OUTCOME OF DISTRICT HEALTH CARE SERVICES MEASURED USING VERBAL AUTOPSY TECHNIQUE: EXPERIENCE FROM NORTH-EASTERN TANZANIA

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Abstract
For the last 12 years most countries in Sub-Saharan Africa have decentralized their health care systems by giving more managerial autonomy to the district level. This is intended to improve local level coordination and management of health services. However, the new District Health Systems (DHS) in most African Countries, have been operating under an unstable and unfavourable socio-economic environment. This emanates from economic and political problems facing most countries in the region. Given the frequency and scale of these problems facing district health systems, some key questions remain unanswered. Do district health systems really work ? How robust are the district health systems ? This paper presents results of a retrospective study on health services utilization, using verbal autopsy, which was done on all deaths in five villages in Muheza district north-eastern Tanzania. The main objective was to assess the effectiveness of district health services in preventing deaths due to acute and chronic illness. The results reveal a limited effectiveness of the services on mortality aversion.

Key words: District Health Services, verbal autopsy, outcome

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Introduction

Patient outcome form one part of the classic triad used to define quality of care: structure, process and outcome (Lohr, 1988).Used within this context outcome is the end result of health services: what happened to the patient after the contacts with health care services in terms of palliation, control of illness, cure, rehabilitation or death ? The concept of outcome therefore directs attention to service users' well-being and emphasizes those individuals who need health services over the general population. This approach therefore has the advantage of taking specific consideration of those in need and provides some indications of equity within the health care system.

The current health sector reform movements in most developing countries target at the problems surrounding access to health services for those who need them most. There is growing realization that current health services in some areas do not respond to users needs (Cassels, 1995). Users of health services will not benefit from the services just because they are provided to them if they do not reflect their immediate and long term needs. Further more the use of services in some cases even when desired do not produce the intended outcome (Sodeman et al, 1997). Any health sector reform therefore, should aim at ensuring that appropriate share of public revenue is allocated to health and target the users needs; that the benefits of public-funded health care are equitably distributed; and the resources are used as efficiently as possible — both in terms of maximum health gain for resources invested and minimum cost for the range of services provided (Cassels, 1995).

Since the Harare Conference in 1983 and Bamako Initiative in 1987, the dominant paradigm for organization of health services in most African countries has been "HEALTH DISTRICT", recognised as an organizational and operational tool for implementing integrated primary and secondary health care services in the context of decentralization. For the past 12 years most countries in the region have reorganised their health care systems by giving more managerial autonomy to district levels (Porignon, et al 1998, WHO,1988, World Bank, 1993, World Bank 1994).

A District Health System (DHS) is defined as a:*"self-contained segment of national health system. It comprises a well-defined population, living within clearly delineated administrative and geographical area, whether urban or rural. It includes all institutions and individuals providing health care in the district, whether government, social security, non-governmental, private, or traditional (WHO 1988 p 9).*

A District Health System, therefore consists of a large variety of interrelated elements that contribute to health in homes, schools, work places, and communities, through the health and other related sectors. It includes self-care and all health care workers and facilities, up to and including the hospitals at the first referral level and the appropriate laboratories and other diagnostic, logistic support services. Its components need to be well coordinated by an officer assigned to this function in order to draw together these elements and institutions into a comprehensive range of promotive, preventive, curative and rehabilitative health activities (Tarimo, 1991).

Districts are considered the "most appropriate level for coordinating top-down and bottom-up planning; for organising community involvement in planning and implementation; and for improving co-ordination of government and private health care" (Mills A, et al (1984). The general principle for developing DHS is based on the declaration of Alma Ata (WHO-UNICEF, 1978) and the Global strategy for Health For All, which incorporates key elements namely: equity, accessibility, emphasis on promotion and prevention, inter-sectoral action, community involvement, decentralization, integration of health programmes, and coordination of separate health activities. Linked to the concept of district health systems is the concept of decentralization, defined as *"the transfer of responsibility for planning, management, and the raising and allocation of resources from the central government and its agencies to the field unit of government agencies, subordinate units or levels of government, semi-autonomous public authorities or corporations, area-wide, regional or functional authorities, or non-government or private or voluntary organizations"* (Rondinneli et al, 1989). Decentralization is considered a key element for District Health System to function effectively. Some degree of autonomy and authority for planning services, for allocating financial resources, and for managing human resources is necessary for DHSM to fully function as part of the national health system (WHO, 1988). At the policy level there is a link and interdependence between DHS and national health systems in defining policies and broad strategies in order to limit fragmentation of health development at the country level.

