

Care seeking and management of common childhood illnesses in Tanzania: Questioning the quality of primary care services

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Dedicated to:

My beloved daughter, Naomi Mshamu, whom I left for my studies in Norway while she was only eighteen months old, and my husband for taking good care of her while I was away.

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Abbreviations

PHC	Primary Health Care
AWD	Acute watery diarrhoea
WHO	World Health Organization
ARI	Acute respiratory infections
DHS	Demographic and Health Survey
TDHS	Tanzania Demographic and Health Survey
GDP	Gross Domestic Product
MDG	Millenium Development Goal
FGD	Focus group discussion
OPD	Out-patient department
SES	Socio-economic status
PI	Principal Investigator
PCA	Principal Component Analysis
MUAC	Mid-upper arm circumference
SP	Sulphadoxine-pyrimethamine
HRS	Home rehydration solution
ORS	Oral rehydration salts
MoH	Ministry of Health
ACTs	Artemisinin-Combination Therapies

Abstract

Introduction

Mild cases of malaria, pneumonia and diarrhea can be effectively treated with cheap and widely available first-line drugs at the primary care level if care is sought at an early disease stage and the infection is correctly diagnosed and managed by the attending care provider. Tanzania has an extensive network of primary health care (PHC) facilities and substantial child survival gains might result if these facilities could provide quality care and are properly utilized by the populations they are intended to serve. However, several studies have reported poor quality of services at the primary care level in Tanzania and mismanagements of sick children, resulting into some care seekers to bypass such facilities while seeking child care and other health care services. Few studies have explored in-depth, the actual users' experiences in relation to the reported deficiencies at the primary care level in Tanzania. The current thesis sought to explore PHC utilization for child care and caretakers' expectations versus experiences from services offered to their underfive children at this level of care.

Methods

The current thesis employed mixed methods approach and is composed of three main studies:

- A hospital-based study: composed of 560 interviewer administered questionnaires and 30 qualitative interviews among caretakers seeking care for their underfive children at Korogwe and Muheza district hospitals between Jul 2009 and Jan 2010.
- A community based study: composed of four focus group discussions (FGDs) with 47 caretakers of underfive children in four villages of Muheza district in Sep 2009, and
- A study based on the 2010 Tanzania Demographic and Health Survey (2010 TDHS) data for 8176 children born in a period 2005-2010.

Results

The most commonly reported first action taken for a sick child among the hospital-based study participants was giving some treatment at home (66.6%): with drugs either purchased from drug shops (52.1%) or that had remained from previous consultations (14.5%). Nearly 60 percent of all the caretakers seen at the two district hospitals reported not having utilized their nearer PHC facilities for the index child's sickness episode. The main reason given for bypassing such facilities was the lack of diagnostic facilities (42.2%) at this level of care. This was supported by findings from the DHS which showed that, only one in four children with fever and who were solely attended at PHC facilities had received a blood test during the illness. Other reasons for bypassing PHC facilities were lack of drugs (15.5%), closed facility (10.2%), poor services (9.7%) and lack of skilled health workers (3.4%). The most commonly reported first option of care

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among caretakers from the DHS was PHC facilities (54.8%), followed by private pharmacies (23.4%).

Further analysis revealed that higher level hospitals were more commonly utilized in urban versus rural areas, and among caretakers with higher level of education. Furthermore, private pharmacies were more commonly utilized by women with lower level of education and those with higher number of children. Findings from the qualitative interviews and FGDs further revealed how the lack of quality services at the primary care level caused delays in accessing appropriate care and how the experiences of inadequate care caused users to lose trust in them. Lack of clinical examinations even when tools were available, skipping of injections due to closed facilities, partial doses administrations secondary to shortage of drugs and reduced access to free services due to inability to pay for the unofficial charges were among the commonly reported experiences, both among the hospital-based qualitative interviews and the FGDs' participants.

Conclusion

Our study findings revealed significant disappointments among caretakers with regard to the quality of services offered at PHC facilities in Tanzania, with implication for their utilization and proper functioning of the referral system. The above mentioned experiences by caretakers at the primary care level in Tanzania need urgent action, as these could be accounting for many preventable child deaths. There is an urgent need for proper accountability mechanisms to govern appropriate allocation and monitoring of health care services and resources in Tanzania, including human resources for health.

List of papers

I. Kahabuka C, Kvåle G, Moland KM, Hinderaker SG: **Why caretakers bypass Primary Health Care facilities for child care? - A case from rural Tanzania.** *BMC health services research* 2011, **11**(1):315.

II. Kahabuka C, Moland KM, Kvåle G, Hinderaker SG: **Unfulfilled expectations to services offered at primary health care facilities: Experiences of caretakers of underfive children in rural Tanzania.** *BMC health services research* 2012, **12**(1):158.

III. Kahabuka C, Kvåle G, Hinderaker SG: **Factors associated with severe disease from malaria, pneumonia and diarrhea among children in rural Tanzania--A hospital-based cross-sectional study.** *BMC Infectious Diseases* 2012, **12**(1):219

IV. Kahabuka C, Kvåle G, Hinderaker SG: **Care-seeking and management of common childhood illnesses in Tanzania – Results from the 2010 Demographic and Health Survey.** Submitted to PLOS ONE, Nov 2012

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1. Introduction

Of the estimated 8.8 million deaths of children younger than 5 years worldwide in 2008, infectious diseases caused 68% (6 million), with the largest proportions due to pneumonia (18%, 1.6 million), diarrhoea (15%, 1.3 million) and malaria (8%, 0.7 million) [1]. The highest rates of child mortality continue to be in Sub-Saharan Africa where, in 2009, one in every eight children (129 per 1000 livebirths) died before their fifth birthday—a level nearly double the average in the developing region as a whole (66 per 1000) and around 20 times the average for developed regions (6 per 1000) [2]. Figure 1 from Black *et al* shows that malaria, pneumonia and diarrhoea accounted for more than half of all child deaths in the African region in 2008 [1].

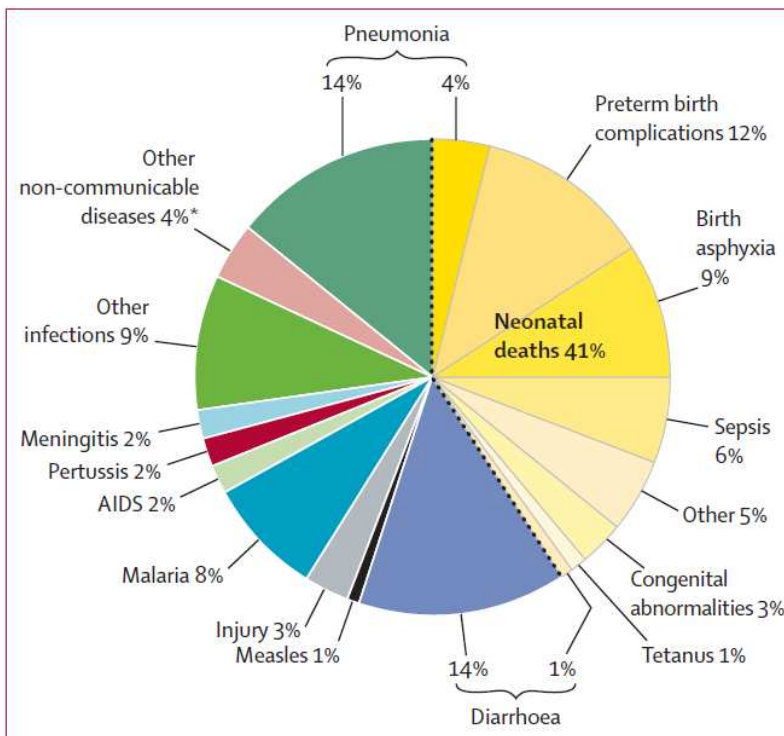


Figure 1: Causes of child deaths in African region [1]. Deaths are categorized in neonates (0-27 days) and children aged 1-59 months.

