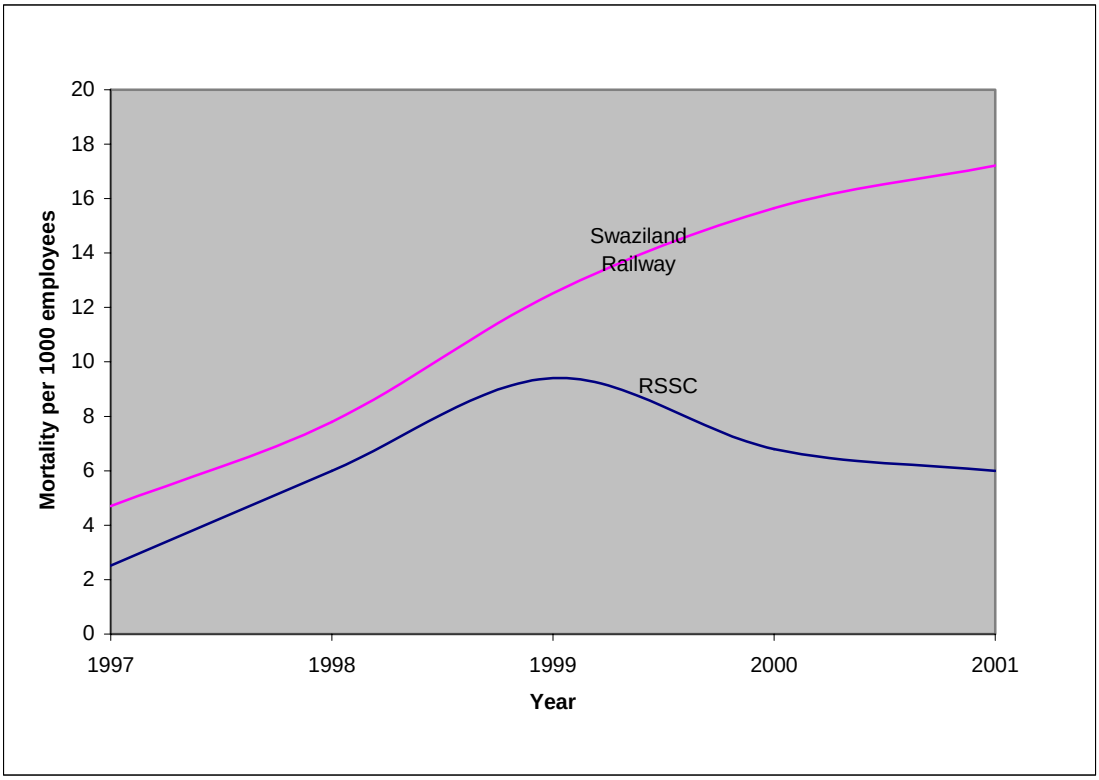

Figure 4.8 AIDS mortality at Swaziland Railway and Royal Swaziland sugar Corporation, 1997-2001**(78, 83, 89)**.

4.3 The macroeconomic sectoral impact of HIV/AIDS on Swaziland.

Three studies reported the projected macroeconomic impact of HIV/AIDS on Swaziland. The World Bank Technical group on Africa **(90)** and Haacker **(84)** both reported a 1 percent reduction in GDP growth due to HIV/AIDS, while International Labour Office **(91)** reported a higher impact of 2.8 percent reduction.

Table 4.2, gives the mean loss in GDP growth due to HIV/AIDS as 1.6 (95% CI 1.59-1.61) and the mean loss in GDP per capita as 1.73(95% CI 1.71-1.74). To effectively represent the impact of HIV/AIDS on both GDP growth and GDP per capita growth, the results have been presented in a table instead of a Forrest Plot. A Forrest Plot would only allow one variable to be plotted.

Table 4.2 Macroeconomic impact of HIV/AIDS on Swaziland.

Study	Percentage annual loss (%)	
	GDP growth	GDP per capita growth
Haacker **(84)**	1.0	2.3
World Bank **(90)**	1.0	1.1
ILO **(91)**	2.8	1.8
Mean	1.6(95% CI 1.59 -1.61)	1.73 (95%CI 1.72-1.74)

5.0 Quality of research and the limitations imposed on the review

One of the objectives of this systematic review was to clarify weaknesses in existing data on the impact of HIV/AIDS in Swaziland. This chapter clarifies these weaknesses and the limitations they impose on the review. Further, the discussion on quality of the studies will encourage better quality in future research. Quality assessment of impact studies on Swaziland identified four major weaknesses. These are discussed in this chapter.

5.1 Timeframe in which studies were conducted

The first weakness the studies faced is the time when studies were done. All but four of studies on the impact of HIV/AIDS on Swaziland that were identified were done after 1999. This is after ten years had elapsed since the start of the epidemic in Swaziland.

The problem with the first impact studies only being conducted so late in the epidemic is that the most seriously affected institutions may have actually dissolved by the time these surveys were conducted. The units that are included in surveys of this nature may be those that have been able to survive the earliest stages of the AIDS epidemic.