In most countries in SSA the concept of "District Health Systems" (DHS) are made operational through District Health Services. This is a chain of formal public health delivery units and institutions ranging from Village Health Post to District Hospital (Vaughan, J.P and Morrow R.H, 1991). In most countries in the region such services are financed through public taxes via central and local governments (Mills, 1992). In some countries user charges have also been introduced as an additional financing method (World Bank, 1993).

As District Health Services in most Sub-Sahara African (SSA) countries are now in active stages of operation , several old and new issues have emerged which were

not anticipated and are poorly understood. These include; inadequate quality of care especially in the rural units, problems related to resource allocation and the general lack of adequate systems for monitoring performance. Despite the considerable emphasis placed on DHS, quantifying their impact on health status of the target populations has proven difficult. There are also large differences in services provided with, in some cases, the same level of resources between districts within the same country. Some of these differences are manifestations of differences of resources between districts, but close examination among similar districts at any given country reveal large systematic differences that cannot be explained by resource differences, demands and needs alone (Alilio, 1999).

There are also major gaps in the research of this area. Specifically, very limited research information exist to offer practical understanding on how the District Health Services system performance could be improved using the available resources. The reasons for the apparent lack of research in this area include:

i) Lack of quantifiable objectives for most DHS activities;
ii) Lack of sensitive tools for outcome measurement especially regarding changes in health status;
iii) General anticipation of poor performance results for most programmes.

Technically there is no consensus on adequate and objective health services outcome measurement. The question on what methods are adequate in the evaluation of health systems and from whose point of view; users, providers or policy makers has remained debatable since 1978 when the Primary Health Care (PHC) initiative was first launched in Alma Ata (Primary Health Care services form the corner stone of most DHS in Africa, WHO, 1988). There is, for example, a relatively large and growing body of literature on evaluation of vertical programmes within the PHC services such as Expanded Programme for Immunization (EPI) and Essential Drug Programme (EDP) where external donors have demanded an account for the money spent, but relatively few research studies on PHC programmes as an integral part of DHS. Even for the regularly evaluated vertical programmes, the main approach has been to account for "life saved per $ spent" focussing more on mortality indicators as a measure of outcome. Little attention hawever, has been paid to assessment of the balance between service need and utilization for District Health Services.

Recent studies in Guinea-Bisssau, The Gambia and Kenya have failed to show a decisive effect of district health on mortality for diseases/conditions that are not part of vaccination and antenatal services (Sodemann et al, 1997, Menon, 1993). In all these three studies infant mortality rates and child mortality fell after introduction of district health services, but the trend on the improvement did not continue to decline at the same pace after 5-7 years of district health existence. The reasons for such stagnation have not been fully explored. One possible explanation for the decline, could be related to the fact that a considerable part of decline in mortality is attributable to vaccination and anti-natal care. There is therefore a need to improve other aspects of district health services to allow mortality reduction trends to reach the level now enjoyed by most developed countries. This study, using verbal autopsy technique, reviewed the effectiveness of district health services in five villages of Muheza district in an attempt to establish potential areas for improvement.

Materials and Methods

Study area and population
The study was carried out in 5 villages in Muheza district-North Eastern Tanzania. These villages were selected to represent three main geographical characteristic of the district namely highlands, lowlands and coastal plain. The 5 villages have an estimated population of 13,000 people. Three of the five villages have a primary health care dispensary and the other two were served by nearby DHS health centres. In each of the three village dispensaries there were 5 staff members (standard requirement for DHS facilities in Tanzania). The two health centres had 13, and 21 staff members respectively. The cadres of staff in these units are assistant medical officers, nurse assistants and maternal and child health assistants.

Mortality data
In the period from November 1996 through June 1997 all deaths in the five villages were reviewed. Interviews were performed with parents, guardian or spouse of the deceased, to establish causes of death, access to DHS prior to death and the impact of services provided. Details of the illnesses were obtained first by reviewing available hospital information; and secondly by using a standard verbal autopsy questionnaire developed by the World Health Organization (WHO) in 1991 (Smith and Morrow, 1996). Details of the verbal autopsy technique has been described in detail by Chandramohan et al (1994).