1.1 Who is dying?

There has been an unacceptable widening gap in child mortality between rich and poor countries as well as between children from wealthy and poor families within most countries [3]. Around seventy percent of the world's under-5 deaths in 2009 occurred in only 15 countries and about half in just five countries: India, Nigeria, Democratic Republic of the Congo, Pakistan, and China [2]. India and Nigeria together accounted for nearly one-third of the total deaths (21% and 10%, respectively) [2]. Within countries, child mortality is higher in rural areas, and among children from poor and less educated families [3]. These inequities are compounded by reduced access to available preventive and curative interventions by poor people [3]. The majority of child deaths could be prevented through improved access to the already available low-cost interventions and effective primary health care [4-6].

1.2 Infection prevention

There have been many efforts to prevent infections in children through vaccination programmes and other community interventions, some with success [7, 8]. However, primary infection prevention is still difficult to achieve particularly for children from poor families who are constantly exposed to health risks and other hazards typical in poor communities [3]. In addition, many of these children are also undernourished, making them less resistant to infections [9]. This makes early disease detection and timely management crucial in preventing child deaths from treatable illnesses.

1.3 Efforts to facilitate early disease detection and management

To facilitate early access to health care, many low-income countries have assigned village level primary health care (PHC) facilities, namely dispensaries and health centers, as the main point of care for uncomplicated health problems. These are usually run by non-physician clinicians, such as clinical officers and/or nurses who are trained to attend simple cases and refer complicated ones to hospitals. Mild cases of malaria, pneumonia and diarrhea can be effectively treated with cheap first-line drugs at this level

of care if children are taken at an early disease stage and the infection is correctly diagnosed and managed by the attending clinician. On the other hand, management of severe forms of these illnesses is complicated and costly, often requiring higher level expertise at higher level hospitals. Mortality from severe forms of malaria, pneumonia and diarrhoea is significantly higher compared to that from mild cases [10-12]. In one study conducted among children admitted to a pediatric emergency room in India, it was found that the case fatality rates for non-severe, severe and very severe pneumonia were 0%, 8.7% and 47.0% respectively [12].

1.4 Obstacles to timely infection management

Delays in seeking appropriate medical care is one of the major factors contributing to severe disease among children presenting to hospitals with severe forms of malaria, pneumonia and diarrhoea [13-15]. Studies have reported that many caregivers are able to recognize the first symptoms of a sick child, however, they often first engage in home treatment, with drugs commonly purchased from local and drug shops, and only bring children to a health care facility if home treatment fails or if they perceive the illness as severe [16-18].

When a decision to seek hospital care is reached, studies have further reported that patients frequently bypass PHC facilities, in favour of higher level hospitals, despite substantial additional time and financial costs [19-23]. A study in Kenya found that half or more of survey respondents had bypassed their nearest (usually lower level) facility for antenatal care, immunization and child illnesses [19]. High bypass of outpatient care for common illnesses has also been observed in Sri-Lanka, Namibia and Tanzania [20-23]. In a study conducted in Tanzania, 44% of the women seeking birth care had bypassed their nearest facility while 60 % of women who lived in a village with a functioning health facility had delivered at home [23].

1.5 Reasons for bypassing PHC facilities

The main reasons given for bypassing PHC facilities in the studies mentioned above were poor services (including lack of drugs and diagnostic services) and lack of trust in health workers at the bypassed facilities. In the above mentioned study in Tanzanian [23], the women reported that quality of care (e.g. best provider, availability of drugs) and a greater trust in health workers were important factors for selecting a facility for delivery. Another household survey carried out in Lushoto district of Tanzania reported that patients had bypassed their lower level of care to seek hospital treatment because of perceived poor quality of services and poor availability of drugs [24]. The bypassing practice not only leave PHC facilities under-utilized but also puts a high burden and affects the quality of care at most higher level hospitals, secondary to the overwhelming number of patients.

1.6 Research gaps and rationale for the study

Even though many studies have repeatedly reported poor quality of services at the primary care level in Tanzania, very few studies have explored in-depth the actual users' experiences in relation to the reported deficiencies. PHC facilities are the closest and most common first contact for sick children when the disease is still mild. Tanzania has an extensive network of PHC facilities. If these facilities could provide quality care and are properly utilized by the populations they are intended to serve it might result in major child survival gains. Understanding population perceptions of quality of care is critical to developing measures to increase the utilization of PHC services. It was emphasized in the WHO report 2008 "Primary Health Care Now More Than Ever" that, neglecting peoples' needs and expectations is a recipe for disconnecting health services from the communities they serve [25].

The current thesis sought to explore caretakers' experiences and expectations to services offered to their underfive children at the primary care level in Tanzania. The findings of this study may assist the policy makers in identifying important deficiencies and obstacles to adequate quality care provision at the primary care level in Tanzania. We are not aware of other studies from Tanzania that utilized the care-seeking history of sick

underfive children attending higher level hospitals to investigate 1) the prior care received at the initially attended PHC facilities and 2) the potential contribution of various demographic and care seeking factors towards child progression to severe disease.

2. Study aim and objectives

The current thesis aimed to study care seeking behaviors and management of suspected malaria, pneumonia and diarrhoea among underfive children in Tanzania, focusing on the role of primary care services.

2.1 Specific objectives

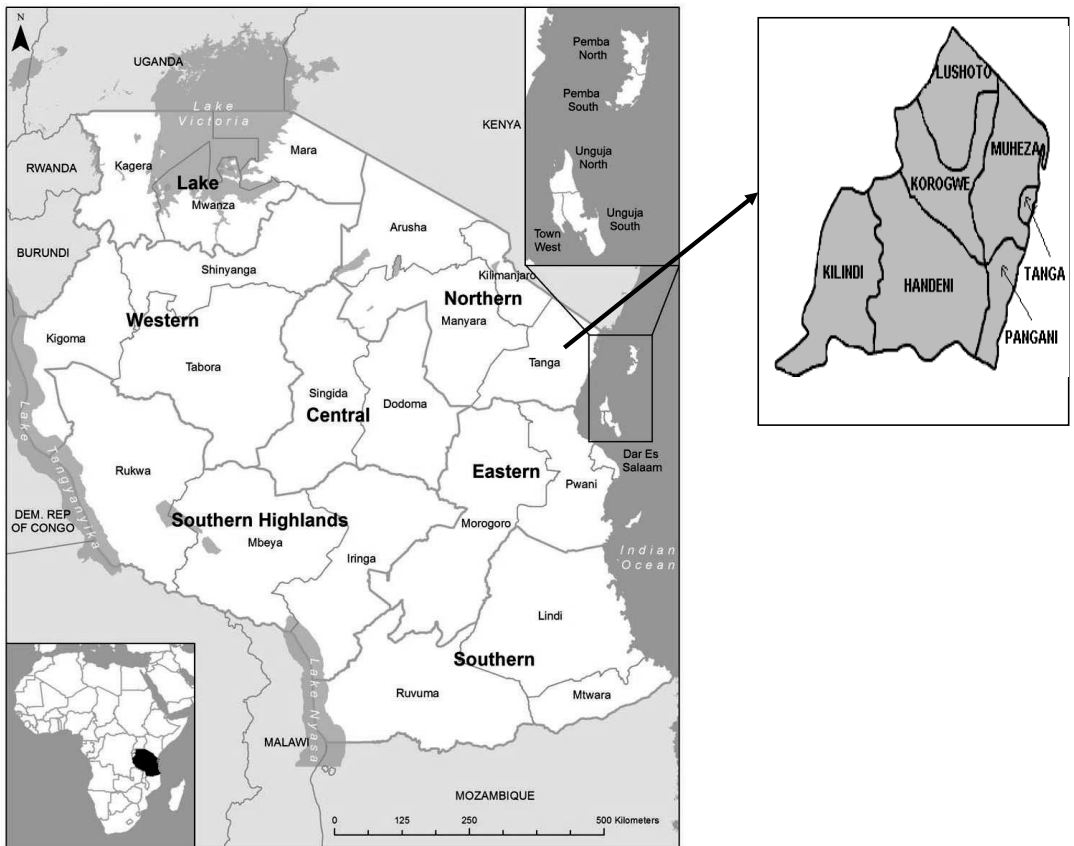
1. To explore caretakers' experiences of and expectations to the quality of services offered at the primary care level in rural Tanzania– paper I & II
2. To identify demographic and facility related factors determining caretakers' first choice of health care services consulted for sick children – paper I & IV
3. To assess care-seeking for children with fever, diarrhoea and/or symptoms suggestive of acute respiratory infections (ARI) and management of these illnesses at different levels of care in Tanzania – paper IV
4. To assess demographic, care seeking and facility related factors associated with severity of disease from malaria, pneumonia and diarrhea among underfive children in rural Tanzania – paper III