5.2 Design of studies

The second weakness is that all impact studies that were based on primary research were observational studies. The observational studies were either cross-sectional or case control study designs. Observational studies face the problems inherent of such methodology, namely bias in case identification and selection **(108)**, recall bias **(109,110)** and misclassification of cases and non-cases **(108).**

First, observational studies rely on either review of records or interview of respondents to select subjects. The accuracy of the information therefore depends on the respondents' recall of events. This makes observational studies vulnerable to recall bias. This has the potential to affect the validity of the results recorded by the study **(108).**

Secondly, case-control studies rely on accurate identification of cases and non-cases **(109)**. With limited access to voluntary counselling and testing in Sub-Saharan Africa, most people do not go for HIV testing. Even when they do so, because of stigma, they do not freely disclose their status. This leaves researchers to rely on signs and symptoms suffered in terminal stages to associate an illness or death with HIV/AIDS. However, there are many other diseases with similar signs and symptoms to HIV/AIDS. This approach is

therefore subject to failure to identify and select the correct subjects leading to a selection bias **(108).**

Kahn, Tollman, Garenne and Gear **(111)** have suggested that in situations where death certificates are unavailable or if available do not state cause of death accurately, cause of death can be determined by use of verbal autopsy method. Verbal autopsies involve trained investigators who interview relatives who were the closest caregivers about signs and symptoms suffered in terminal stages of the illness. The information from the questionnaires is then summarised by two independent researchers using pre-defined criteria to determine likely cause of illness and death.

Verbal autopsy has been used to determine cause of death in under-fives and in adults for infectious diseases in communities where death certificates are not readily available **(112)**. It is now increasingly being used to identify causes of adult death, including death from AIDS **(111,113,114)**. Verbal autopsy may be the only method to identify HIV-infected and affected households in communities where stigma to HIV/AIDS is prevalent. However, for verbal autopsies to be comparable, they need to be based on similar interviews, and the cause of death needs to be arrived at in the same way in all cases.

Therefore standardisation and local validation of the verbal autopsy tool by calculating sensitivity and specificity is important **(115).** This reduces information bias and misclassification of causes of death.

The failure to identify the HIV-infected cases accurately means that some of these cases are misclassified as non-cases and vice-versa. Since the impact of HIV/AIDS is measured as the impact in excess of what is observed in non-HIV infected cases, the misclassification of cases and non-cases has the potential to reduce the impact of HIV/AIDS recorded by the studies **(108,116).**

5.3 Alternative explanations for Impacts measured.

The third weakness faced by the impact studies is associating the impacts observed amongst those infected with HIV/AIDS to the epidemic as opposed to other factors operating within the environment. There are alternative factors operating within the environment that could produce similar effects to HIV/AIDS. Some of the confounding factors include changes in markets, increased poverty levels, and drought. Confounding is the distortion of an exposure-outcome association brought about by the association of another factor with both the outcome and exposure **(108,117)**. The study on impact of HIV/AIDS on rural households faced these difficulties as it was done at a

time when Swaziland was faced with drought and famine. The source of confounding is the fact that poverty, which is a risk factor to HIV infection, is also associated with increased vulnerability of households to food insecurity.

According to Stokes **(118)** control of alternative explanations is essential in inferring the impacts of one set of variables from another. Only one study, Muwanga **(89)** reported controlling for confounding factors in the analysis of results. The researchers stratified the households into those that had not experienced any deaths, those that experienced deaths but not AIDS related and those households that had experienced AIDS deaths.

According to the Faculty of accident and Emergency Medicine **(119)**, dealing with confounding is easy if the confounders are known, as the results can be stratified according to the confounders. It is therefore important for the researchers to identify possible sources of confounding. Other methods that can be used to control for confounding factors include the following:

a) Randomisation at design stage so that the confounders are randomly distributed between the cases and non-cases **(119,120)**.
b) Collecting data on known and possible confounders and feeding these into a multiple regression analysis **(119,120)**.

c) Doing longitudinal studies where cohorts of infected and non-infected entities are matched and/or followed over a period of time **(119, 120, 121)**.

5.4 Lack of demographic data for use in economic projections

Economic modelling relies on current and adequate demographic data for effective modelling of the impact of HIV/AIDS. However, the only demographic data currently available in Swaziland is from the 1991 Household survey and the 1997 Census. These have not been updated ever since they were done. Results from the 2002 demographic survey are not yet available. Therefore studies that based their projections on this data may not produce accurate results.

The other weakness faced by economic modelling is the inclusion of the micro-level and meso-level impacts into modelling the impact of HIV/AIDS at macroeconomic level. Current models do not effectively integrate micro-level and meso-level impacts of HIV/AIDS **(80)**. The impact of HIV/AIDS on annual growth of GDP and GDP per capita income may be underestimated.

5.5 Limited number of Impact studies

Most of the impact studies in Swaziland have been done on the private sector. There are limited studies on the impact of HIV/AIDS on the microeconomic and macroeconomic sectors; and the public sector. Therefore most of the studies included in the review are from the private sector. Important sectors like the health sector have not been adequately covered in this systematic review.

5.6 Other limitations

The subject of systematic reviews on the impact of HIV/AIDS is still new. This was a major limitation as the author did not have existing systematic reviews to refer to. The author therefore largely used methods adopted from systematic reviews on other areas.

Secondly, because of the lack of systematic reviews on the impact of HIV/AIDS in sub-Saharan Africa, the author did not have many international studies with which to compare the extent of the impact of HIV/AIDS on Swaziland.

6.0 DISCUSSION

In this chapter, the results of the systematic review on impact of HIV/AIDS in Swaziland are discussed. The discussion is stratified into the three levels of the economy, namely micro-level, meso-level and macro-level impact.