Case Identification and classification
Cases were defined as all deaths that occurred in the five villages during the six months period. The names of these cases were obtained through a village government, dispensary and hospital records. For each of the cases, inquiries were made about both immediate and secondary symptoms and illness by the patients before death. The questionnaire also had screening questions on most common illness in Muheza district, which include fever, diarrhoea, vomiting, cough and respiratory

problems, stiff neck, fits (convulsions), loss of weight and skin conditions including rash. The screening also included inquiry on the duration of the illness, on whether the symptoms were present all the time or intermittent or whether there were other symptoms occurring concurrently.

On DHS facilities use, the respondents were asked where the care was sought, who saw the patient, what treatment did the patient get, when was care sought, after how many days of illness, and whether several facilities were used. Included were also questions on the referral path and whether the patient was able to obtain care from the DHS facility used. Other questions concerned the duration of the illness and whether the patient was hospitalized during the entire period of illness. In those cases where care was not sought from DHS facility available in the district, inquiries were made on alternative care sought, as well as the reasons for choice of the alternative service. The last part of the interview covered health records and information available at the household regarding the deceased. This included growth monitoring, and vaccination cards for under-fives as well as out patient records for adults. A specific inquiry was also made, on whether the deaths occurred at home or in the DHS facility.

Controls
In this study, an attempt was made to establish whether the group of those patients who died had a different pattern in using DHS facilities, and whether the time from onset to the first consultation for the illness causing death, was different from other DHS users. Each case was compared to one control drawn from the patients attendance register of the patient using DHS facility during the same month. These registers contain information on names of the patients, age and sex, illnesses presented, diagnoses made, treatment provided, and whether the cases were referred, admitted or sent home and whether the case was re-attendance or first time attendance for a particular illness.

Seven matching criteria were used in selecting a pair for each case of verbal autopsy, these were: age, sex, disease category, occupation, type of house, residence and facility used. For each of the closely matching control patients, a questionnaire was either administered to parents if the case was a child, or to the patients themselves if they were adults. The issues inquired included; narration of the illness and symptoms that patient had experienced. This narrative was followed by screening questions on fever, diarrhoea, vomiting, cough and respiratory problems, stiff neck, fits (convulsions), loss of weight and skin conditions including rash. The screening questions included inquiry on the duration of illness, on whether the symptoms were present all the time or intermittent or whether there were other symptoms occurring concurrently.

The Interviews
The interviews were conducted by three medical technicians from The National Institute of Medical Research. The questionnaires were pilot tested and reviewed before the interview in separate village. Each questionnaire form in the verbal autopsy was discussed and reviewed by a assistant medical officer, to identify the possible cause of the death from the description provided by the respondents. For 71 of 112 cases, the information on causes of death was complemented by hospital and health centres' records.

Statistical methods
To compare cases and controls, odds ratios (OR) were calculated for three main exposure variables namely; use of district health facilities in the two groups, time to first consultation and care providers for the patients in the two groups. For comparison of the proportional outcomes, statistical significance was evaluated with chi-square test or Fishers exact text, and the 95 per cent confidence intervals (CI) for OR was calculated by using EPI INFO Version 6 (1994) (Centres for Disease Control, Atlanta, Georgia, USA).

Results
The results are discussed under five main headings. These are; characteristics of the respondents and cases in the study, causes of death, access and utilization of district health facilities prior to death, duration of illness leading to death and time to first consultation of district health facility, and other aggravating factors to occurrence of death.

Characteristics of Respondents and Study Population
The respondents in this study (N=224) were parents i.e mothers (47%), fathers (28%) and spouses or guardians 25% of the cases or controls. Eighty percent of all the respondents had certain level of primary education (median 7 range from 1 and 8 years). Most respondents (94%) were peasants, the remaining 6% were small scale traders. The houses for 78% of the respondents were made of wood and mud bricks, the rest 22 % were made of cement bricks. The education, occupational and housing characteristics in the study group are typical of the general population in the Muheza district (MOH, 1996).