3. Materials and methods

3.1 Study setting

The current study was conducted in Tanzania. Papers I, II & III are based on the data collected in Muheza and Korogwe districts of Tanga region located in the northern eastern Tanzania. Paper IV utilized the DHS data collected throughout Tanzania.

Map of Tanzania



Source: 2010 Tanzania Demographic and Health Survey [26].

3.1.1 Country profile

Tanzania is the largest country in East Africa, covering 940,000 square kilometers with a projected population of 43 million inhabitants in 2010 [27]. For administrative purposes, the country is divided into 26 regions, and each region is subdivided into several districts. Tanzania has a mixed economy with agriculture (comprising of crop growing, animal husbandry, forestry, fishery, and hunting) having played a key role in past years. In the current economy, activities in the service industry account for 42 percent of the gross domestic product (GDP) [26]. The population of Tanzania has continued to be predominantly rural despite the increase in proportion of urban residents over time, from 6 percent in 1967 to 23 percent in 2002 [26]. In 2010, the infant mortality rate in Tanzania was estimated to be 51 per 1,000 live births while the under-5 mortality rate was 81 per 1,000 live births [26]. Malaria, pneumonia and diarrhoea remain the main causes for admissions and deaths among underfive children in Tanzania [26].

3.1.2 Tanga region

Tanga is among regions with the slowest reductions in infant and underfive mortality rates in Tanzania [28:99]. Korogwe and Muheza are two among eight districts of Tanga Region [28]. According to the 2002 Population and Housing census, Tanga had a total population of 1,636,280. The major occupation in the region is farming which employs about 77.4 percent of the total labor force [28]. Corresponding with the figures in the national statistics, malaria, pneumonia and diarrhoea are listed among the top five causes of morbidity in Tanga region, with malaria being the largest and responsible for 47 % of the total morbidity [28].

The two districts (Korogwe and Muheza), were selected because they are predominantly rural, but were still easy to access. Korogwe district is located about 100 km inland from the city of Tanga, and based on the 2002 Census [29], it had a projected population of 282,901 in 2009. In year 2006, Korogwe district was served by 45 dispensaries, four health centres and three hospitals (the study hospital and two church owned hospitals) [28:84]. Muheza district is around 25 km from Tanga town and 70 km from Korogwe. It had a projected population of 306,862 in 2009, based on 2002 census [29]. In year 2006,

the district was served by 59 dispensaries, six health centres, and one district hospital (study hospital) [28:84]. Malaria is the leading cause of admissions and deaths among under-five children in both Korogwe and Muheza districts [30, 31]. Table 1 shows the estimates of infant and underfive mortality rates for Korogwe and Muheza compare to the other five districts of Tanga region in 2002 and 2005.

Table 1. Infant and Underfive mortality rates, Tanga region, 2002 and 2005

District	IMR/1000 2002	Estimated IMR/1000 2005	U5MR/1000 2002	Estimated U5MR/1000 2005
Pangani	105	100	173	140
Muheza*	96	92	158	150
Korogwe ***	115	86	192	184
Tanga	75	73	118	158
Handeni	104	99	172	140
Kilindi	108	105	179	40
Lushoto	91	90	147	23
Regional	98	96	162	140

*Includes Mkinga district

*** Includes Korogwe Town Council and Korogwe District Council

Source:

1. Tanga regional commissioner's office [28]
2. 2002 Population and Housing Census [32]

3.1.3 Current situation of child health in Tanzania

Tanzania is among the countries with a good progress towards attaining the Millennium Development Goal (MDG) number 4 i.e. to reduce the underfive mortality rate by two thirds between 1990 and 2015. In 1990, the underfive mortality rate in Tanzania was estimated to be around 155 [33], which sets a millennium target of 52 by the year 2015. The child mortality in Tanzania was estimated to be 76 in 2010 [33], which is a 51.0 % reduction compared to an average reduction of 28.3 % in the Sub-Saharan Africa region as a whole from 180 deaths per 1000 livebirths in 1990 to 129 deaths per 1000 livebirths in 2009 [34].

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The reduction in child mortality in Tanzania between 1990 and 1999 was minimal, around 1.4% per year, whereas for 2000 to 2005, this trend accelerated to 10.8% per year, from 141 deaths per 1000 livebirths in 2000 to 83 deaths per 1000 live births in 2004 [5]. The observed survival gains between 2000 and 2004 were attributed to important improvements in the Tanzania's health system within the same period, including doubled public expenditure on health; decentralization and sector-wide basket funding; and increased coverage of key child-survival interventions, such as integrated management of childhood illness, insecticide-treated nets, vitamin A supplementation, immunization, and exclusive breastfeeding [5]. Between year 2004 and 2010 child mortality was reduced by 8.7% from 83 in 2004 [5], to 76 in 2010 [33].

3.1.4 Access to basic health services in Tanzania

Tanzanians enjoy a relatively good geographic access to primary health care services. By the year 1992, about 72% of the Tanzanian population was reported to live within 5 km of a health facility [35]. This proportion was increased to about 90% in 2007 [36]. With this density of PHC facilities, access in terms of distance is reasonable but the problems of poor quality of services at the primary care level in Tanzania and care-seekers bypassing such facilities have been repeatedly reported [22, 23, 37-39]. If properly utilized, the wide network of PHC facilities in Tanzania has a great potential for further health gains, both for children under five years and other vulnerable groups e.g. pregnant women.

3.1.5 Priorities of the Tanzanian health policy

Since its adoption by the Government in 1980s, Primary Health Care has been the cornerstone of the Tanzania National Health Policy [40]. "Access to quality primary health care for all" is listed first among other main objectives of the Tanzania 2003 health policy [40], as well as among the strategies in the Tanzania Development Vision 2025 [36]. The Tanzania health policy proposes establishment of a dispensary in every village, a health centre in every ward and a district hospital in every district. Tanzania

has 129 districts, more than 2554 wards and more than 9,000 villages [32, 41]. In 2007, there were 4,679 dispensaries, 481 health centers and 219 hospitals, both public and private, distributed throughout the country [36]. In its endeavor to ensure success in delivery of essential health care in the country, the Government through Primary Health Care emphasizes on:

- Community involvement and ownership through active participation in identification of problem areas, planning, implementation, monitoring and evaluation of health care services.
- Multisectoral collaboration by establishment of Committees involving other Sectors such as Water, Agriculture, Education and Ministries such as Community Development, Gender and Children.
- Equity in accessibility to health care by ensuring that every individual has the right to health care, and equitable distribution of health resources in the country.
- Empowerment through decentralization of health services to regions and districts and communities to ensure effective coordination, implementation, supervision and provision of quality health care to the community.
- Providing promotive, preventive, curative and rehabilitative interventions to all individuals and families with their active participation.