6.1 Impact of HIV/AIDS on the microeconomic sector in Swaziland.

This chapter covers the micro-level impact of HIV/AIDS in Swaziland. The increased vulnerability of Swazi rural households to natural shocks and the burden of orphans due to HIV/AIDS are discussed in this chapter.

6.1.1 Increased Vulnerability of Swazi rural households affected by HIV/AIDS to negative environmental shocks

Rural households rely on household capabilities, assets both material and social resources for a means of living. These capabilities and assets include labour and human capital, income from the farm and remittances from households' members in regular employment. They sustain their livelihood by utilising these assets and capabilities to cope and recover from stresses and shocks. These shocks include drought, wars, death and war.

The erosion of human capital and removal of income by decimating the productive members of society increases vulnerability of these households to stresses and shocks within the environment. HIV/AIDS is not only a shock to the households but also erodes the capabilities and assets that these households can rely on to cope and recover from this shock. These households are therefore vulnerable to environmental shocks operating within their community and the negative impacts of the HIV/AIDS epidemic. The negative impacts of the epidemic on households include reduced income and increased expenditures, children dropping out of school, reduced farm area cultivated and farm productivity.

From this systematic review, HIV/AIDS has increased the vulnerability of households affected by HIV/AIDS in Swaziland to environmental shocks and the negative impacts of the epidemic by four-fold. The areas most affected are farm area cultivated and reduction in crop yield per household per year.

The reduction in farm area cultivated and crop yield is due to three major reasons (Figure 4.1). First, the loss of labour on the farm as the productive age group who are the sources of labour in the household start to sicken and die of AIDS. This reduces the amount of labour available on the household farm.

Secondly, there is diversion of labour from the farm to care for the sick members of the household. Since AIDS is a prolonged illness, this diversion of labour from the farm is for a long period of time. This prolonged diversion of labour denies the household farm labour over a long time. This results in less farm area cultivated and reduction in the farm yield. In Tanzania, when a household had a member with AIDS, 29 percent of the household labour was spent on AIDS-related matters **(13)**. From the systematic review, households in Swaziland that had experienced an AIDS-related death were five-times more likely to report diversion of labour from the farm to care for the sick relative.

A big proportion of the affected households in Swaziland resorted to crops that require less labour as a coping mechanism to the reduction in household labour. Muwanga **(89)** found that 42 percent of affected rural households in Swaziland had changed their cropping patterns. The affected households were 3-times more likely to change cropping patterns as compared to those households that had not been affected by HIV/AIDS (Table 4.1).

The third factor is death of relatives who are either breadwinners or regularly remit money to the households, leads to loss of income. The importance of loss of income has previously been shown in Cote d'Ivoire, Rwanda**(12)**, Uganda**(122)**, Tanzania**(123)** and Ethiopia**(124)**. This is income that the

households use to purchase farm inputs. With less farm inputs less land is cultivated and also productivity from the farm is less. Swaziland households that have experienced AIDS-related deaths faced a 34.2 percent reduction in land area under cultivation, 54.2 percent reduction in maize production and 29.6 percent reduction in number of cattle kept **(89)**.

A study done by the Zimbabwe Farmers Union showed that death of a breadwinner due to HIV/AIDS reduced maize production by 61 percent and cattle kept by 29 percent **(125)**. The percentage reduction in maize production is slightly higher than the results from the Swaziland studies. This has been attributed to the reduction in maize production in Swaziland due to prolonged drought, reducing the reference point for calculation of the percentage reduction **(89)**.

The combined result of reduction in farm area, loss of remittances and reduction in crop yield is reduction in income and food for the household. Swaziland households rely of the farm produce for income and food supply **(89)**.

The reduction in income happens at a time of increased expenditure on health. Households affected by HIV/AIDS were 3-times more likely to report an increase in health expenditure than those not affected (Table 4.1).

In Tanzania, households affected by HIV/AIDS spend 8 percent of total household expenditure on healthcare compared to 0.8 percent for those not affected **(123)**. This was a ten-fold increase in expenditure on health. While in Ethiopia, expenditure on health, funerals and mourning exceeded the average household income **(124)**.

The multiple impacts make it impossible for the affected households to mount any effective coping strategies. The end result is children dropping out of school and increased food insecurity. Affected households were four-times more likely to have children dropping out of school (Table 4.1). In 1994, Swaziland had 0.5 percent fewer 6-year olds entering school as result of the HIV/AIDS. This has been projected to increase to 5 percent in the year 2000 and to 16.6 percent by the year 2006 **(77)**. In Zambia, orphans were 1.3 times more likely to drop out of school compared to non-orphans **(126)**.

By cutting agricultural productivity of households and undermining the ability of these households' ability to recover from natural shocks, HIV/AIDS has become a major factor in the changing nature of famine in Swaziland.

6.1.2 Burden of orphans due to AIDS

HIV/AIDS predominantly affects young adults. Therefore high mortality amongst this age group leads to increasing number of orphans.

Figure 4.1 shows, that Swaziland had 44,000 orphans due to AIDS by the end of 2002 (95% CI 34,000-59,300).

In their end of 2003 report, UNAIDS defined an orphan as “a child under the age of 15 who has lost the mother or both parents to HIV/AIDS”. This definition has been used by the three studies – Government of Swaziland **(79),** Muwanga **(89)** and the Vulnerability assessment Committee **(88)**. However, UNAIDS in the 2004 report **(82)** define an AIDS orphan as “a child under the age of 18 who has had at least one parent die of HIV/AIDS”. The extended age for cut off means that the new definition included more orphans than the earlier definition.