Age and Sex Distribution of Cases (N=112)
Fifty three percent of all the deaths reviewed were among children below five years of age. The age median for the remaining 47 % was 20 (range 6-40 years). The sex ratio of the deceased was approximately 1:1, 53 % were female and 47 % male. No persons older that 40 years was included in the study (Table 1)

Table 1: *Age and Sex of the Verbal autopsy Cases Causes of Death*

Sex/Age	≤ 5 Years	6-15 Years	16-30 Years	31-40 Years	Total
Male	34	6	8	5	53 (47%)
Female	25	7	15	12	59(53%)
Total	59 (52.7%)	13 (11.6%)	23 (20.5%)	17 (15.2%)	112 (100)

There were three main attributable causes of death; malaria 31 (28%) HIV/AIDS 21 (19%) and pneumonia 17 (15%). Other causes included, delivery complications 9 (8%), diarrhoea 7 (6%), and tuberculosis 7 (6%). Other less important other causes of death were cancer, accidents, kidney complications and epilepsy (12 (10%) each with 3 cases). The cause of death was not known for the six percent of the cases, there were no consistency between the records available and the interview results. A cause of death for these cases were categorised as not known. The results show that malaria, pneumonia, delivery complications, tuberculosis, and diarrhoea or 63% of all deaths resulted from conditions for which therapy exists. In addition, malaria, HIV/AIDS, pneumonia, delivery complications, tuberculosis, and diarrhoea (78%) which were the primary causes of death for the cases reviewed are the primary targets of the PHC approach at the district level (MOH, 1998).

Use of DHS Facilities

Figure 1 shows the care seeking path (tree) for both cases and control. For all the cases this path is for the illness that led to death. The tree indicates that 105 (94%) of the cases sought care from the DHS facilities of whom 29 (26 %) went to hospital directly and 55 (49%) used recommended referral system i.e sought care from the village dispensary first and were subsequently referred to hospital. Six percent (6) of the deceased did not seek care from DHS facility, all the 6 cases had illness episodes lasting for one day or had sudden death. There was no significant difference between cases and controls in relation to use of hospital, health centres, and dispensary between the cases and controls. This implies that (i) there was a similar care seeking pattern between the two groups (ii) access to services between the two group was similar.
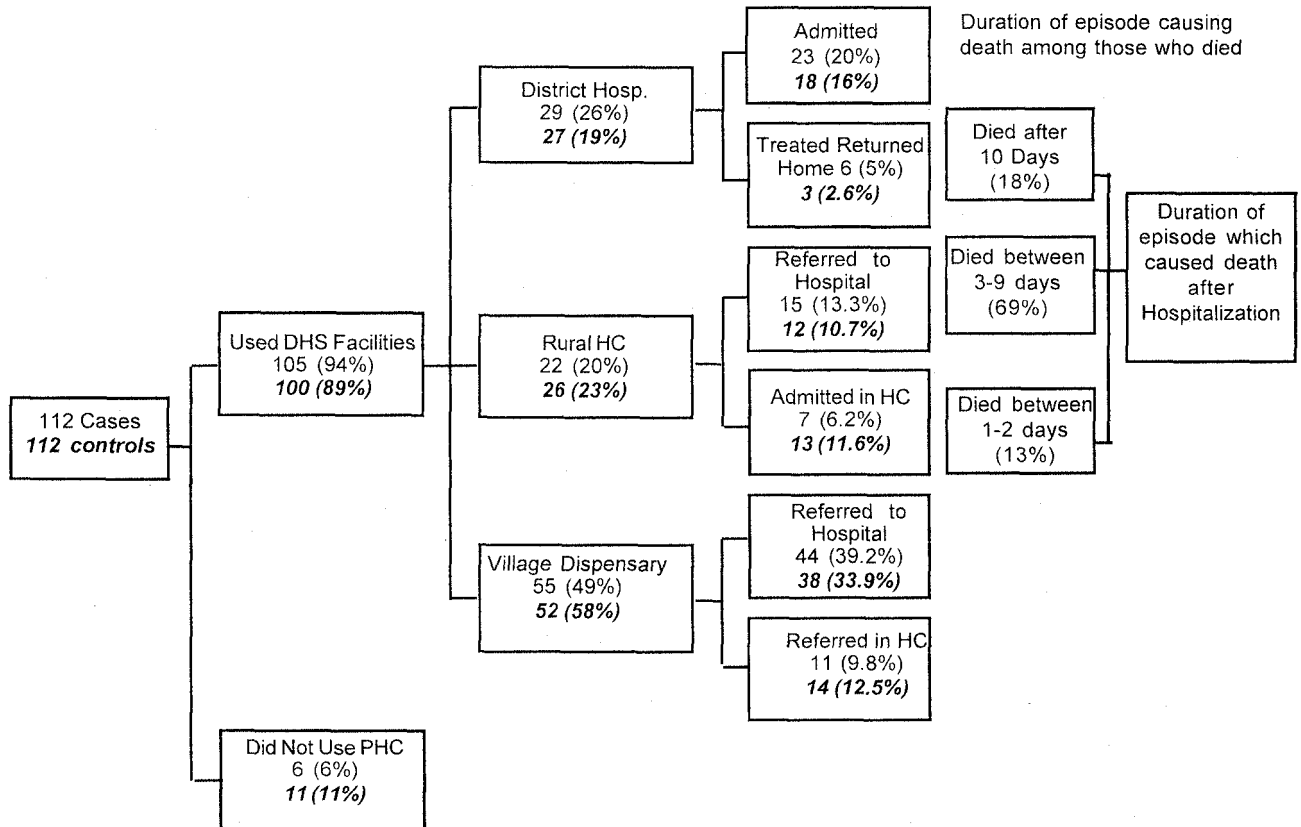