According to the 2003 Tanzanian health policy, health services to children below 5 years as well as pregnant women should be provided free of charge at all levels of care [42].

3.1.6 Health system financing in Tanzania

Tanzania's spending on health is still far less than what is recommended by the World Health Organization (WHO). Globally in 2006, expenditure on health was about 8.7% of gross domestic product (GDP), with the highest level in the Americas at 12.8% and the lowest in the South-East Asia Region at 3.4% [43]. In 2003, Tanzania's government total expenditure on health was 4.3% of GDP, as compared with 4.9% in sub-Saharan Africa and 5.2% in other low income countries [44]. Tanzania is also still highly dependent on donor funding for health care provision [45]. The total Tanzania's

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government expenditure on health has been stable at around 4% of GDP between 1999 and 2003, however, external funding of the total health spending has been steadily increasing from around 22% in 2002 [43] to 40% in 2010 [46]. This has resulted in a reduced households expenditures on health from 47% in 2000 [47] to around 14% in 2010 [46].

Several health insurances exist in Tanzania. In 1999, the Ministry of Health approved the National Health Insurance Fund Act, which establishes a compulsory social health insurance scheme for formal sector employees [43]. This fund covered 3% of the population in 2007 [43]. Community health funds (CHFs) established in 2001 brought community-based insurance to 48 districts, mostly in rural areas [43]. Churches, informal sector groups, cooperatives, and mutual health organizations run microinsurance schemes for those employed in the informal sector [43]. Private health insurance is limited, but available for those who choose and are able to pay for it.

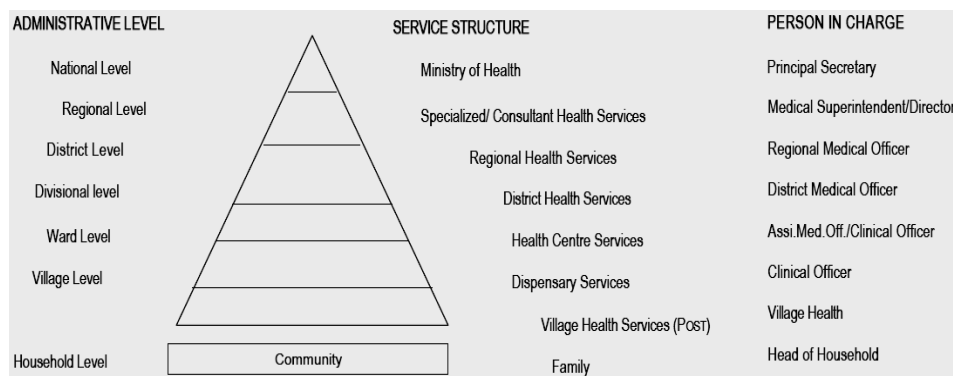
3.1.7 Organization and management of health care services in Tanzania

Health services in Tanzania are organized in a referral pyramid, with health posts at the village level, community dispensaries at the ward level, rural health centers at the divisional level, district or district designated hospitals at the district level, regional hospitals at the regional level, referral/consultant hospitals at the zonal level and national/specialized hospitals at the national level [40].

The roles of the Health Sector are executed at three levels: - Central, Regional and Districts. At the Central level, the Ministry of Health is responsible for Policy formulation, health legislation, regulation and control of all matters pertaining to health in the country. The Regional level supervises and provides technical support to the district health services. The districts are the focal point for the implementation of the health policy and other health interventions. Districts provide health services at level one which include the district hospital, other hospitals, health centers and dispensaries. The district level also coordinates and supports supervision, monitoring and inspection of all

health facilities and activities in the district. The studies for the current thesis were targeted at the district level because of its central role in the health care provision.

Figure 2. Organization Pyramid of the Tanzania Health Services (Structure)



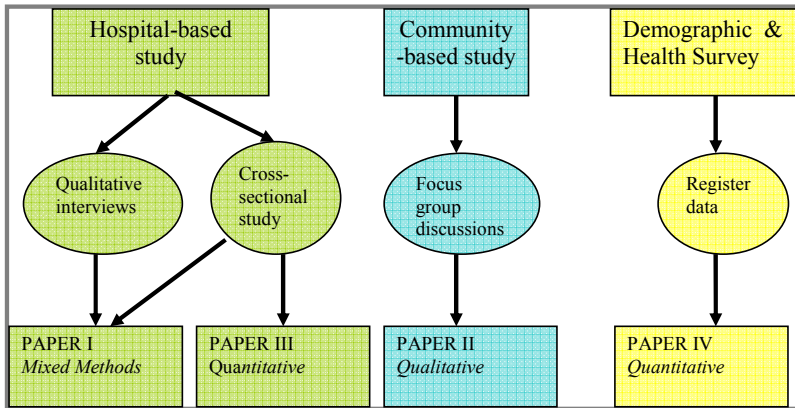
Source: National PHC supervision Guidelines [48]

According to the organization structure of the health services in Tanzania above, patients, particularly those with mild disease are expected to start at the dispensaries/ health centres while seeking health care, where they may be referred to the district hospitals and/or higher level hospitals if required.

3.2 Study design

As we aimed to investigate the health system and socio-demographic factors determining health seeking behaviours, as well as experiences of care provided at the PHC facilities, a mixed methods approach was deemed appropriate. “Mixed methods” involves applying both the quantitative and qualitative research methods in the same study [49]. We used the quantitative methods to study the frequencies and factors associated with various care seeking behaviours whereas the qualitative methods were utilized to investigate reasons behind selecting certain health care options, and also to explore caretakers’ experiences from the health services provided at the primary care level.

Figure 3: Study Design



Mixed methods

Creswell J.W. suggests that the design of a mixed methods study should be guided by four main factors [49:206-217]: timing of the two data collections, weight (priority) given to each database, how and at what stage the two databases mixes and whether a larger, theoretical perspective guides the entire design. Based on timing of data collection, he distinguishes between *Sequential* i.e. when the two data sources are collected in different phases, one after another, and *concurrent* i.e. when both quantitative and qualitative data are collected in the same phase [49:206].

The current work, composed of the hospital based study, the community based study and the DHS study (see figure above), employed a sequential mixed methods design. The hospital based study constituted the main study while the community based FGDs and DHS study were added at different points in the course of the study. Within this overall design, the hospital based study employed the *concurrent embedded* mixed methods strategy where the predominant method that guided the study was quantitative and the qualitative part was embedded or nested as a secondary database that had a supportive role. The mixing of the two databases was done in the discussion section of the study (in paper 1).

The community based FGDs were added to explore further some issues that came up in the hospital based study. In Cresswell's terminology this can be described as a *sequential explorative* strategy [49]. The DHS study was added towards the completion of the analysis of both the hospital-based and the community based data in a *sequential* manner to provide additional comparative quantitative data from the national DHS. The database that has been given most weight in this thesis is the quantitative one with the qualitative part playing a supportive role. An explicit theoretical perspective was not employed. More details on the rationale for the individual studies forming the basis for this thesis are given in table 2.

Table 2. Participants, size and aims of the individual studies forming the fundament for the thesis.