Projections have estimated the burden of children orphaned by AIDS to increase by between 10,000-20,000 every year (**79, 82, 89**). At the end of the year 2003, UNAIDS, estimated Swaziland to have between 43,000-93,000 orphans, with an average of 65,000 orphans due AIDS **(82)**.This figure lies within the range of the results of this review.

Haacker **(84)** has projected that by the year 2010, 7.9 percent of Swaziland population will be under age orphans between the ages of 0-14 years. Of these 80-90 percent would be orphaned by AIDS. Only Botswana is estimated to have a higher burden of orphans due to AIDS in Southern Africa **(82, 84)**.

The burden of looking after these orphans is left to other households. From the review, 17 percent of Swazi households had taken in at least two orphans per household. The effect is worsening dependency ratios. Before the advent of HIV/AIDS Swaziland had a dependency ratio of 116.8, only second to Zambia that had a dependency ratio of 120.8 in the year 2000. Other countries in the region are expected to improve their dependency ratios with Zambia moving from 120.8 in the year 2000 to 106.6 in the year 2010 **(127)**.

However, because of the impact of HIV/AIDS, Swaziland is estimated to have the worst dependency ratios in southern Africa by the year 2010, estimated at 112.6 **(84)**.

6.2 Impact of HIV/AIDS on the meso-economic sector in Swaziland.

Three indicators of the impact of HIV/AIDS at the meso-level were combined across studies. These are employee mortality due to HIV/AIDS, HIV/AIDS absenteeism and cost of AIDS to the organisations. In this section the indicators for the impact on the meso-economic sector in Swaziland are discussed.

6.2.1 Employee Mortality due to HIV/AIDS in Swaziland.

From Figure 4.2 the pooled estimate for mortality due to HIV/AIDS amongst the Swazi workforce is 10.54/1000(95% CI 9.04-12.12), with the highest mortality amongst workers of the Ministry of Agriculture and Co-operatives and the private smallholder farms.

By the year 2001, 73 percent of Swazi organisations had reported a worker dying from HIV/AIDS and 64 percent of the businesses had felt the negative impact of HIV/AIDS on their organisations **(81)**.

From studies done earlier in the epidemic **(74, 75, 76)**, it is evident that mortality due to HIV/AIDS is on the increase. By 1998, HIV/AIDS had become the leading cause of death amongst employees in Swaziland. AIDS

deaths contributed to over 60 percent of all employee deaths by the year 1999 **(78,83)**. From Figure 4.2, the mean employee crude mortality rate was calculated at 16.77 deaths/1000 per year. Therefore AIDS mortality rate of 10.54/1000 per year is 63 percent of all deaths in the Swazi workforce. It is estimated that by the year 2010, mortality amongst the workforce will have peaked to 30/1000 employees per year **(77).**

The Ministry of Agriculture and Cooperatives (MOAC) shows the highest mortality rate. From earlier studies, it has been reported that the public sector has not implemented HIV/AIDS workplace programmes and are therefore vulnerable to the negative impacts of HIV/AIDS including high mortality of employees **(81)**. The public service is crucial sector to the national development and efforts to eradicate poverty. The governance provided by this sector is key to translating macro-policies into programmes and initiatives that lead to development and reduction of poverty.

The public sector provides essential services to other sectors. These services include agricultural advice, roads, telecommunications, health and education. As technocrats involved in planning and provision of these services begin to sicken and die, there are serious negative consequences for implementation of government policies and programmes.

Further, the essential services rendered by the public service sector are required by the private sector to enhance their productivity. As income growth in the country declines, private sector future growth also declines.

Comparing the mortality rate of the Swazi workforce from HIVAIDS with internationally reported figures, it is evident that Swaziland has not yet reached the high death rates amongst workers that other countries like Zambia and Uganda experienced.

Barclays Bank-Zambia recorded an increase of employee mortality due to HIV/AIDS from 4/1000 in the year 1987 to 22/1000 in the year 1998 **(127)**. Higher death rates have been reported by Uganda Railways, 100/1000 employees per year **(128)**. This resulted in Uganda Railways experiencing a 15 percent labour turnover. The highest employee mortality rate due to HIV/AIDS reported in Swaziland was, 17/1000, by Swaziland Railway in the year 2001. This is comparable to studies in Tanzania that reported AIDS mortality amongst employees of 5-15/1000 per year **(129)**, but far lower than employee mortality rates reported in Uganda and Zambia.

There are several reasons why Swaziland has not recorded the very high death rates recorded elsewhere in the region. Either the studies are reporting a lower death rate than what is on the ground or if the studies give a fairly

true picture of the death rate, then the epidemic of AIDS deaths in Swaziland is still in the early stages. The other reason may be that organisations and businesses have responded to the epidemic by implementing measures that protect them against these negative impacts.

There are facts that favour each side of the argument. First, records on AIDS deaths amongst workers have only been forthcoming from those organisations that accurately keep records on their employees. Usually these are organisations that have substantive human resource managers. It is these companies that have invested in implementing HIV/AIDS workplace programmes **(83)**. Therefore, AIDS mortality within these organisations might not be expected to be too high if the workplace programmes have succeeded in protecting the organisations from negative impacts. A typical example is RSSC, which in addition to having implemented a comprehensive workplace programme, also implemented cost avoidance measures by retrenching terminally ill employees **(78)**.