Fig.1: *Care-seeking Pattern: Cases and Controls Compared*

Table 2 shows the type of care providers consulted and the proportion of consultations for each provider in the sample for case and the reference group. A slightly higher proportion (53%) of those who died were seen by assistant medical officers compared to those in the reference group most of whom were seen either by medical assistants or rural medical aids a lower cadre in medical hierarchy within the DHS. More cases in the verbal autopsies were seen by a more qualified provider (AMO). This implies that deaths did not occur as a result of lack of access to credible medical professional advice of those who died 91(81%) were

Table 2: *Care Providers for Cases and Control Compared*

Providers	Deceased	Controls	P Value and Confidence intervals (Fisher Test)
Rural Medical Aides	11(10%)	45 (38%)	P=0.000 (CI 0.71-0.34)
Medical Assistants	28 (25%)	39 (35%)	p=0.11 (CI 0.34 - 1.5)
Assistant/ Medical Officers	59 (53%)	14 (12%)	p=0.000 (CI 3.8-16.4)
Others	14 (12%)	17 (15%)	P=0.56
Total	112 (100%)	112 (100%)	

admitted to DHS facility for 3 to 21 days with median of 9 days, and 6 (5%) were discharged a week before death ensued and died at home. Reasons for discharge included; requests from patient's relatives (3) cases of HIV/AIDS), routine discharge based on good prognosis (1) and routine discharge based on poor prognosis (2).

The Time from Onset of Illness to First Consultation
Table 3 shows the causes of death, and median duration of illness for all the cases in the verbal autopsy study.

Table 3: *Causes of Death, Duration of Illness Before Death and Median Days to First Consultation*

Cause of Death	Median Duration of Illness Days and Range	Median Days to First Consultation and Range	Total Number of Deaths
Malaria	5 (2-23)	2 (2-4)	31(28%)
AIDS	NA	NA	21(19%)
Pneumonia	3 (3-26)	2 (2-3)	17(15%)
Delivery complications	1 (1-5)	1(1-5)	9(8%)
Diarrhoea	7 (7-60)	4(2-31)	7(6%)
Tuberculosis	NA	NA	7(6 %)
Others	NA	NA	20(18%)

( ) range

The median time from when the illness leading to death ensured to first consultation for malaria, pneumonia diarrhoea and delivery complications (57% of all deaths) was 2 days (range 1 - 13 days). Durations for tuberculosis and HIV/AIDS could not be established. Comparison of estimates of the time elapsed from onset of disease to first consultation for the case group and the controls (reference group) are shown in Figure 2. There was a slightly longer delay (5+ days) in care seeking for the reference group 66 (59%) compared to 55 (49 %) among those who died but the difference between the two groups was not statistically significant (OR = 0.62, 95%CI 0.34 - 1.2) suggesting a similar care seeking pattern in the two groups.
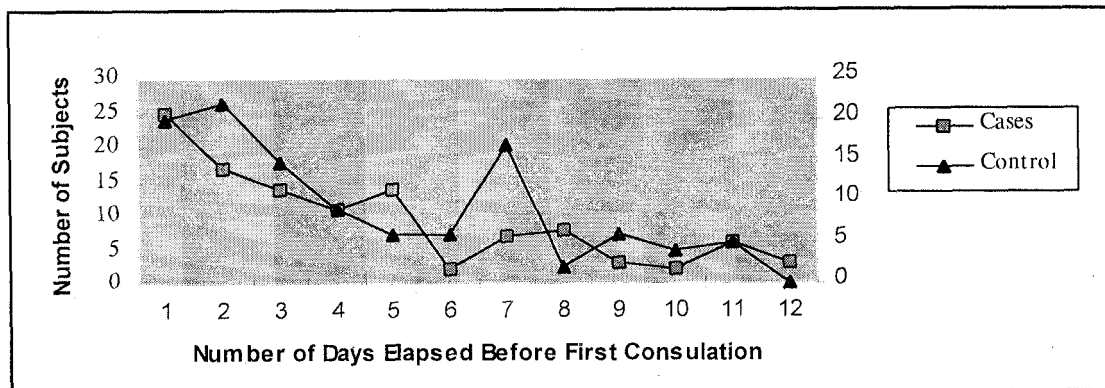