STUDIES		STUDY SIZE AND PARTICIPANTS		AIMS OF THE INDIVIDUAL STUDIES
<u>QUANTITATIVE STUDIES</u>	Hospital-based cross-sectional study	560 Children aged 1-59 months attending Muheza and Korogwe district hospitals		To study associations between background and health system factors with care seeking behaviors, in relation to severity of disease from malaria, pneumonia and diarrhoea.
		Muheza 266	Korogwe 294	
	Demographic and Health Survey	8176 Children aged 0-59 months from 475 sample points throughout Tanzania.		To assess care-seeking behaviors and management of underfive children with suspected malaria, diarrhoea or pneumonia (ARI ¹) at the national level.
<u>QUALITATIVE STUDIES</u>	Hospital-based qualitative interviews	Caretakers of 30* severely-ill children admitted at Muheza and Korogwe district hospitals		To explore caretakers' experiences of the primary care services while seeking care for the same child's illness episode and explore their potential contribution to child's progression to severe disease.
		Muheza 13	Korogwe 17	
	Community-based focus group discussions (FGDs)	4 FGDs** with 47 caretakers in four villages of Muheza district		To explore community perceptions and experiences to services offered at the primary care level in their areas.

* The 30 qualitatively interviewed caretakers were also part of the larger quantitative hospital-based study.

** FGDs' participants had no sick children at the time of study and were not related to the hospital based study participants except for the fact that they came from the same study area.

¹ Acute respiratory infections

² Primary health care

3.3 Data collection

The author was responsible for the planning of and was directly involved in collecting data for the three out of four data sources that have been used in this thesis i.e. the hospital-based quantitative study, the hospital-based qualitative interviews and the community-based focus group discussions. The 2010 demographic and health survey data were acquired from the Measure DHS [50].

3.3.1 Hospital-based study

This was composed of a cross-sectional study and qualitative interviews among caretakers accompanying sick children at Korogwe and Muheza district hospitals. Our target population were children between 1 month and 5 years, with a diagnosis of malaria, pneumonia or diarrhoea attending the outpatient departments (OPD) of the two hospitals.

Quantitative data collection

Between July 2009 and January 2010, we identified all sick children presenting at the OPD, between 9 am and 2 pm, with a history of one or more of the following symptoms: fever, cough, difficult or fast breathing, diarrhoea and/or vomiting. These children were reviewed and assigned diagnosis following the WHO guidelines [51], by the principal investigator or a trained clinical officer. Children with a diagnosis of malaria, pneumonia or diarrhoea were included in the study. Prior starting the data collection we had found that most caretakers brought children to the hospitals between 09am and 02pm. After 2pm very few caretakers would bring children to the hospital unless the child was severely sick, in which case the child would be admitted and the interview would be conducted later the same day (if the clinician was around) or the next morning. While the diagnosis of pneumonia and diarrhoea was made clinically, malaria diagnosis was confirmed with a rapid malaria diagnostic test (Paracheck[®]).



A child receiving a malaria test

Interviews were conducted by trained clinical officers after obtaining a written informed consent. Caretakers of children who did not need admission were interviewed in a room located near the outpatient department while caretakers of children who needed admission were interviewed later within their respective wards and after the child had received initial treatment. Caretakers of severely ill children who died before the interviews could be conducted were not included.

The questionnaire: The questionnaire for the hospital-based study was designed to collect as much as possible of the care-seeking information pertaining to the index child's sickness episode. The questions included a detailed care-seeking history, treatment history and child's condition prior and during care seeking. Also included were questions on demographic factors and other indicators of socio-economic status (SES). In addition to above, the questionnaire also assessed the availability and utilization of primary health care (PHC) facilities and whether the child was referred or not. When the caretaker reported presence of a PHC facility nearer than the district (study) hospital but had not utilized it, an open-ended question was used to investigate reasons for bypassing it. The questionnaire was pre-tested to ensure the clarity of questions and amendments were done prior to the main study.

Sample size considerations: Assumptions for calculating the sample size for the hospital-based quantitative study was based on specific objectives no. 1 and 3. Requiring only qualitative data, objective no. 2 did not require calculations of sample size while Objective no. 4 was achieved using the already existing DHS data. For objective number one, our main interest was to study the factors associated with bypassing of PHC facilities for child care. We intended to detect a minimal difference of 15% between bypassers and non-bypassers with respect to potential factors that would influence bypassing of PHC facilities. For example, with respect to SES, the assumption would be 65% of caretakers in the higher SES group will bypass their nearer PHC facility while seeking child care compared to only 50% among those in the lower SES group. Setting the level of significance at 0.05 and power at 80%, the maximum required sample size would be 364 children.

For objective no.3, we as well wanted to detect a minimal difference of 15% among children presenting with severe compared to mild disease with respect to various risk factors. Taking caretakers' level of education as a risk factor for child disease severity, our assumption would be 20 % of caretakers with no formal education would present with severely ill children as compared to only 5% among caretakers with primary education. Setting the level of significance at 0.05 and power at 80%, the maximum required sample size would again be 364 children. Adjusting the above sample size for a maximum of 20% non-response rate, the required sample size was 437 children.

Qualitative interviews

Qualitative interviews were conducted with a purposive sample of caretakers from the hospital-based study participants who on the day of admission, had presented with a severely-ill child. Qualitative interviews were aimed to explore events in the care seeking of disease that might have contributed to the severe illness. All caretakers of children with a confirmed diagnosis of severe malaria, very severe pneumonia or acute watery diarrhoea with severe dehydration qualified to be interviewed.

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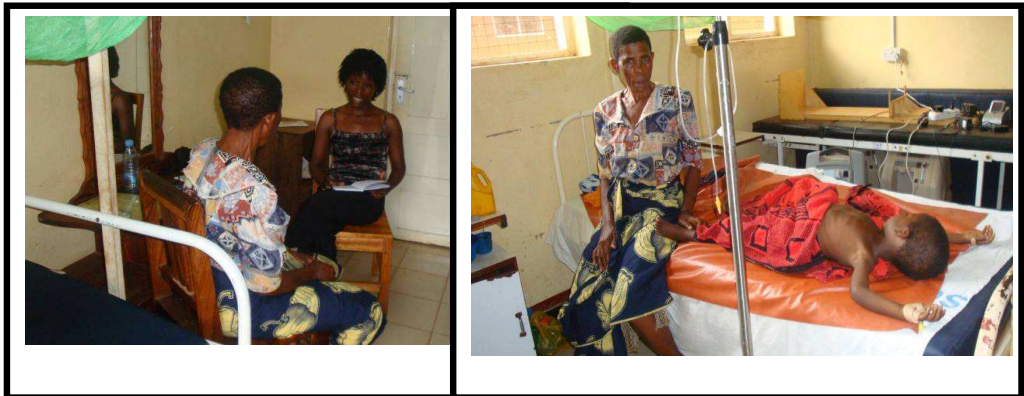
Caretakers were asked to recall details on all actions taken from when they recognised the first symptoms of the index child's sickness episode until the day of admission at the district hospital. The information collected included all the care options attended and all the treatments received by the sick child for the same illness. Caretakers who utilized their nearer PHC facilities for the same illness were asked to give details of what happened at these facilities while those who did not were asked to give reasons for bypassing them. The interviews were rather open and no written interview guide was used. Using the first day when the caretaker noted the first symptom as a starting point, follow-up questions were asked on what was done next. The interviews lasted between 25 and 45 minutes.

All the interviews were performed in Swahili (the national language) by the principle investigator (PI) in a ward side-room and they were all digital-recorded. In order to create a relaxed atmosphere where the informants would express their views freely, the interview commenced with a general conversations and simple jokes. To secure confidentiality, the PI also made sure that no one else was around in the interview room except for her and the caretaker with or without the child. At around the 25th interview nothing new seemed to come out of the interviews and the author decided to stop at the 30th interview. Seventeen interviews were conducted at Korogwe district hospital while 13 were conducted at Muheza district hospital. Table 3 shows the diagnoses of children whose caretakers were interviewed qualitatively.

