

The State of Health Economic and Pharmacoeconomic Evaluation Research in Zimbabwe: A Review

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ABSTRACT

BACKGROUND: Economic evaluation of health care has developed into a substantial body of work, and its contribution to medical decision making is increasingly being recognized.

OBJECTIVE: The aim of the study was to describe the characteristics and quality of health economic (including pharmacoeconomic) evaluation research studies related to Zimbabwe.

METHODS: A review of the literature was conducted to identify published health economic evaluation studies related to Zimbabwe. HEED, PubMed, MEDLINE, HealthSTAR, EconLit, and PsycINFO databases and sociological and dissertation abstracts were used to search for economic analyses. The searches used the following terms alone and in combination: *costs, budgets, fee, economics, health, pharmacy, pharmacy services, medicines, drugs, health economics, cost-effectiveness, cost-benefit, cost-minimization, cost utility analysis, and Zimbabwe*. Only original applied economic evaluations addressing a health-related topic pertaining to Zimbabwe and published in full were included. Two reviewers independently evaluated and scored each study in the final sample using the data collection form designed for the study.

RESULTS: Fifty-nine studies were identified in the database searches, 18 of which were excluded because they were not about Zimbabwe (3 studies) or were not health related (15). Of the 41 remaining studies, 8 were excluded after further review because they were not original research, 6 because they were not economic analyses, and 1 because it was not about Zimbabwe. The final 26 studies appeared in 13 different journals (based mostly [17 (65%)] outside of Zimbabwe). The mean (SD) number of authors of each study was 3.36 (2.13); most of the authors had medical/clinical training. The number of studies peaked between 1994 and 1997. Based on a 10-point scale, with 10 indicating the highest quality, the mean (SD) quality score for all studies was 5.40 (1.56); 8 of the studies (31%) were considered to be of poor quality (score ≤ 4). The quality of the studies reviewed was significantly (all, $P < 0.05$) associated with the country in which the journal was based (non-Zimbabwe = higher), the primary health intervention (services > pharmaceutical interventions), the number of authors (more authors = higher), and year of publication (more recent = higher).

CONCLUSION: This study indicated that the use of health economic (including pharmacoeconomic) evaluation research in Zimbabwe was low, and 31% of the studies were of poor quality. More and better quality health economic research in Zimbabwe is warranted. (*Curr Ther Res Clin Exp.* 2008;69:268–285) © 2008 Excerpta Medica Inc.

KEY WORDS: cost-effective analysis, health economics, pharmacoeconomics, economic evaluation, quality assessment, Zimbabwe.

INTRODUCTION

Economic evaluation of health care has developed into a substantial body of work, and its contribution to medical decision making is increasingly being recognized.¹ In the worldwide medical literature, the number of publications relating to economic analyses of health care programs, including pharmaceuticals, has increased. The use of reliable, timely health economic evaluation data is helpful in making optimal policy decisions regarding the allocation of health care resources and enhances the pursuit of cost-effective medical excellence.

There have been concerns about the quality of some *health economic* (in this study, considered to always include pharmacoeconomics) studies published in the medical literature; many published studies are of poor quality.^{2–6} This challenge is expected to be more pronounced in developing countries that have ineffective, poorly financed health systems. Developing countries, including Zimbabwe, face many challenges to conducting good quality economic evaluation studies, resulting in their limited availability.^{7,8}

The Zimbabwean economy suffers from high inflation, poverty, unemployment, and persistent foreign currency and food shortages.⁹ The negative macroeconomic environment, together with high unemployment (60%), high poverty levels (65%), and high HIV/AIDS prevalence (18%) have reduced the standard of health among the majority of Zimbabweans and have widened the gap between the rising demand for health care (including pharmaceuticals) and the shrinking national resources.^{9–11} Concerns over the rising costs of health care in Zimbabwe have been growing.^{10,12–14} Health interventions in the country may be inefficient and ineffective. To date, no effort has been made to analyze the economic evaluation studies that have been conducted in Zimbabwe. Despite the recognized importance of cost data in health care planning, there is little information on the cost-effectiveness of Zimbabwean health care delivery.¹⁵

The present study assessed the state of health economic evaluation research studies about Zimbabwe published between 1987 and 2005. We sought to describe the study characteristics and to assess their quality and quantity.

METHODS

An initial literature search was conducted in September 2006 (and updated in March 2007) to identify published economic evaluation studies pertaining to Zimbabwe. HEED, PubMed, MEDLINE, HealthSTAR, EconLit, and PsycINFO databases and sociological and dissertation abstracts were used to search for economic analyses. The

searches used the following terms alone and in combination: *costs, budgets, fee, economics, health, pharmacy, pharmacy services, medicines, drugs, health economics, cost-effectiveness, cost-benefit, cost-minimization, cost utility analysis*, and *Zimbabwe*. Additional studies were identified from reference lists of the obtained studies. This continued for all the additional studies until no more new studies could be identified.

This review included only original economic evaluations that pertained to Zimbabwe, addressed a health-related topic (eg, pharmacy, nursing), and were published in full (eg, no abstracts). Abstracts of the studies that met the inclusion and exclusion criteria were assessed by 2 reviewers who were blinded to each other's work. Studies that met all of the inclusion criteria were reviewed. The selected studies were obtained for full evaluation from university libraries in the United States and Zimbabwe and through interlibrary loan.

EVALUATION OF STUDIES AND INFORMATION EXTRACTION

A data collection form was designed based on existing economic guidelines^{16,17} and on previous work by Zarnke et al¹⁸ and Offman et al.¹⁹ Two reviewers independently evaluated and scored each study using this data collection form. A third researcher, serving as a tiebreaker, read and scored the items about which the 2 primary reviewers disagreed. The data collection form included general information (eg, the number of authors, country of residence of the first author, primary training of the first author, and year of publication of the study), economic analysis information (eg, the study's primary outcomes, whether or not economic evaluation was the primary objective, the study's perspective, and the study design), and a subjective rating of the quality of the study. The reviewers provided an overall assessment of the quality of each of the studies based on a 10-point scale (1 = lowest quality to 10 = highest quality). The reviewers considered all the strengths and weaknesses of the study in determining their rating. Scores were collapsed into 3 groups: poor = 1 to 4; fair = 5 to 7; and good = 8 to 10.