Fig 2: *Care Seeking Pattern: Number of Days before First Consultation (Cases and Control Compared)*

Other Aggravating factors Contributing to Death

i) Other Concurrent Illnesses
Forty percent of cases had two or more complaints, mostly fever, diarrhoea, vomiting or cough (verbal autopsy information). A similar pattern was observed in the control group for cough, vomiting and fever.

ii) Family History
Overall, in all malaria cases in the verbal autopsy and control group respondents reported more than one family member having malaria symptoms (fever and joint pain).

Verbal Autopsy Subjective Assessment: Respondents and Professional Judgements
A subjective assessment of each case in the verbal autopsy was made to identify patient and service related factors that could have contributed to each of the death. The assessment was made by respondents in each questionnaire as well as three separate assistant medical officer working in the district hospital. The respondents used personal experience during the time of caring for the deceased and the professional judgement were based on the questionnaire response and other patient records available. The results of the subjective assessment is outlined in Table 4.

Table 4: *Subjective Assessment of Each Case in the Verbal Autopsy: Respondents and Professional Judgements*

Selected factors contributing to death	Respondents assessment	Assistant medical officers assessment
PHC facility factors (care was inadequate)	68(61%)	75(67%)
Multiple illness and nutritional disorder	10(9%)	15(13%)
Severity and complication of illness	27(24%)	9(8%)
Delayed cases	7(6 %)	13 (12%)
Total	112(100%)	112(100%)

Sixty three percent of the respondents judged the death as being preventable if adequate care was provided. The inadequacy of care cited by respondents included delayed treatment (36%), irregular treatment i.e patients did not receive the drugs prescribed (49%) and inadequate diagnosis (15%).

Discussion
Any unexpected, premature, untimely, or avoidable death can be considered as an indicator of unwanted outcome of health services. The difficulty lies in defining explicitly what constitutes avoidable death. In the present study comments on the performance of DHS in relation to death aversion only makes sense if linked to DHS objectives (what were stated as DHS outcome measures). Interpreted within the context of DHS objectives, the results in the verbal autopsy questionnaire raise a number of effectiveness questions for DHS. The results shows that 63% of causes of death were due to acute and chronic infections (malaria, pneumonia, tuberculosis, diarrhoea) and delivery complications for which effective treatment can be provided for by DHS facilities. Contrary to findings from two previous studies (Sutrisna et al, 1993) showing a delay in care seeking as the main reason for limited impact of the DHS on mortality, the results of this study show that care was sought after two-four days of illness for 75% of all the cases. There was no statistically significant difference in care seeking pattern between cases and control (OR 0.62 (95% CI 0.34 - 1.2). Other studies have also shown that the other main contributing factor for the limited impact of the PHC services on mortality is patients not seeking allopathic care, or resorting to traditional medicine (Oranga, H and Nordbjerg (1995) and Sutrisna et al 1993). This study shows that 94 % of all the cases in the verbal autopsy sought care from DHS facilities and 80% were admitted and died within the allopathic care premises. In terms of access to trained care provider a relatively large proportion (53 %) of those who died were seen by assistant medical officers compared to those in the control group. However the emphasis placed on district health services at the district level in Tanzania, these results indicate a limited effectiveness. They indicate a need for improvement in patient management within the DHS facilities to improve their potentials for avoiding preventable death especially those which are due to acute conditions for which effective therapy exist. The results raises a question in relation to overall accountability on the part of care providers within the DHS. They also raise questions in relation to definition and setting national targets for DHS both in-terms of health services to be rendered at the district level and target setting.