Table 3. Diagnoses of the children whose caretakers underwent qualitative interviews

Diagnosis	Frequency
Severe malaria	17
Very severe pneumonia	5
AWD with severe dehydration	5
Severe malaria and AWD with severe dehydration	1
Very severe pneumonia and AWD with severe dehydration	2
Total	30

AWD – Acute watery diarrhoea



A grandmother with a severely-ill child undergoing a qualitative interview

3.3.2 Community-based FGDs

Focus group discussions (FGDs) were conducted in four villages of Muheza district in September 2009. The villages were purposely selected from a list of eleven villages where the hospital-based survey participants reported to live. We used three main criteria for villages selection; 1) A village should be located at least 10km from the district

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hospital, 2) It should have a dispensary or a health centre nearer than the district hospital and 3) It should have a significant number of bypassers (caretakers who did not at all utilize their nearer dispensary or health centre during the index child's sickness) and non-bypassers (caretakers who utilized their nearer dispensary or health centre prior to coming to the district hospital) as documented in the hospital-based study [52]. In addition to the criteria above, we also selected villages in different geographical directions from the district hospital.

FGDs' participants were recruited one week before the meeting, through the village leader who was informed of the criteria for selection of the FGDs participants. The inclusion criteria were that the participants 1) should have at least one child less than five years under their care and 2) there should be only one caretaker participating per household. We advised the village leader to pick households skipping several in between even if they had a potential participant so as to have a wider geographical area represented. A total of 47 women and men participated in the four focus groups, each comprising around 9-14 participants. The majority were women, reflecting the fact that women are the ones who commonly accompany sick children to hospitals within the study setting. Two FGDs were mixed while two were with women only. Table 4 shows the sex composition of the four FGDs.

Table 4. Composition of FGDs

FGD number	Participants	
	Men	Women
Village 1	0	9
Village 2	7	5
Village 3	4	10
Village 4	0	12

The FGDs were either held in the village government halls or a school classroom. A topic guide (attached) was used to introduce topics for discussion in the form of questions and the participants were left to discuss each question actively with as little interference as possible from the principal investigator who was acting as a moderator. The topics discussed included the available health care options, the quality of services at their nearer PHC facilities, barriers and obstacles caretakers faced while seeking care for their sick underfive children, and reasons for bypassing PHC facilities. We kept adding emerging new issues in the guide as the discussions progressed and these were asked in subsequent FGDs. The discussions were conducted in Swahili (the national language) by the principal investigator assisted by two research assistants. One assistant was responsible for the tape recording while the other was taking notes. The discussions lasted between 55 and 90 minutes. At the end, participants were given an opportunity to ask general questions on various health issues, and the principal investigator and one research assistant who was a clinician responded accordingly.



Picture showing two among the four FGDs

3.3.3 Demographic and Health Survey

As previously mentioned, the current thesis also utilized data from the 2010 Tanzania DHS. This is the eighth and most recent in a series of national surveys that measure levels, patterns, and trends of demographic and health indicators in Tanzania. DHS surveys are nationally-representative cross-sectional household surveys (involving

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between 5,000 and 30,000 households) that are performed in many low-income countries at regular intervals and which provide data for a wide range of monitoring and impact evaluation indicators [53]. The 2010 Tanzania DHS included 10,300 households that were selected from 475 sample points (clusters) throughout Tanzania. DHS Datasets are available for free from the measure DHS website after a simple registration process [50].

To facilitate analysis of data and allow for different units of analysis (e.g. household, women, children etc), DHS ultimately translates into several data sets. Our study utilized the children's recode data file which defines the unit of analysis as all children born alive during the 5 years period preceding the survey. The data file contains information for 8176 children born between 2005 and 2010. The information includes pregnancy and delivery related to the child, postnatal care, child's health indicators such as immunization coverage, vitamin A supplementation as well as child's health in general. The file also contains care-seeking information on recent occurrences of diarrhoea, fever and cough. Care-seeking information for child illnesses is collected by asking mothers whether their children had been ill with fever, diarrhoea or cough in the two weeks period preceding the survey. The types of facilities attended and treatments received by the sick child are recorded. The file also contains data for the mother of each of these children, including indicators for socio-economic status.

3.4 Ethics consideration

Ethics approval for the hospital-based study and the FGDs was obtained from the National Institute for Medical Research (NIMR) in Tanzania. Prior to conducting the interviews, informed written consent was obtained from all the hospital-based study participants, and none refused to participate. Prior to discussions, verbal consent was obtained from all the FGDs' participants. This is in addition to the fact that they had already accepted the initial invitation through the village leader. All study procedures at the district hospitals were conducted with caution not to interfere with the patients' ordinary consultations, and the interviews were executed only after all the necessary treatments were initiated. Ethical procedures for the DHS are described elsewhere [26:367].

3.5 Data management

3.5.1 Data entry and cleaning

The hospital-based study data was double-entered and validated by the principal investigator using Epidata version 3.1. The validation process involved checking for errors such as impossible values. These were corrected or classified as missing if the correct value could not be found. The DHS data set was carefully studied using the DHS recode manual [54], which lists and describes all variables used in DHS data files. Following this, the data set was reduced to the variables of our interest and the necessary categorizations were done. The initial word to word transcription of the qualitative audio materials was done in the original (Swahili) language by one of the research assistants. The transcriptions were counter-checked by the principle investigator by listening to the audio and errors or unclear statements were corrected.

3.5.2 Data analysis

Quantitative data analysis

Both the hospital-based study and DHS data were analysed using SPSS version 18. For the DHS data complex samples analysis methods were applied so as to control for the clustering design effect. In both cases, analysis started by doing the frequency counting of all variables, followed by cross-tabulations to explore any potential associations among variables of our interest. Finally, univariate and multiple logistic regression analyses were used to study the associations and adjust for potential confounders. The confidence interval was set at 95 %.

For paper I, the main outcome variable was bypassing of PHC facilities. A bypasser was defined as a caretaker who reported having a PHC facility (dispensary or health centre) nearer than the district (study) hospital but did not utilize it at all during the index child's sickness episode. For the paper III, the main outcome variable was severe disease, where severe cases were defined as severe malaria, severe and very severe pneumonia, or acute

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watery diarrhoea (AWD) with some or severe dehydration. These were compared with non-severe cases: non-severe malaria, mild pneumonia and AWD with no dehydration. Paper IV had multiple outcomes.

Wealth index: The wealth index (SES) for the hospital-based study was constructed based on the principle component analysis (PCA) method developed by Filmer and Pritchett [55]. Based on household characteristics and ownership of different assets, caretakers were classified into three socio-economic groups; low, middle and high. The variables that were included in the PCA were type of wall material, type of floor and household ownership of the following assets; car, motorbike, bicycle, radio, plough, cows, goats and sheep. For the DHS data, we utilized the pre-constructed wealth index after reducing it from five to three categories.

Qualitative data analysis

Both the qualitative interviews and FGDs were analysed by the principal investigator following the principles of thematic content analysis. The latter principles are commonly used for health care research [56]. This type of analysis involves grouping of the data materials into themes which are created from the recurring codes that are similar or connected. Following the transcription of the audio materials, the process of qualitative data analysis followed the steps below;

I. Familiarization with the data materials: This process commenced by counterchecking all the transcripts through listening to the audio while reading and correcting errors. This was followed by examining the transcripts to identify units in the text that were relevant to the subject in question. The latter process involved reading repeatedly through every transcript while marking the relevant text units. Familiarization with the data materials commenced during data collection.

II. Codes generation: Relevant text as per study questions, were then labelled using codes. These are words or short phrases that suggest how the data segment informs the research objectives. This process began alongside familiarization with the data materials.