The most appropriate instrument for assessing the quality of economic analyses is the validated quality of health economic studies (QHES) instrument.¹⁹ The data collection form contained questions from the QHES instrument, which is intended to assess the overall quality of full economic analyses. However, given that only 3 of the 26 studies were full economic evaluations, the QHES scores were not used in comparing the quality of the studies.

STATISTICAL ANALYSIS

The ratings of the 2 reviewers were compared for all studies. The number of times the reviewers agreed was noted for each item and was reported as a percentage. Through post hoc training and the intervention of the tiebreaker, the reviewers were able to agree on 1 coded response for each item. The correlation between the reviewers' 10-point subjective quality score ratings of the studies was assessed using the Spearman rank correlation. A mean of the 2 reviewers' quality scores for each study was calculated and was used for all further analyses whenever a quality score was needed.

Descriptive statistics were calculated and reported for all variables. The *t* tests and analyses of variance were conducted to determine if there were significant differences

in the mean quality of the studies by various categories (country of journal, type of publication, primary objective, type of data), if a category had ≥ 5 observations. The Pearson correlation coefficient was used to investigate the relationship between the quality score and the number of authors, the year of publication, and sample size. All statistical analyses were performed using SPSS version 14.0 (SPSS Inc., Chicago, Illinois). $P < 0.05$ was considered statistically significant.

RESULTS

Fifty-nine studies, all of which were written in English, were identified in the database searches. Eighteen studies were excluded because they were not about Zimbabwe (3) or were not directly health related or original economic analyses (15) (Table I). Of the remaining 41 studies, 8 were excluded because they were not original research, 6 because they were not economic analyses, and 1 because it was not about Zimbabwe (although it was published in Zimbabwe) (Table II). The final literature sample consisted of 26 economic evaluation studies^{10,12-15,20-40} that satisfied the inclusion criteria (Table III and Figure 1).

INTERRATER AGREEMENT

Agreement between the reviewers ranged from a minimum of 77% to a maximum of 100% per item (mode = 100%). There was high agreement between raters on all primary variables, such as the method of economic evaluation as defined by the authors (88%), the method of economic evaluation as rated by reviewers (77%), the primary objective of the economic evaluation (81%), and the decision reached on cost-effectiveness (100%). Spearman rank correlation showed that there was a high and positive statistically significant correlation between the reviewers' quality scores on the 10-point subjective scale ($r = 0.83$; $n = 26$; $P < 0.001$).

CHARACTERISTICS OF THE ECONOMIC EVALUATION STUDIES

The 26 studies^{10,12-15,20-40} we reviewed were published in 13 different journals that were based in 4 different countries. Nine of the studies (35%) were published in Zimbabwe, and the majority of the remainder were published in journals based in the United Kingdom and the United States. Nineteen studies (73%) were published in medical journals and 7 (27%) were published in nonmedical journals. No study was published in a health/medical economics journal (including pharmacoeconomics journals) (Table IV). Seven studies^{12,21,29,31,32,36,40} (27%) were published in *The Central African Journal of Medicine*, which is based in Zimbabwe.

The mean (SD) number of authors per study was 3.36 (2.13) (range, 1-9). Eighteen of the corresponding authors (69%) resided in Zimbabwe at the time the study was published, and the majority of the remaining corresponding authors resided in the United States (5) and United Kingdom (2). Fourteen of the first authors (54%) had medical/clinical training and 7 (27%) had nonmedical training. Sixteen studies (62%) covered a portion of 1 country, 7 studies (27%) were national, and 3 studies (12%) were multinational (Table IV). The sample sizes ranged from a minimum of 22 to a maximum of 16,063 participants.

Table 1. Articles excluded after screening abstracts (n = 18).

Author(s)	Citation	Reason
Maumbe	Hidden health costs of pesticide use in Zimbabwe's smallholder cotton growers. <i>Soc Sci Med.</i> 2003;57:1559–1571.	Not directly health related
Waterkeyn and Cairncross	Creating demand for sanitation and hygiene through community health clubs: A cost effective intervention in two districts in Zimbabwe. <i>Soc Sci Med.</i> 2005;61:1958–1970.	Not directly health related
Chapman et al	The burden of disease in Zimbabwe in 1997 as measured by disability-adjusted life years lost. <i>Trop Med Int Health.</i> 2006;11:660–671.	Not directly health related or original economic analyses
Howard et al	Barriers and incentives to orphan care in a time of AIDS and economic crisis: A cross-sectional survey of caregivers in rural Zimbabwe. <i>BMC Public Health.</i> 2006;6:27.	Not directly health related or original economic analyses
Mashange et al	Validation of a simple and cheap gelatin particle agglutination test for human immunodeficiency virus using dried blood spot samples. <i>Cent Afr J Med.</i> 2003;49:5–8.	Not directly health related or original economic analyses
De Castella	Health workers struggle to provide care in Zimbabwe. Brain drain adds to woes of a cash-strapped health-care system. <i>Lancet.</i> 2003;362:46–47.	Not directly health related or original economic analyses
Nyati and Sebit	Burden of mental illness on family members, care-givers and the community. <i>East Afr Med J.</i> 2002;79:206–209.	Not directly health related or original economic analyses
Tagwireyi et al	Routine prophylactic antibiotic use in the management of snakebite. <i>BMC Clin Pharmacol.</i> 2001;1:4.	Not directly health related or original economic analyses
Chirenje et al	A review of cervical cancer patients presenting in Harare and Parirenyatwa Hospitals in 1998. <i>Cent Afr J Med.</i> 2000;46:264–267.	Not directly health related or original economic analyses
Hunter et al	Economic development and women's blood pressure: Field evidence from rural Mashonaland, Zimbabwe. <i>Soc Sci Med.</i> 2000;50:773–795.	Not directly health related or original economic analyses