Secondly, up to late 2002, death certificates did not give cause of death as HIV/AIDS. Studies done earlier relied on case definition of HIV/AIDS to make an inference of AIDS as cause of death. As earlier discussed, misclassification of cause of death could lead to a reduction in impact reported.

However, the mortality statistics have showed a trend of increasing deaths due to HIV/AIDS over the past six years. Therefore the studies cannot be dismissed as not representing the true picture on the ground. If the studies are instructive and fairly represent the true picture on the ground, then the lower than expected death rates recorded could be due to the following reasons:

- The epidemic of AIDS deaths in Swaziland is yet to reach its peak. Some estimates have projected that the death rate will peak at 30/1000 by the year 2010 **(77)**.

- Swazi businesses have had the benefit of the recent knowledge in effective responses to HIV/AIDS at the workplace. Some of the organisations have effectively avoided costs related to HIV/AIDS by implementing comprehensive HIV/AIDS workplace programmes. Some of these responses have involved rather unpopular measures like targeting terminally ill employees for retrenchment. This has proven an effective measure to avoid costs as most of the healthcare utilisation and sick leave occurs in the last six months before death **(78)**.

Those sectors that have not implemented HIV/AIDS workplace programmes show relatively high mortality rates. A typical example is the Ministry of agriculture and cooperatives in the public sector with an AIDS mortality of

16.75/1000 and the private smallholder farms in the private sector with an AIDS mortality of 14.01/1000(Figure 4.2). The private small holder farms lack the expertise to implement HIV/AIDS workplace programmes while the public sector has not yet responded to the epidemic. But this is still far lower than AIDS mortality rates reported elsewhere in Africa. The epidemic of AIDS mortality in Swaziland has therefore not reached its peak.

6.2.2 Absenteeism

The prolonged illness associated with AIDS leads to increased absenteeism of sick workers. Previous studies have all documented a significant increase in absenteeism due to sickness, but most of these studies did not quantify the rate of absenteeism. Figure 4.4, shows that Swaziland organisations lose 2.97 working days per employee per year due to HIV/AIDS absenteeism (95% CI 2.88-3.06). Considering a total of 250 working days in a year, 2.97 sick leave utilisation is equivalent to 1.2 percent rate of absenteeism. The most affected sector of those studied is the manufacturing industry losing 4.93 working days per employee per year (95% CI 4.24-5.79).

The pooled estimate of 2.97 mean sick leave utilisation (1.2 percent) in Swaziland is comparable to that of 1.03 percent recorded by Kenyan firms in 1997**(130)**.

Reports from international studies have quoted higher rates of HIV/AIDS absenteeism. Companies in Zambia **(131)** and South Africa **(132)** have recorded higher rates of HIV/AIDS absenteeism**.** Nakambala sugar estate in Zambia, reported a sick leave utilisation rate due to HIV/AIDS of 2 percent in 1992 **(133),** while Hillside Aluminium manufacturing company in South Africa recorded a rate of 2.4 percent in 1998**(132)**. In United Kingdom, sick leave utilisation from all causes has been reported to be 7 days per employee per year (2.8 percent)**(134).**

There are several reasons why Swaziland organisations have not recorded high rates of HIV/AIDS absenteeism. First, not all HIV infected employees are known to the organisations and their utilisation of sick leave would not be recorded as HIV/AIDS absenteeism. Further, most organisations in Swaziland do not keep accurate records on absenteeism.

However, previous studies show that HIV/AIDS has tremendously increased absenteeism in Swaziland organisations. At RSSC, sick leave utilisation for other illnesses not related to HIV/AIDS was 0.9 days per employee for the year 1999, while each employee suffering from HIV/AIDS related illnesses utilised 18 days of sick leave during the year **(78).** At Swaziland Railway average sick leave utilisation for non HIV/AIDS related illnesses in the year 2001 was 0.6 days per employee per year, while utilisation due to HIV/AIDS

was 11.82 days per infected employee per year **(83,89).** HIV/AIDS induced a 20-fold increase in sick leave utilisation for these two organisations. Chilanga Cement in Zambia reported a 15-fold increase in absenteeism between 1992-1995 due to HIV/AIDS **(135)**. This is comparable to the 20-fold increase in absenteeism recorded in Swaziland.

As prevalence of HIV/AIDS increases amongst employees, the impact of absenteeism is expected to increase in Swazi organisations. Absenteeism leads not only to reduced productivity but is also a cost to the organisation as the employee is paid for work he has not performed. Further, costs may be incurred to pay for his replacement. Haacker **(84)** estimates that absenteeism contributes 24 percent of AIDS costs for affected companies in southern Africa. This is equivalent to 1.6 -2.4 percent of the total wage bill.

Tuberculosis has been cited as the biggest cause of absenteeism. Muwanga **(89)** found that over 70 percent of sick leave taken by an employee longer than 32 days was due to tuberculosis. Royal Swaziland Sugar Corporation reported an increase in incidence of tuberculosis amongst the workforce from 11.9/1000 in 1997 to 12.7/1000 in 1999 **(78).** Swaziland railway reported a tuberculosis incidence rate of 10.95/1000 in 2001, with 90 percent of these cases co-infected with HIV **(89)**. The Government of Swaziland 2001 HIV

sero-surveillance report **(136)**, found that 70 percent of tuberculosis cases in Swaziland were co-infected with HIV.