III. Codes into themes: Themes are general propositions that emerge from diverse and detail-rich experiences of participants and provide recurrent and unifying ideas regarding the subject of inquiry [57]. In this study, the qualitative part was meant to explore further on some of the findings from the hospital-based study. Hence the themes were partly generated in relation to findings from the hospital based study. For example, the reasons given by caretakers for bypassing PHC facilities in the hospital-based study were used as themes for the findings from the qualitative interviews and also as building blocks for the themes for the FDGs. For example, “*lack of diagnostic facilities*” was the most common reason for bypassing PHC facilities from the hospital-based study. This was used as a theme in the hospital-based qualitative interviews (paper I) which revealed how lack of such services affected care-seekers. A theme “*expecting examinations before treatment*” from the FDGs findings (paper II) is also linked to the above, and it represented care-seekers’ expectations and experiences of lack of diagnostic facilities at the PHC level.

IV. Interpretations of the findings: This was the final stage of qualitative data analysis which involved digging for the central meanings within the created themes. This was done while taking caution not to add perspectives that were initially not present. The findings were interpreted while relating them to the findings from the hospital-based study and also the previous studies on the same subject.

Even though codes and themes were created in English language, the stages I to III above was done while the main data materials were still in the original interview language (Swahili). This was done to avoid losing meaningful units by early translations. Translation into English language was done at a later stage, after identifying meaningful themes.

4. Results

In this section we present our study findings based on the four papers that comprise the current thesis. For each paper, we present a summary of the study design, materials and main findings while more details can be found on the original papers attached at the end of this thesis.

Paper I: Why caretakers bypass Primary Health Care facilities for child care – A case from rural Tanzania.

This study employed *mixed methods* design. It utilized quantitative methods to study the factors associated with bypassing PHC facilities among caretakers seeking care for their underfive children, and qualitative methods to explore the experiences at such facilities among those who utilized them.

This paper was based on two studies:

- A cross-sectional study among caretakers accompanying sick underfive children at Muheza and Korogwe district hospitals (n=560)
- Qualitative interviews with 30 caretakers of severely-ill children among participants of the cross-sectional study above.

Almost all caretakers in this study (91.6 %) reported taking some action within the first 24 hours after recognizing the first symptoms of the sick child. The majority gave simple treatments at home, either purchased from local or drug shops (52.1%) or which had remained from previous consultations (14.5%). Only 20.9% went to public hospitals within the first 24 hrs. More than half of the caretakers (62.7 %), reported having a PHC facility nearer than the district hospital. However, 59 % had not utilized them during the index child's sickness episode. The commonest reason given for bypassing PHC facilities was lack of diagnostic services at this level of care (42.2 %). Other reasons reported were lack of drugs (15.5%), the facility being closed (10.2 %), poor services (9.7%) and lack of skilled health workers (3.4%).

Results from the multivariate logistic regression model showed that the frequency of bypassing a PHC facility for child care increased significantly with decreasing travel time to the district hospital, shorter symptoms duration and mild compared to severe disease. There was no significant difference of bypassing a nearer facility according to child's age or sex, or caretaker's socio-economic status.

The recurrent themes from the qualitative interviews further revealed how the lack of diagnostic facilities, drugs and qualified health workers caused delays in accessing appropriate care among children initially attended at the PHC facilities, and how it caused other caretakers to lose trust in this level of care. A case presented on the care seeking history of a caretaker and management of a four months old female child illustrates how the deficiencies and delays at the PHC level of both the disease diagnosis and management caused severe dehydration and death of the child. Table 5 below provides more examples from the qualitative interviews, of the reported deficiencies at the PHC level.

Paper II: Unfulfilled expectations to services offered at primary health care facilities: Experiences of caretakers of underfive children in rural Tanzania

This is a *purely qualitative* study that was a community extension of the hospital-based study above (paper I). This study utilized community-based FGDs to explore caretakers' perceptions of and expectations to services offered at PHC facilities in their areas. Four FGDs were conducted with 47 caretakers of underfive children in four villages of Muheza district. The four districts where the FGDs were conducted were selected from a list of villages that the hospital-based study participants reported to live.

Across all the FGDs, lack of clinical examinations and laboratory tests, combined with shortage of drugs and health workers at PHC facilities were common experiences. Unpleasant health workers' behaviors, lack of urgency and delays in accessing care were also major complaints. In some places, unauthorized fees reduced access to free health services. Table 5 presents selected quotes from the main themes of the qualitative

findings in relation to the quality of care offered at the primary care level, both from the qualitative interviews (paper I) and FGDs (paper II), as reported by caretakers in the study area. As illustrated below, the findings from the two studies support each other.

Table 5. Selected quotes as reported by caretakers demonstrating multiple deficiencies at PHC facilities in rural Tanzania

Themes	Hospital-based qualitative interviews (paper I)	Community-based focus group discussions (paper II)
Lack of investigations	<i>"We usually go there, and it's free but sometimes they don't have malaria investigation. They tell you to go and do it at a private hospital and come back with results. I find it bothersome so I decided to go straight to the private hospital..."</i>	<i>"Nowadays people are civilized, they are afraid of giving the child drugs before she is investigated. They want to be sure if it's real malaria. The fever could be just a result of the teething process."</i>
Lack of drugs	<i>"Back there, they didn't give me any help, even paracetamol. Because my child had fever, we requested for paracetamol but they told us to go and buy. But we decided to go straight to look for transport to take us to this hospital as we were afraid we might be late and lose the child, it was around 8.30 pm..."</i>	<i>"Antimalarial drugs are as well not available sometimes. We are used to go and buy these old ones like Fansider. The drug will help the child for three, four days, and then malaria comes back very severe".</i>
Facility being closed in evenings and on weekends	<i>"Usually I don't take my child there (private dispensary), that day I went because it was Saturday and the public hospital wasn't operating",</i>	<i>"If your child gets sick at night, there is nowhere to run to until morning. If you have money then you will look for transport and take her to Teule (district hospital) the same night. If you can't afford then your child might die while you are watching her."</i>
Lack of qualified health workers	<i>"The main doctor is no longer there, he was brought to this hospital. Back there, we have remained with no one. I was given this drug to give at home but after seeing the way my child was breathing I decided not to give but come straight here"</i>	<i>"Sometimes you find that the main doctor is not around and only one nurse is doing everything. She then will become the doctor. She will be the one taking care of the MCH¹ clinic services, she will be the one working at the Antenatal clinic etc".</i>
Unsafe drug dispensing practices		<i>"They ask if you brought a bottle, if you do not have they tell you to go and buy. They pour you some amoxicillin and you go. One bottle is divided among two to three children".</i>
Lack of urgency		<i>"When you approach the nurse and tell her that my child's condition is not good she tells you 'do not teach me my job'. Then you</i>

		<i>remain with nothing to do but wait while observing your child until when she feels like helping your child by herself."</i>
Unofficial payments		<i>"Consultation and treatment costs one thousand and we pay two hundred for the guard who watches the dispensary. Weighing a child at the clinic costs two hundred"</i>

¹ Maternal and Child Health

Paper III: Factors associated with severe disease from malaria, pneumonia and diarrhea among children in rural Tanzania – A hospital-based cross-sectional study

This purely quantitative study was based on data from the cross-sectional study at Korogwe and Muheza district hospitals. By comparing children presenting with mild and severe forms of malaria, pneumonia and/or diarrhoea (n=483), the study aimed to investigate how care-seeking behaviours, demographic and other factors were associated with severity of disease from these three major childhood killers.

We found severe disease to be slightly more common among younger compared to older children (64.8 % among infants versus 52.3% among children aged two or more years), as well as among children with smaller mid-upper arm circumference (MUAC) (70.6 % among those with MUAC between 8.0-13.9 cm compared to 53.7% among those with MUAC of 15cm and above). Caretakers with no formal education had a significantly higher chance of presenting with a severely ill child (82.1%) compared to those with primary (57.9%) or post-primary (43.6%) education. The risk of severe disease was also increasing with increasing travel time to the district hospital, increasing number of own children and decreasing socioeconomic status.