(continued)

Table I. (Continued)

Author(s)	Citation	Reason
Hensher and Jefferys	Financing blood transfusion services in sub-Saharan Africa: A role for user fees? <i>Health Policy Plan.</i> 2000;15:287–295.	Not directly health related or original economic analyses
Mukhebi	An assessment of the economic impact of heartwater (<i>Cowdria ruminantium</i> infection) and its control in Zimbabwe. <i>Prev Vet Med.</i> 1999;39:173–189.	Not directly health related or original economic analyses
Adamolekun et al	The pattern of utilization of EEG services in Harare, Zimbabwe. <i>Cent Afr J Med.</i> 1996;42:319–322.	Not directly health related or original economic analyses
Mimpriss and McGown	The economics of inhalation anaesthesia. <i>Anaesthesia.</i> 1974;19:249–253.	Not directly health related or original economic analyses
Hongoro et al	A qualitative assessment of the referral system at district level in Zimbabwe: Implications on efficiency and effective delivery of health services. <i>Cent Afr J Med.</i> 1998;44:93–97.	Not directly health related or original economic analyses
Farooq	Medical and economic importance of Schistosomiasis. <i>J Trop Med Hyg.</i> 1964;67:105–112.	Not on Zimbabwe
Castle	The cost of disease. <i>S Afr Med J.</i> 1969;43:1131–1135.	Not on Zimbabwe
Morris and Cheevers	The direct costs of HIV/AIDS in a South African sugar mill. <i>AIDS Anal Afr.</i> 2000;10:7–8.	Not on Zimbabwe

Table II. Articles excluded after screening full articles (n = 15).

Author(s)	Citation	Reason
Chandiwana and Taylor	The rational use of antischistosomal drugs in schistosomiasis control. <i>Soc Sci Med.</i> 1990;30:1131-1138.	Not original research
Langhaug et al	Improving young people's access to reproductive health care in rural Zimbabwe. <i>AIDS Care.</i> 2003;15:147-157.	Not original research
Nyambuya	The social impact of cost recovery measures in Zimbabwe. <i>South Afr Polit Econ Mon.</i> 1994;7:14-15.	Not original research
Summers	PEDLIZ: Unwarranted restriction of prescribing freedom, or rational cost effective measure? <i>Cent Afr J Med.</i> 1983;29:43-46.	Not original research
Ward	Praziquantel in the treatment of Bilharzia. <i>Cent Afr J Med.</i> 1983;29:227-229.	Not original research
Watts	Low cost water supplies and their contribution to health. <i>Afr Health.</i> 1992;15:10-11.	Not original research
Wylie	Cost-benefit analysis of a school health education program: One method. <i>J Sch Health.</i> 1983;53:371-373.	Not original research
McDonald and Jarvis	Community-acquired bacteremia in Zimbabwe and the global cost of contaminated blood cultures. <i>Pediatr Infect Dis J.</i> 1997;16:537-538.	Not original research
Nelson et al	Paediatric treatment costs and the HIV epidemic. <i>Cent Afr J Med.</i> 1995;41:139-144.	Not on Zimbabwe (on Malawi)
Sevene et al	System and market failures: The unavailability of magnesium sulphate for the treatment of eclampsia and pre-eclampsia in Mozambique and Zimbabwe. <i>BMJ.</i> 2005;331:765-769.	Not economic analysis
Tamashiro and Hayman	Reducing the cost of HIV antibody testing. <i>Lancet.</i> 1993;342:866.	Not original cost analysis
Craven	EMS in Zimbabwe. <i>Emerg Med Serv.</i> 2003;32:175-177, 180.	Not original economic analysis
Gomo et al	In vitro activity of several antimicrobial agents against <i>Neisseria gonorrhoeae</i> and comparison of cost of treatment. <i>Cent Afr J Med.</i> 1995;41:83-86.	Not an economic analysis
Langhaug et al	Improving young people's access to reproductive health care in rural Zimbabwe. <i>AIDS Care.</i> 2003;15:147-157.	Not an economic analysis
Stranix-Chibanda et al	Screening for psychological morbidity in HIV-infected and HIV-uninfected pregnant women using community counselors in Zimbabwe. <i>J Int Assoc Physicians AIDS Care (Chic Ill).</i> 2005;4:83-88.	Not an economic analysis

Table III. Articles on health economics and pharmacoconomics in Zimbabwe included in the present study (N = 26).

Author(s)	Citation	Type of Analysis
Bvochora et al	Disease pattern and prescribing at the University of Zimbabwe students health service, 1987–1991. <i>Cent Afr J Med.</i> 1993;39:88–95.	Cost-analysis
Chisadzwa et al	User fees and drug pricing policies: A study at Harare Central Hospital. <i>Health Policy Plan.</i> 1995;10:319–326.	Cost-analysis
Gomo et al	In vitro activity of several antimicrobial agents against <i>Neisseria gonorrhoeae</i> and comparison of cost of treatment. <i>Cent Afr J Med.</i> 1995;41:83–86.	Cost-analysis
Cullen and Baloyi	Chrysoile asbestos and health in Zimbabwe: I. Analysis of miners and millers compensated for asbestos-related diseases since independence (1980). <i>Am J Ind Med.</i> 1991;19:161–169.	Cost-analysis
Hansen et al	The cost of home based care for HIV/AIDS patients in Zimbabwe. <i>AIDS Care.</i> 1998;10:751–759.	Cost-analysis
Hansen et al	The Costs of HIV/AIDS care at government hospitals in Zimbabwe. <i>Health Policy Plan.</i> 2000;15:432–440.	Cost-analysis
Harvey	The impact of condom prices on sales in social marketing programs. <i>Stud Fam Plann.</i> 1994;25:52–58.	Cost-analysis
Hongoro	Hospital costs of high-burden diseases: Malaria and pulmonary tuberculosis in a high HIV prevalence content in Zimbabwe. <i>Trop Med Int Health.</i> 2003;8:242–250.	Cost-analysis
Hore	Zimbabwe: Are the costs of AIDS medical care affordable? <i>AIDS Anal Afr.</i> 1993;3:6–8.	Cost-analysis
Hore	AIDS and private health costs in Zimbabwe. <i>SAF AIDS News.</i> 1997;5:2–6.	Cost analysis
Hore	The impact of AIDS on direct health care costs in Zimbabwe. <i>AIDS Anal Afr.</i> 1997;7:8–9.	Cost-analysis
Kravitz and Sanders	Paediatric pneumonia in Zimbabwe: Management and pharmaceutical costs of inpatient care. <i>J Trop Pediatr.</i> 1994;40:17–23.	Cost-analysis
McFarland et al	Deferral of blood donors with risk factors for HIV infection saves lives and money in Zimbabwe. <i>J Acquir Immune Defic Syndr Hum Retrovirol.</i> 1995;9:183–192.	Full economic evaluation
McPake and Hongoro	Contracting out of clinical services in Zimbabwe. <i>Soc Sci Med.</i> 1995;41:13–24.	Cost-analysis