The results point to the need to improve or reform the process aspects of district health services including patient management. Lack of appropriate drugs (as indicated in the subjective assessment of services related weakness, which contributed to death), is one of the main structural limitation which will require attention in the future. However, for some cases such as malaria which constitute 28% percent of all the deaths, and for which drugs are relatively cheap and are regularly available within the district health facilities, death outcome could not be attributed to structural factors. Again, although the current health sector reform in Tanzania is focussing more on macro structural issues; from the cases reviewed one can argue that if the district health services impact on mortality is to be enhanced, process issues like case management and accountability are vital in reducing unnecessary deaths

at the village level. The micro aspects of district health dealing with disease prevention which concurrently needs to be improved are discussed elsewhere (Alilio, 1999).

Retrospective follow-up of death cases using verbal autopsy questionnaire in assessing primary health care effectiveness, has not widely been used. This is mainly because there are very few studies that have assessed effectiveness aspect of district health services in Africa. Verbal autopsy is a useful technique, especially in areas where hospital records are not adequate and where the qualitative aspects of care seeking needs to be included in the review. One of the main weakness of the verbal autopsy technique is respondents inability to recall all the necessary details of the event leading to death. This however can be minimized by limiting the interval of duration between the interview and the death event, to a maximum of six months. The results of this study compares well with similar study in Guinea-Bissau (Sodemann, et al, 1997) which reported high infant mortality despite what they called "good care-seeking". Limited effectiveness of DHS services mitigate against its primary objective and imply that at the health unit level, there were a number of implementation failures which explain the limited use of DHS services. To some extent, some of the weaknesses emanate from wider system failure inherent in the Tanzanian health system. The manifestation of wider structural weakness include weak resource allocation system, limited services outcome and weak systems of setting objectives and service targets for DHS. The three problems imply a lack of required competence in terms of qualifications and necessary skills on the part of DHMT, and the lack of right attitude among the providers toward the service users. Beyond these wider structural problems studies elsewhere have identified political support to be the crucial determinants of health services performance (Long and Harrison, 1985). If the current factors that make the DHS ineffective are related to basic institutional structure of service delivery and lack of political backing and support, changes such as a better supervision, new refresher courses, or improved supply procedures are not likely to remove the weaknesses observed.

Solution for some weaknesses therefore will need to be sought from the restructuring of the DHS basic concepts and model. At present the Tanzania's health authorities are restructuring the basic model of service delivery at the district level as an option for improving access and quality of care (MOH, 1998). By documenting some weakness within the current DHS system, this study intends to contribute information that might inform the process.

Much has been written in the recent years about the need for health services to be reoriented towards primary health care if the goal of health for all by the year 2000 is to be achieved (Tarimo, 1991, WHO, 1988, Greese and Parker, 1994, McMahon et al 1992, Bindari-Hammad and Smith, 1992, Vaughan an Morrow, 1991, MOH, 1998). In particular, there is widespread recognition that the district is the key point where national policies can be translated into action and where various programmes and institutions within the health system can most effectively be coordinated. Several guidelines have been developed on how district health services should be organized and managed for maximum efficiency and effectiveness (Tarimo, 1991, WHO, 1988, Greese and Parker, El- Bindari-Hammad and Smith, 1992, Vaughan an Morrow, 1991, MOH, 1998). This study attempted to review the robustness of DHS against the growing challenges in Tanzania in terms of ever increasing burden of infectious diseases, chronic illnesses, accidents and pollution as well as problems emanating from civil strife and refugees. There are also concerns that despite the steady growth in terms of number of facilities and manpower, there is relatively large proportion of people without access to health services. Although such problems are not unique to the Muheza district (Sodemann et al (1997), Gilson, (1992), Greenwood et al (1990)) they nevertheless imply a weak mechanism and capacity for DHS to deal with multitude of problems of both infectious as well as chronic illness. The paradox of steady structural growth on one hand, and decline in use and access on the other, imply that the DHS is facing more complex problems. The tragedy is that large part of health problems within the district could be prevented through primary health care facilities, through the use of simple medication, environmental alterations and provisions of appropriate information (education) to the general public.

Acknowledgements

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