Considering the co-infection of Tuberculosis and HIV, tuberculosis presents the greatest challenge to organisations controlling absenteeism.

6.2.3 The direct cost of HIV/AIDS to Swaziland organisations

HIV/AIDS affects organisations' costs through a variety of channels. The most important are healthcare utilisation, disability and retirement payments, funeral and burial costs, recruitment and training costs and absenteeism. However, costs for absenteeism have not been determined by any study in Swaziland and therefore not part of the cost analysis in this review.

Figure 4.5 shows, that HIV/AIDS cost Swazi organisations 2.65 percent (95% CI 2.46-3.03) of their annual total wage bill. This figure would have been substantially higher if the cost of absenteeism was included in the cost. Absenteeism has been estimated to cost organisations between 1.6-2.4% of total wage bill **(84, 80)**. Therefore the total figure with absenteeism included should be between 4-5 percent.

At Nakambala sugar estate In Zambia, AIDS costs represented 1.9 percent of company costs in 1992-1993 **(133)**. In Cote d'Ivoire the cost was calculated to be between 0.8-3.7 percent of total wage bill **(137)**. Projections made for Botswana in 1997 estimated HIV/AIDS to cost organisations 5 percent of total wage bill by the year 2004 **(138)**. However, recent projections have come up with higher estimates of 7-8 percent of total wage bill **(84)**. This is due to higher than expected prevalence and adult AIDS mortality that has occurred in Botswana. Similar high figures have been quoted in South Africa. A study by Metropolitan Life Insurance company **(139)** estimate AIDS to cost South African companies between 7 and 14.6 percent of total wage bill.

The cost of AIDS to the organisation depends on the level of benefits provided to the employees. Swaziland organisations have largely provided limited benefits to their employees, with most of the benefits reserved for the skilled workforce **(107)**. It is the unskilled workforce that is predominantly affected by HIV/AIDS **(81)**. The cost of AIDS to Swaziland organisations may therefore not reach the high figures seen in South Africa and Botswana who provide wider benefits to their workforce.

6.3 The impact of HIV/AIDS at the macroeconomic level

The impact of HIV/AIDS at the macro-level is the combined effect of the micro-level and meso-level impacts. From Table 4.2, HIV/AIDS will cause a mean annual loss in GDP growth of 1.6 percent (95%CI 1.59-1.61) and annual loss in GDP per capita growth of 1.73 percent (95% CI 1.72-1.74).

Swaziland GDP is estimated to grow by 3.2 percent per year without HIV/AIDS **(140)**. An annual loss of GDP growth by 1.6 percent due to HIV/AIDS would leave Swaziland with a GDP growth of 1.6 percent per year and a 70 percent loss in GDP per capita growth.

Botswana and Swaziland are projected to have the highest percentage annual loss in GDP and GDP per capita growth due to HIV/AIDS **(91)**. The other African countries that are projected to suffer a high annual percentage loss in GDP growth and GDP per capita growth are Lesotho, Namibia, and Zimbabwe. Table 6.1 below shows the comparison between these countries.

Table 6.1 Macroeconomic impact of HIV/AIDS in southern Africa

Country	Percentage annual loss (%)	
	GDP growth	GDP per capita growth
Swaziland	2.8	1.8
Botswana	2.8	1.8
Zimbabwe	2.3	1.4
South Africa	2.1	1.3
Lesotho	2.4	1.6
Namibia	2.1	1.3

Source: International Labour Office (91).

Some economists **(141,142)** have argued that the measurement of the macroeconomic impact of HIV/AIDS through annual losses in GDP growth and GDP per capita does not tell the whole story behind the impact of HIV/AIDS at this level.

More sensitive indicators have been suggested. They include decline in life expectancy, shift in private and public expenditures needs in response to the epidemic and the erosion of social capital **(143)**. Currently, it is not be possible to calculate these indicators for Swaziland due to lack of current demographic data. Life expectancy in Swaziland was projected to decline from 58.1 to 38.5 years due to HIV/AIDS **(144)**. Recent studies in Swaziland found the average age at death in Swaziland from HIV/AIDS to be 33.7 as compared to 41.6 for deaths from non-AIDS causes **(89)**.

7.0 Conclusions

This section clarifies how the author addressed each of the objectives of the systematic review. The objectives were; to identify completed research conducted on the economic impact of HIV/AIDS on Swaziland, make a preliminary assessment of the quality of this research, identify gaps and methods of dealing with these gaps and determine ways and extent in which HIV/AIDS has affected the various sectors of the Swazi economy.

This section will also highlight the implications of that results of this systematic review have on policy and future research.

7.1 Identification of completed research on the economic impact of HIV/AIDS on Swaziland

There is an increasing number of research studies on the impact of HIV/AIDS on Swaziland. Thirty-four studies on the impact of HIV/AIDS on Swaziland were identified and eighteen of these studies met the inclusion criteria. However, most of these studies, ten out of eighteen, covered the private sector. There is still a limited number of studies on the public sector, micro-level and the macroeconomic impact of HIV/AIDS on Swaziland. Four studies covered the public sector, three covered the macroeconomic level and only one covered the micro-sector. Future studies should focus on the public sector, rural households and the national economy.

7.2 Quality of existing research on impact of HIV/AIDS on Swaziland.

The studies identified were predominantly observational studies. These studies have faced several difficulties including recall bias, misclassification and identification of cases and, confounding. Secondly, most organisations did not keep accurate records on HIV/AIDS at the workplace. These factors could have reduced the impact recorded by these studies.