(continued)

Table III. (Continued)

Author(s)	Citation	Type of Analysis
Manyemba	A randomized crossover comparison of reserpine and sustained-release nifedipine in hypertension. <i>Cent Afr J Med.</i> 1997;43:344–349.	Cost-analysis
Palmer et al	Value of mandatory testing of human immunodeficiency virus in a sub-Saharan hospital population. <i>Clin Infect Dis.</i> 2000;31:1258–1265.	Cost-analysis
Ndamba et al	A cost effective two step rapid diagnosis of urinary schistosomiasis in Zimbabwe. <i>Cent Afr J Med.</i> 1998;44:167–171.	Cost-analysis
Nhachi et al	Drug utilisation, supply and expenditure at Chitungwiza, Gweru, Mpilo, Parirenyatwa and United Bulawayo Hospitals in one year (1987–1988). <i>Cent Afr J Med.</i> 1991;37:159–167.	Cost-analysis
Chishawa et al	Comparative evaluation and assessment of the diagnostic usefulness of four commercial HIV-1/HIV-2 antibody assays using two well-characterized serum panels from blood transfusion service and the National Health Laboratory services in Zimbabwe. <i>Cent Afr J Med.</i> 2001;47:1–8.	Cost-analysis
Sweat et al	Cost effectiveness of nevirapine to prevent mother to child HIV transmission in eight African Countries. <i>AIDS.</i> 2004;18:1661–1671.	Full economic evaluation
Vander Plaetse et al	Costs and revenue of health care in a rural Zimbabwean district. <i>Health Policy Plan.</i> 2005;20:243–251.	Cost-analysis
Verkuyil	Economics of anti-rhesus prophylaxis in an African population. <i>Cent Afr J Med.</i> 1987;33:32–37.	Full economic evaluation
Vos et al	Cost and output of mobile clinics in a commercial farming area in Zimbabwe. <i>Soc Sci Med.</i> 1990;31:1207–1211.	Cost-analysis
Watts	Can people afford to live? The effect of changing economic conditions on high density urban dwellers around Harare, March 1992 to June 1993. <i>Cent Afr J Med.</i> 1994;40:272–275.	Cost-analysis
Mitchell et al	Costing of reproductive health services. <i>Int Fam Plan Perspect.</i> 1999;25(Suppl):S17–S21, S29.	Cost-analysis
Janowitz et al	Excess capacity and the cost of adding services at family planning clinics in Zimbabwe. <i>Int Fam Plan Perspect.</i> 2002;28:58–66.	Cost-analysis

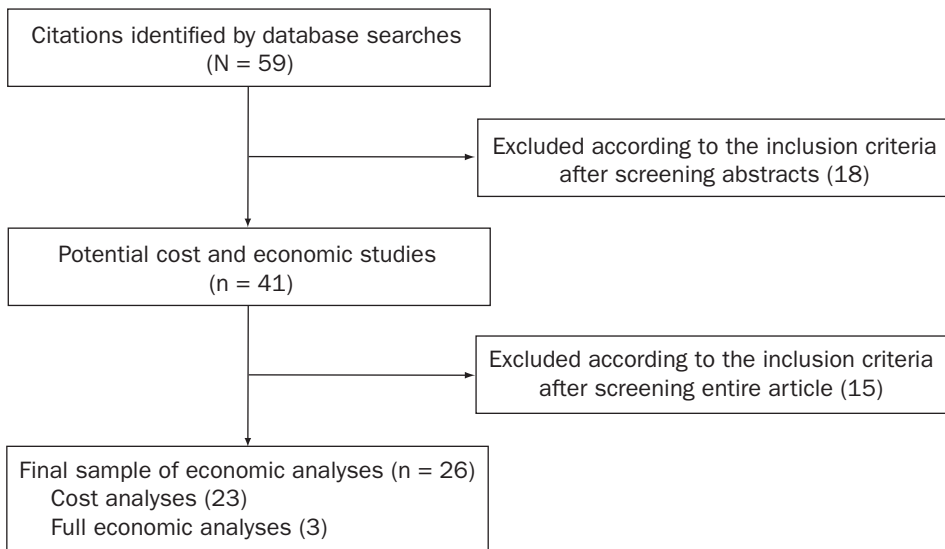


Figure 1. Flow chart of the manuscript selection process.

Sixteen studies (62%) did not list the source of funding. Of the 10 studies that listed the funding source, 6 (60%) were funded by private nonprofit organizations and 1 (10%) was funded by the pharmaceutical industry. The government payer (14 [54%]) was the dominant study perspective. Seventeen studies (65%) collected primary data and 8 (31%) used secondary data sources; the type of data could not be determined for 1 study (Table IV). Ten studies (38%) did not investigate a specific disease. HIV/AIDS was the most frequently (9 [35%]) investigated disease.^{10,13,14,22,24,25,27,30,33} Each of the following diseases was investigated in 1 study: hypertension,²⁹ urinary schistosomiasis,³¹ *Neisseria gonorrhoeae*,²¹ pulmonary tuberculosis/malaria,²⁴ and reproductive tract infection.³⁹

EXTENT AND TREND OF ECONOMIC EVALUATION STUDIES

There were 23 cost studies (88%) and 3 full economic evaluation studies (12%), all of which were cost-effectiveness analyses (CEAs). Only 1 of these 3 studies was correctly labeled as such by the authors. Economic evaluation was the primary objective of 18 studies (69%) (Table IV). Twelve studies (46%) were about pharmaceuticals, 7 (27%) were about services, and the remaining 7 (27%) were about other health interventions. Treatment (12 [46%]) and prevention and screening (6 [23%]) were the most investigated medical functions.

The earliest study³⁶ was published in 1987 and the latest study³⁴ was published in 2005. The highest number of studies^{20,21,27,28} published in a given year (4) was in 1995. The number of studies peaked between 1994 and 1997 and declined slightly thereafter (Figure 2). A mean (SD) of 3.21 (1.65) years (range, 1–7 years) elapsed between the year of publication of the study and the last year of data collection.

Table IV. Relationships between quality scores and study characteristics (N = 26).

Characteristic	No. of Studies	Quality Score,* Mean (SD)
Country in which the journal was based [†]		
Zimbabwe	9	4.44 (1.36)
Outside Zimbabwe	17	5.91 (1.44)
Type of publication		
Medical	19	5.05 (1.54)
Nonmedical	7	6.36 (1.22)
Country of current residence of lead author		
Zimbabwe	18	5.17 (1.48)
Other	8	5.94 (1.70)
Primary training of the lead author		
Medical	14	5.46 (1.50)
Nonmedical	7	5.79 (1.78)
Undetermined	5	4.70 (1.48)
Geographic location covered in the study [†]		
Portion of 1 country	15	5.10 (1.63)
National	8	5.50 (1.51)
Multinational	3	6.67 (0.76)
Primary source of funding ^{†§}		
Private nonprofit organization	6	6.00 (0.89)
Government	2	5.75 (3.18)
Pharmaceutical industry	1	–
Not listed	16	5.03 (1.64)
Study perspective [†]		
Government payer	14	5.14 (1.68)
Private payer	3	4.50 (0.50)
Patient	2	4.75 (2.47)
Not provided	7	6.33 (0.82)
Type of data used [¶]		
Primary	17	5.09 (1.49)
Secondary	8	5.75 (1.49)
Method of economic evaluation [†]		
Cost analysis	23	5.15 (1.46)
Cost-effectiveness analysis	3	7.33 (0.76)
Was economic evaluation the primary objective?		
Yes	18	5.61 (1.55)
No	8	4.94 (1.57)
Primary health intervention [†]		
Pharmaceuticals	12	4.75 (1.32)
Services	7	6.29 (1.32)
Other	7	6.08 (1.53)

(continued)

Table IV. (Continued)

Characteristic	No. of Studies	Quality Score,* Mean (SD)
Study design [†]		
Retrospective design	9	4.67 (1.67)
Modeling	4	7.13 (0.75)
Other	13	5.39 (1.31)
Continuous variables		Pearson Correlation, <i>r</i>
No. of authors [†]	26	0.420
Year of publication [†]	26	0.375
Sample size	17	-0.215

*Scale: 1 = lowest quality to 10 = highest quality.

[†] $P < 0.05$.

[‡]Cell sizes too small for statistical comparison.

[§]One study indicated the authors used their own resources.

[¶]Type of data used could not be determined for 1 study.

^{||}Post hoc analysis of variance indicated mean quality score for Services was significantly higher than that of Pharmaceuticals and Other.

QUALITY OF HEALTH ECONOMICS INFORMATION IN THE STUDIES

The mean (SD) quality score for all 26 studies was 5.40 (1.56) and ranged from 3 to 9. Eight studies (31%) were of poor quality (score ≤ 4), 15 (58%) were of fair quality (score 5–7), and 3 (12%) were of good quality (≥ 8).

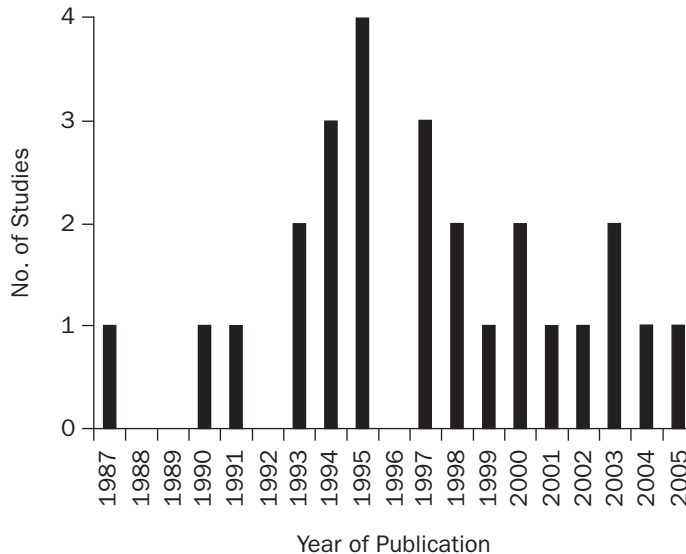


Figure 2. Number of economic evaluation studies published about Zimbabwe between 1987 and 2005.

The quality of the studies was significantly related (all, $P < 0.05$) to the country in which the journal was based (non-Zimbabwe = higher), primary health intervention (services > pharmaceutical interventions), number of authors (more authors = higher), and year of publication (more recent = higher). Quality was not related to the country of residence of the primary author, type of publication, primary objective, type of data used, primary training of the first author, or sample size. Sample sizes were not large enough to conduct statistical comparisons on method of economic evaluation, geographic location covered in the study, study perspective, study design, or primary source of funding (Table IV).