There is therefore need for increased use of longitudinal studies to determine impact of HIV/AIDS on economies. Longitudinal studies involve enrolling a cohort of confirmed cases of HIV/AIDS and a control group of non-HIV cases and follow them over time. This has the advantage of tracking the long-term impacts of HIV/AIDS, eliminate recall bias and confounding factors and; misclassification of cases.

Further longitudinal studies would identify and control for alternative and confounding factors operating in the environment that produce similar effects to HIV/AIDS. Since the alternative explanations would be expected to affect both cases and control group randomly, any impact in excess of these alternative factors would be attributed to HIV/AIDS. As access to voluntary counselling and testing increases, researchers will have opportunities to enrol cohorts of infected individuals in longitudinal studies.

According to Stokes **(118)** participatory rural appraisal and key informant interviews can be used to identify the alternative factors operating within the community or environment under study. Participatory appraisals and key informant interviews should be included in future research studies to explore and identify alternative and confounding factors. This would facilitate the identification of alternative factors and control for such factors in the final analysis.

The second solution that is increasingly being used, is to identify HIV-infected cases through the use of verbal autopsy. Verbal autopsy may be the only method to identify HIV-infected and affected households in communities where stigma to HIV/AIDS is prevalent and death certificates not readily available.

Thirdly, there is a dearth of research on the impact of HIV/AIDS on the public sector and the macroeconomic level in Swaziland. There is need to initiate more studies on these two sectors. The other aspect is the use of sensitive indicators to determine the macroeconomic impact of HIV/AIDS. Suggested indicators include erosion of social capital, effective integration of micro-level and meso-level impacts, and the reduction in life expectancy.

7.3 The Impact of HIV/AIDS on the Swaziland Economy.

In this section the results of the systematic review on the impact of HIV/AIDS on the three levels of the Swaziland economy and the policy implications are summarised.

7.3.1 The impact of HIV/AIDS on the Micro-economic level sector in Swaziland.

The micro-economy represented by the rural households is a key sector in the economy. However, with the vulnerability of rural households to negative impacts of HIV/AIDS and environmental shocks increased four-fold (Figure 4.1), the micro-sector in Swaziland is greatly affected by HIV/AIDS.

The increased death of breadwinners and productive age group due to HIV/AIDS has affected the sources of labour and income to the rural households. Affected rural households are therefore left with minimal resources at their disposal to effectively cope with the negative impacts of HIV/AIDS. This has resulted in reduced farm productivity and children dropping out of school. This will have serious consequences for food security and children's education attainment for these households.

HIV/AIDS has increased the burden of orphans in Swaziland rural households. Over 17 percent of Swaziland rural households are taking care of orphans due to AIDS. Swaziland was estimated to have had 44,000 orphans due to AIDS by the end of year 2002. This number will increase by 10,000-20,000 every year.

Some of responses that the private sector has implemented to mitigate the impact of HIV/AIDS on their organisations have increased the burden of rural households. These measures include targeted retrenchment and restructuring of workers' benefits. These measures effectively transfer the burden of terminal care and funeral costs from the employer to the households. Therefore policies and responses implemented by the meso-level of the economy to mitigate the impact of HIV/AIDS at this level may have negative consequences for rural households. Planners, policy makers and those involved in implementing development programmes should ensure that policies and responses implemented by organisations and institutions at meso-level do not harm rural households and their communities.

Lastly, rural households rely on the public sector for the planning and provision of basic social services like health, education and agricultural extension services. This requires good governance and translation of macro-policies into programmes by technical staff in the public sector. With

increasing mortality of the workforce, the skilled workers at meso-level are being decimated by HIV/AIDS. This has the potential to affect governance and programme implementation. This has its greatest impact on rural households.

The micro-sector is therefore not only greatly affected but also does not have the means to cope effectively with the negative impacts of HIV/AIDS. It will therefore note escape the negative impacts of HIV/AIDS.

Development programmes should therefore integrate HIV/AIDS into their project cycle. Integration should focus on four major issues. These include advocacy to ensure that rural households are protected from policies that would harm them, disaster preparedness, impact mitigation and impact alleviation. These measures will prevent rural households from destitution.

7.3.2 The impact of HIV/AIDS on the meso-economic level sector in Swaziland.

This systematic review has shown that Swaziland organisations have experienced the negative impacts due to HIV/AIDS.

AIDS is currently the leading cause of death amongst Swazi employees, contributing to over 60 percent of all deaths. The pooled AIDS mortality rate is currently 10.54/1000 employees per year, while the mean crude mortality rate of Swazi employees is 16.77/1000 employees per year.

The public sector has experienced higher mortality of workers than the private sector. The high mortality of skilled workers in the public sector will affect governance. This has the potential to affects government's implementation of policies and programmes aimed at alleviating poverty and maintaining security.

HIV/AIDS has increased absenteeism in Swaziland organisations by over 20-fold. On average, Swaziland organisations are losing of 2.97 days per employee per year due to HIV/AIDS related absenteeism. Increased absenteeism reduces productivity and the organisations incur costs as the employee is paid for work not done.

In addition, HIV/AIDS has increased the expenditure of Swaziland organisations on employee welfare. The costs include costs due to increased utilisation of healthcare, funerals and death benefits. Swaziland organisations are spending 2.65 percent of their total wage bill on HIV/AIDS related costs. As the epidemic progresses these costs will increase.