The reviewers identified the following additional shortcomings that, in their opinion, compromised the quality of the studies: (1) did not specify when data collection was undertaken (6 studies); (2) did not specify the study's perspective (7); (3) had a methods section that was not clearly written (1); (4) did not explicitly discuss direction and magnitude of potential biases (1); (5) did not conduct sensitivity analyses (1); (6) failed to perform incremental analysis when needed (1); and (7) failed to discount the benefits and costs that extended beyond 1 year (1).

DISCUSSION

CHARACTERISTICS OF THE ECONOMIC EVALUATION STUDIES ABOUT ZIMBABWE

Although all of the studies in this review were about Zimbabwe, most (17 [65%]) of them were published in journals based outside Zimbabwe. This might be explained by the absence of specialized health journals in Zimbabwe. Publishing studies outside Zimbabwe increases the chances of rejection and greatly limits the dissemination of the studies within Zimbabwe, as many Zimbabweans may not have access to journals published outside the country.⁴¹ The proportion of studies published in Zimbabwe (35%) was similar to the proportion of studies published in domestic journals (33%) in Thailand, also a developing country, between 1982 and 2005.⁴² The majority of studies in our review were written by primary authors who resided in Zimbabwe at the time the study was published, and most had medical/clinical training. It is noteworthy that most of the studies were published in medical journals and none were published in a health economics or pharmacoeconomics journal.

The dominance of the government in health care in Zimbabwe was also reflected in the economic evaluations, as 50% of the studies we reviewed had a government payer perspective. The fact that many of the studies in our review did not list the primary source of funding is worrisome, raising concerns about transparency. Only 1 study was reported to have been funded by the pharmaceutical industry.

EXTENT AND TREND OF ECONOMIC EVALUATION STUDIES ABOUT ZIMBABWE

The total number of economic evaluation studies published in Zimbabwe over the 18-year period (1987–2005) covered in our study was small. In addition, most of the studies were cost studies, with only 3 being full economic evaluation studies. Only 1 of the full evaluations assessed a pharmaceutical intervention. The number of topics and diseases investigated in the economic evaluations in Zimbabwe were limited; most of the studies of specific diseases were related to HIV/AIDS. This was expected,

given the high HIV/AIDS prevalence in the country (24%) and in many other developing countries.¹⁰ Teerawattananon et al⁴² found a similar pattern in Thailand, with 50% of the health economics studies being related to infectious diseases, including HIV/AIDS.

There were no studies regarding some of the other major health problems in the country (eg, injury, mental disorders, diabetes mellitus, and perinatal conditions). The few areas covered by the studies and the low number of studies about pharmaceuticals indicate that health economic evaluation is still in its infancy in Zimbabwe. Our findings confirmed the results of Walker and Fox-Rushby⁷ and Lee et al,⁸ who found a limited supply of good quality economic evaluation studies in developing countries. Based on the small number of publications found, it appears that health policies and plans in Zimbabwe are being made without sound economic evaluation data, which confirms findings by Maynard.⁴³ The absolute number of health economic evaluation studies about Zimbabwe was low compared with such studies about the United Kingdom, Australia, the United States, and Canada, where economic analyses are formally used in health policy formulation.^{19,44–47} The number was low even when compared to the number of studies published in other developing countries, such as Thailand⁴² (39 full economic evaluations, including 27 CEAs) and Korea⁸ (33 full economic evaluations, including 14 CEAs).

The study found that CEA was the most popular type of method of economic evaluation used. No study used other economic evaluation methods (eg, cost-benefit analysis or cost-utility analysis). Similarly, Teerawattananon et al⁴² found that CEA was the most popular (full economic) study type in Thailand, and Lee et al⁸ found equal numbers of CEA (14/45 [31%]) and cost-benefit analysis (14/45 [31%]) studies in Korea. Without a national requirement for submission of economic data as part of the drug regulatory process in Zimbabwe, there is little incentive for stakeholders to conduct full economic appraisals or evaluations. Numerous factors and constraints might be affecting the paucity of economic evaluations in Zimbabwe (eg, clinicians' lack of appreciation of economic evaluations, misconceptions about economic evaluations, the organization and payment structure of the health care system, and lack of expertise in economic evaluation). Moreover, conducting health economic evaluations is expensive and time consuming.

The number of studies increased with time and peaked in the mid-1990s. This coincided with the increased importance of cost recovery, increased cost of care, and shrinking budgets allocated to health in the public sector during this period. This period was also characterized by a widening gap between costs and available resources, increased use of new and expensive medicines and technologies, the high prevalence of endemic diseases, and efforts by the government and private payers to maximize value for money.¹⁰ These developments might have influenced the increase in the number of economic evaluations conducted during that period.

QUALITY OF THE ECONOMIC INFORMATION IN THE STUDIES

We found that a large percentage (31%) of the studies we reviewed were of poor quality, and only 3 of the 26 studies (12%) were of good quality. Although these

estimates of the number of quality studies may be debatable because they were subjective, the gap between what is known to constitute good quality studies and the characteristics of the studies we found was substantial enough to warrant attention. Our findings concur with findings of Gerard,² Udvarhelyi et al,³ and Adams et al,⁴ who reported that many published studies in general were of poor quality. The large number of poor studies might be explained by lack of expertise and limited knowledge about economic evaluation among clinicians, policy makers, and managers, given that Zimbabweans may not have local training opportunities in health economics. The low quality of the studies might be compromising the usefulness of health economic evaluation research in policy formulation in Zimbabwe.

The quality of the studies was significantly associated with the country in which the journal was based, the primary health intervention, the number of authors, and the year of publication. Although Neumann et al⁴⁸ and Gerard et al⁴⁹ reported that clinical specialty journals had higher chances of publishing poor quality economic studies, we found the association between the quality of the studies and type of publication was not statistically significant.

RECOMMENDATIONS AND IMPLICATIONS

There is evidently great potential for increasing the quantity and improving the quality of economic evaluations to inform health policy and planning in Zimbabwe. Increasing health costs in Zimbabwe make the need for economic analysis even more urgent. Possible strategies for improving economic evaluations include increasing the awareness of and expertise in health economic evaluation through short-term courses and seminars. The incorporation of health economics and pharmacoeconomics in the undergraduate training curriculum may help solve the problem. Neumann et al⁴⁸ underscored the need for educational efforts to improve the quality and quantity of future studies. If the value of these studies increases to the users, more studies will be undertaken and will have funding support.

In the authors' opinion, there is a need to build an infrastructure that supports and nurtures health economic evaluation. The use of economic evaluation in health care requires at least a structure of priority setting, research facilities, and procedures for synthesizing and disseminating results.

Improvement of the peer review process and better quality control by medical journal editors is essential in Zimbabwe and beyond. The peer review process has been shown to be a critical element in improving the quality of published studies.⁵⁰

The adoption of health economic guidelines would help standardize the conduct of future health economic evaluations in Zimbabwe. Such standardization would also help improve the quality of the studies, reduce bias, and increase the comparability of the studies. Bell et al⁵¹ recommend that medical journals should follow and adhere to health economic evaluation guidelines and checklists to improve the quality of the manuscripts they publish.

More research studies are needed to investigate the impact and contribution of health economic studies to policy formulation in Zimbabwe.

LIMITATIONS

The results of this study might have been affected by some internal and external limitations. Although every attempt was made to include all relevant studies, it is possible that some published studies were missed or omitted. The choice and use of only studies published in full excluded studies in abstract or manuscript form, therefore introducing publication bias. Selection bias was likely, as studies with positive results are more likely to be published in journals than studies with negative findings. In addition, the methods section of some studies did not clearly describe what was done, making it difficult to categorize and code them; other readers may categorize them differently. Although the correlation between reviewers' quality ratings was high, these were subjective ratings.

CONCLUSION

Despite the pressure on the government, third party payers, and hospitals to address the high and increasing cost of health care in Zimbabwe, our study found that the use of health economic (including pharmacoeconomic) evaluation research from 1987 to 2005 was limited. Only 26 cost and outcome analyses, mainly of poor or fair quality, were conducted, and these were targeted at 6 specific health problems. Measures are needed to promote the commissioning of more and better quality health economic and pharmacoeconomic evaluation studies in Zimbabwe and to promote the use of their results in policy formulation.

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REFERENCES

1. Drummond MF, Sculpher MJ, Torrance GW, et al. *Methods for the Economic Evaluation of Health Care Programmes*. 3rd ed. Oxford, UK: Oxford University Press; 2005.
2. Gerard K. Cost-utility in practice: A policy maker's guide to the state of the art. *Health Policy*. 1992;21:249–279.
3. Udvarhelyi IS, Colditz GA, Rai A, Epstein AM. Cost-effectiveness and cost-benefit analyses in the medical literature. Are the methods being used correctly? *Ann Intern Med*. 1992;116:238–244.
4. Adams ME, McCall NT, Gray DT, et al. Economic analysis in randomized control trials. *Med Care*. 1992;30:231–243.
5. Hill SR, Mitchell AS, Henry DA. Problems with the interpretation of pharmacoeconomic analyses: A review of submissions to the Australian Pharmaceutical Benefits Scheme. *JAMA*. 2000;283:2116–2121.
6. Colmenero F, Sullivan SD, Palmer JA, et al. Quality of clinical and economic evidence in dossier formulary submissions. *Am J Manag Care*. 2007;13:401–407.
7. Walker D, Fox-Rushby JA. Economic evaluation of communicable disease interventions in developing countries: A critical review of the published literature. *Health Econ*. 2000;9:681–698.
8. Lee KS, Brouwer WB, Lee SI, Koo HW. Introducing economic evaluation as a policy tool in Korea: Will decision makers get quality information? A critical review of published Korean economic evaluations. *Pharmacoeconomics*. 2005;23:709–721.