However, the private sector in Swaziland has not experienced high mortality rates and costs due to AIDS to the magnitude projected earlier in the epidemic. The impacts experienced by Swaziland private sector is so far lower than that experienced by organisations in other African countries.

The epidemic in Swaziland is a late epidemic that has come at a time when knowledge on impact mitigation has been articulated. Swaziland organisations may have therefore avoided the cost of AIDS through workplace responses. There responses should be emulated by other organisations, especially, the smaller organisations and the public sector.

The workplace responses to HIV/AIDS should include education, awareness and prevention activities to prevent new infections amongst staff. For staff to access antiretroviral treatment, they need to know their sero-status. Organisations should therefore provide access to voluntary counselling and testing for staff and their dependants as part of the workplace programme.

To reduce HIV/AIDS absenteeism and healthcare costs, HIV-infected staff should be kept health through the provision of anti-retrovirals. Providing access to care, support and treatment for infected staff and their dependants would improve quality of life of infected employees and their productivity and, protect the organisations and households of infected staff from the negative impacts of HIV/AIDS.

Co-infection of HIV and tuberculosis is a major cause of AIDS deaths and HIV/AIDS absenteeism. Over 60 percent of all AIDS deaths were due to tuberculosis, while 70 percent of prolonged absenteeism of longer than 30 days was due to tuberculosis. There is need to increase tuberculosis surveillance and case identification. This will increase on timely diagnosis and initiation of treatment. This will reduce spread of tuberculosis.

7.3.3 The impact of HIV/AIDS on the Macroeconomic level sector in Swaziland.

Swaziland will face a 1.6 percent annual loss in GDP growth and 1.73 percent GDP per Capita growth due to HIV/AIDS. However, these figures do not project the true picture of the impact of HIV/AIDS on Swaziland. With one of the highest rates of HIV prevalence in the world and increasing mortality, Swaziland will face huge micro-level and meso-level impacts. These are likely to have enormous negative impacts on national economy.

There is therefore need to study further the macroeconomic impact of HIV/AIDS in Swaziland. In addition there is need to integrate effectively the impacts at micro-level and meso-level into the models used to project the macroeconomic impact of HIV/AIDS. Further, the use of more sensitive indicators than GDP growth to determine the impact at national level.

8.0 Disclosures

Three of the studies included in this review are primary research studies done by the author of this report. The studies include: “The private sector response to HIV/AIDS in Swaziland (81)”, “AIDS Mortality and absenteeism at Swaziland Railway (83)” and “The Impact of HIV/AIDS on the private sector and agriculture (89)”. Except for results in Table 4.1, data from these studies were pooled with other studies.

9.0 Dissemination of report

The report will be circulated and disseminated through the following channels:

- GDN and Eldis websites
- Southern African Regional Network on Poverty
- Presentation at international conferences
- Publication in reputable journals on policy and HIV/AIDS
- Circulate to international organisations
- Circulate to academic institutions in Swaziland and South Africa

Table A1 Websites searched **Appendix A**

Website	Web address
AEGIS	http://www.aegis.org/
Centers for Disease Control	http://www.cdc.gov
Center for Health Policy	http://www.health.wits.ac.za/publichealth
Eldis	http://eldis.org
Family Health International	www.fhi.org
Food and Agriculture Organisation	http://www.fao.org; http://www.fao.org/hivaids
Global Development Network	www.gdnet.org
Global Health Initiative	www.weforum.org/site
Harvard AIDS Institute	www.aids.harvard.edu
Healthlink	www.healthlink.org.uk
HIV/AIDS Economic and Research Division– University of Durban	www.und.ac.za/und/heard/
Communications development research	www.id21.org/
International AIDS Economic Network	http://www.IAEN.org/index.htm
International Labour Organisation	http://Ilo.org/
Medinfo	www.medinfo.co.uk
Medline	www.nlm.nih.gov/
Partnership for Health reform	www.phrproject.com/
SafAIDS	www.safaids.org.zw
SAHIMS	http://www.sahims.net/doclibrary/swz
South African Research and Reporting Network(SARPN)	http://www.sarpn.org.za
The AIDS Economic Homepage	http://www.worldbank.org/aids-econ/; http://econ.worldbank.org
The Futures Group International	http://www.tfgi.com; http://www.ForumOne.com
UNAIDS	http://www.unaids.org
UNDP	http://www.undp.org/hiv/publications/
United Nations OCHA IRIN News	http://www.irinnews.org http://plusnews.org/AIDSreport
USAID	http://usaid.gov/pop_health/aids/index.html
World Health Organisation	http://www.who.int/

Basic data extraction tool Appendix B

Details of publication

Author

Title

Source (journal, conference etc.)

Year/volume/pages/country of origin

Institutional affiliation

Research question and aim of study

Study design, sampling and when the fieldwork was conducted

Participation in the study

Target population

Exclusion criteria

Recruitment procedures

Characteristics of participants (age, sex, social class, ethnicity, geographical location, health status, income status, other information)

Research tools

What were the research tools used?

Where were they piloted?

Was a specific attitude scale used? Which?

Theory: Was any theory referred to in the research?

Ethics : Was ethics committee approval obtained?

Analysis

Statistical techniques used

Qualitative analysis techniques used

Computer analysis tools used

Reviewers decision

Is the study methodologically sound ?

Is it relevant to the review topic?

Is it to be included?

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