9. Robinson S. A tale of two countries. Monday, February 18, 2002. <http://www.time.com/time/printout/0,8816,203620,00.html#>. Accessed May 24, 2008.
10. Hansen K, Chapman G, Chitsike I, et al. The costs of HIV/AIDS care at government hospitals in Zimbabwe. *Health Policy Plan*. 2000;15:432–440.
11. Zimbabwe: Demographic and health survey, 2005–2006. Preliminary report. Harare, Zimbabwe: Central Statistical Office and ORC Macro; 2006.
12. Bvochora JF, Kasilo OJ, Nhachi CF. Disease pattern and prescribing at the University of Zimbabwe students health service, 1987–1991. *Cent Afr J Med*. 1993;39:88–95.
13. Hore R. AIDS and private health costs in Zimbabwe. *SA/AIDS News*. 1997;5:2–6.
14. Hore R. Zimbabwe: Are the costs of AIDS medical care affordable? *AIDS Anal Afr*. 1993;3:6–8.
15. Mitchell MD, Littlefield J, Gutter S. Costing of reproductive health services. *Int Fam Plan Perspect*. 1999;25:S17–S21, S29.
16. Drummond MF, Stoddart GL, Torrance GW. *Methods for the Economic Evaluation of Health Care Programmes*. Oxford, UK: Oxford University Press; 1987.
17. Sullivan SD, Lyles A, Luce BR, Grigar J. AMCP Guidance for submission of clinical and economic evaluation data to support formulary listing in U.S. health plans and pharmacy benefits management organizations. *J Manag Care Pharm*. 2001;7:272–282.
18. Zarnke K, Levine M, O'Brien B. Cost-benefit analysis in the health care literature: Don't judge a study by its label. *J Clin Epidemiol*. 1997;50:817–822.
19. Offman J, Sullivan S, Neumann P, et al. Examining the value and quality of health economic analyses: Implications of utilizing the QHES. *J Manag Care Pharm*. 2003;9:53–61.
20. Chisadza E, Maponga CC, Nazerali H. User fees and drug pricing policies: A study at Harare Central Hospital, Zimbabwe. *Health Policy Plan*. 1995;10:319–326.
21. Gomo E, Ndamba J, Murahwa S, et al. In vitro activity of several antimicrobial agents against *Neisseria gonorrhoeae* and comparison of cost of treatment. *Cent Afr J Med*. 1995;41:83–86.
22. Hansen K, Woelk G, Jackson H, et al. The cost of home-based care for HIV/AIDS patients in Zimbabwe. *AIDS Care*. 1998;10:751–759.
23. Harvey PD. The impact of condom prices on sales in social marketing programs. *Stud Fam Plan*. 1994;25:52–58.
24. Hongoro C, McPake B. Hospital costs of high-burden diseases: Malaria and pulmonary tuberculosis in a high HIV prevalence context in Zimbabwe. *Trop Med Int Health*. 2003;8:242–250.
25. Hore R. The impact of AIDS on direct health care costs in Zimbabwe. *AIDS Anal Afr*. 1997;7:8–9.
26. Kravitz J, Sanders D. Paediatric pneumonia in Zimbabwe: Management and pharmaceutical costs of inpatient care. *J Trop Pediatr*. 1994;40:17–23.
27. McFarland W, Kahn JG, Katzenstein DA, et al. Deferral of blood donors with risk factors for HIV infection saves lives and money in Zimbabwe. *J Acquir Immune Defic Syndr Hum Retrovirol*. 1995;9:183–192.
28. McPake B, Hongoro C. Contracting out of clinical services in Zimbabwe. *Soc Sci Med*. 1995;41:13–24.
29. Manyemba J. A randomised crossover comparison of reserpine and sustained-release nifedipine in hypertension. *Cent Afr J Med*. 1997;43:344–349.
30. Palmer DL, Mason PR, Pasi C, Tobiwa O. Value of mandatory testing for human immunodeficiency virus in a sub-Saharan hospital population. *Clin Infect Dis*. 2000;31:1258–1265.
31. Ndamba J, Makura O, Gwatirisa PR, et al. A cost effective two step rapid diagnosis of urinary schistosomiasis in Zimbabwe. *Cent Afr J Med*. 1998;44:167–171.
32. Nhachi FB, Kasilo OJ, Mutengezanwa A, Zvandaziva EA. Drug utilisation, supply and expenditure at Chitungwiza, Gweru, Mpilo, Parirenyatwa and United Bulawayo Hospitals in one year (1987–1988). *Cent Afr J Med*. 1991;37:159–167.

33. Sweat MD, O'Reilly KR, Schmid GP, et al. Cost-effectiveness of nevirapine to prevent mother-to-child HIV transmission in eight African countries. *AIDS*. 2004;18:1661–1671.
34. Vander Plaetse B, Hlatiwayo G, Van Eygen L, et al. Costs and revenue of health care in a rural Zimbabwean district. *Health Policy Plan*. 2005;20:243–251.
35. Vos J, Borgdorff MW, Kachidza EG. Cost and output of mobile clinics in a commercial farming area in Zimbabwe. *Soc Sci Med*. 1990;31:1207–1211.
36. Verkuyl DA. Economics of anti-rhesus prophylaxis in an African population. *Cent Afr J Med*. 1987;33:32–37.
37. Waterkeyn J, Cairncross S. Creating demand for sanitation and hygiene through Community Health Clubs: A cost-effective intervention in two districts in Zimbabwe. *Soc Sci Med*. 2005; 61:1958–1970.
38. Watts R. Low-cost water supplies and their contribution to health. *Afr Healthb*. 1992;15:10–11.
39. Janowitz B, Johnson L, Thompson A, et al. Excess capacity and the cost of adding services at family planning clinics in Zimbabwe. *Int Fam Plan Perspect*. 2002;28:58.
40. Chishawa O, Ziyambi Z, Ndhlovu P, et al. Comparative evaluation and assessment of the diagnostic usefulness of four commercial HIV-1/HIV-2 antibody assays using two well-characterized serum panels from Blood Transfusion Service and the National Health Laboratory Services in Zimbabwe. *Cent Afr J Med*. 2001;47:1–8.
41. Dzvaka SK, Gavaza P, Mukosera KT. Zimbabwe community pharmacists' opinions on continuing education: The case of Harare community pharmacists. *East Cent Afr J Pharma Sci*. In press.
42. Teerawattananon Y, Russell S, Mugford M. A systematic review of economic evaluation literature in Thailand: Are the data good enough to be used by policy-makers? *PharmacoEconomics*. 2007;25:467–479.
43. Maynard A. Developing the health care market. *Economics Journal*. 1991;101:1277–1286.
44. Canadian Coordinating Office of Health Technology Assessment (CCOHTA). *Guidelines for Economic Evaluation of Pharmaceuticals*. 2nd ed. Ottawa, Ontario, Canada: CCOHTA Publications; 1997.
45. Commonwealth Department of Health HaCS. *Guidelines for the Pharmaceutical Industry on Preparation of Submissions to the Pharmaceutical Benefits Advisory Committee*. Canberra, Australia: Australian Government Publishing Service; 1995.
46. Elixhauser A, Luce B, Taylor W, Reblando J. Health-care CBA/CEA—an update on the growth and composition of the literature. *Med Care*. 1993;31:JS1–JS11.
47. Hjelmgren J, Berggren F, Andersson F. Health economic guidelines—similarities, differences and some implications. *Value Health*. 2001;4:225–250.
48. Neumann PJ, Stone PW, Chapman RH, et al. The quality of reporting in published cost-utility analyses, 1976–1997. *Ann Intern Med*. 2000;132:964–972.
49. Gerard K, Smoker I, Seymour J. Raising the quality of cost-utility analyses: Lessons learnt and still to learn. *Health Policy*. 1999;46:217–38.
50. Garcia-Altes A. Twenty years of health care economic analysis in Spain: Are we doing well? *Health Econ*. 2001;10:715–729.
51. Bell CM, Urbach DR, Ray JG, et al. Bias in published cost effectiveness studies: Systematic review. *BMJ*. 2006;332:699–703.

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