With regard to care-seeking behaviors, we found severe disease to be more common among children with longer compared to shorter symptoms duration, as well as among

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those who had attended PHC facilities for the same illness. Children who received treatments other than paracetamol for the same illness before coming to the district hospital had a higher chance of presenting with severe disease compared to those who only received paracetamol (67.9% versus 51.8%). Severe disease was also more common among children who had obtained the first treatment other than paracetamol from local sources or drug shops compared to those who obtained them from public hospitals.

Sulphadoxine-pyrimethamine (SP or Fansidar[®]), the formerly first line anti-malaria drug, was reported by 19 caretakers as the only drug provided to their children for the treatment of malaria. Nine of these children were confirmed as malaria cases at the district hospital. Of these, eight had presented with severe malaria and two died. Five caretakers reported receiving this drug from public facilities.

Paper IV: Care-seeking and management of common childhood illnesses in Tanzania – Results from the 2010 Demographic and Health Survey

In this quantitative study, we utilized the 2010 Demographic and Health Survey data of Tanzania to assess care-seeking behaviors and management of under-five children with suspected malaria, diarrhoea or pneumonia (ARI) at the national level. The survey was based on information for 8176 children born alive between January 2005 and December 2010. Child illnesses and care-seeking information during the two weeks preceding the survey was inquired for 7667 children who were still alive at the day of the interview.

During the 2 weeks preceding the survey, the reported prevalences were 23.9% for fever, 14.9% for diarrhea and 7.7% for pneumonia. More than half of the sick children in this study were taken to a health care provider; 64.3 % of those with fever, 53.3 % of those with diarrhea and 60.8 % of those with symptoms suggestive of ARI. The most common first option for child care was PHC facilities, followed by private pharmacies. These facilities were more commonly utilized in rural compared to urban areas: PHC facilities were utilized by 61.2 % among rural compared to 34.5 % among urban dwellers while private pharmacies were used by 26.5 % among rural compared to 17.7 % among urban

dwellers. Private pharmacies were also found to be more commonly utilized by women with lower compared to higher education, as well as among those with more compared to fewer children below five years under their care.

On the other hand, higher level hospitals were more commonly utilized by women in urban areas (18.5 % urban versus 2.6 % rural) and those with higher education (12.5 % among those with secondary or higher education compared to 2.3 % among those with no education). Furthermore, of the 115 women who reported having utilized higher level hospitals for child care, more than 90 percent also reported them being their first option for child care. Only 20 women reported having utilized both PHC facilities and higher level hospitals for the same child illness episode and none of the respondents reported having received traditional care.

Of the 1754 children with a history of fever in two weeks preceding the survey, only 284 (26.6 %) had received a blood test during the illness. Blood testing was more commonly reported among children who were attended at non-public compared to public facilities: 71.7 % among those solely attended at religious and 81.1 % private facilities compared to 25.6 % among those solely attended at PHC facilities and 43.1 % higher level hospitals. Of all children with fever, 75 percent had received some antimalarials. However, only 48 % had received a proper antimalarial drug according to the current WHO guidelines for malaria treatment in children. Fifteen percent of children with fever had received no treatment. Almost 90 percent of all children with diarrhea had received some treatment. Six in ten children had received oral rehydration salts (ORS) or home rehydration solution (HRS). About half of the children had received antibiotics; in 31 % as the only treatment for diarrhea. Intravenous fluids and Zinc use for diarrhea treatment was very low (less than 1%).

The proportion of children who received proper antimalarials and ORS/HRS for diarrhea was highest among those solely attended at higher level hospitals, followed by PHC facilities and was lowest among children solely attended at private pharmacies. Use of drugs according to the old guidelines for malaria treatment were more commonly

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reported by caretakers solely attended at private facilities (16%) followed by pharmacies (13%). Old guidelines for malaria treatment were also received by children solely attended at PHC facilities (5 %) and higher level hospitals (3 %).

5. Discussions

The discussion is divided into three sections. In the first section we provide the methodological reflections for the study. The second section provides a discussion of the main findings while the third and last section gives conclusions and recommendations.

5.1 Methodological reflections

5.1.1 Justification of the study design

The mixed methods design with its combination of quantitative and qualitative research methods in the current thesis is among its strengths. This gave us various points of vantage to examine care-seeking behaviors among caretakers of sick children. The concurrent mixed methods approach used in the hospital based (sub-) study enabled the researchers to collect the two types of data simultaneously i.e. during a single data collection phase. In addition to the 560 quantitative interviews at the two district hospitals, the 30 qualitative interviews conducted among caretakers of severely-ill children enabled us to explore the detailed health seeking history.

The overall mixed methods sequential design allowed for new components to be added in the course of the study. This created a flexibility to explore further issues that emerged at different stages. Based on the preliminary findings of the hospital based study, we added a community based purely qualitative study to explore community perceptions and experiences related to the quality of care offered at primary health care facilities. This study complemented and strengthened the findings of the hospital based study. The final study based on national DHS data served to provide comparative data from a larger dataset thus adding strength to the hospital based study findings.

The data collection for papers I-III was done during one data collection period, lasting for six months. In a sequential mixed methods design, the data from one dataset should ideally be analyzed before adding another study. However, due to time constraints and low budget it was necessary to complete the data collection before the analysis of the quantitative data in the hospital based study had been completed. This is a weakness of

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the study. A complete analysis of the quantitative dataset before the community based study was conducted may have affected the development of the topic guide and hence the data collected through FGDs. Furthermore the unequal priority (weight) given to the two databases may be seen as a limitation of the approach chosen in this study, as it often results in unequal evidence within the study. This has been shown to complicate the interpretation of the final results [49].

5.1.2 Sample size considerations

Different criteria are used for determining the sample size for quantitative versus qualitative studies. The aim of the quantitative sampling approaches is to draw a representative sample from the population, so that the results of studying the sample can then be generalized back to the population. Several factors are considered when calculating the sample size for a quantitative study: three most important are the *effect size*, *level of significance* and *power* of the study. An appropriate sample size for a qualitative study is one that adequately answers the research question. In qualitative studies, the number of the required subjects usually becomes obvious as the study progresses, as new categories, themes or explanations stop emerging from the data (data saturation) [58].

Hospital-based quantitative study

We calculated our sample size for the hospital-based study to be 437 children; however, we recruited a total of 560 children owing to the fact that some children had been recruited before the malaria rapid diagnostic test was performed, and which turned to be negative. These children were only included in the analysis for paper I which investigates care seeking behaviours in general and was not disease specific.

Qualitative interviews

In line with the primary objective of conducting the interviews (to explore the potential contribution of care seeking factors to child's progression to severe malaria, pneumonia and diarrhoea), only the caretakers of severely ill children were selected. The majority of

children whose caretakers were interviewed had severe malaria, which reflects the fact that the two districts are highly endemic for malaria [30, 31]. At around the 25th interview most of the care seeking information seemed to be repeating and now new themes were emerging: For example, most caretakers would give similar experiences from the PHC services and similar reasons were given for bypassing PHC facilities.

Focus group discussions

Only four FGDs were conducted and in only one of the two study districts because of limited resources. This is primarily because FGDs were not planned for initially. The principal investigator decided mid-way during the hospital-based data collection to obtain the community views on the quality of the primary care services. This was done following the observed high frequency of bypassing of PHC facilities among the hospital-based study participants.

Typically, focus groups consist of between 6 and 12 members drawn from a study population of interest [59]. Three of our four FGDs consisted of 12 or more individuals. This was because more than expected caretakers who were approached were willing to participate. However, we did not encounter any difficulties during the discussions resulting from the slightly bigger group size. The higher number of female caretakers participating as compared to male caretakers was expected, and it can be seen as strength of the study, since women are commonly the ones taking children to health facilities in the study area.

Demographic and Health Survey

Determining the optimal sample size is a critical step in DHS surveys because it requires a trade-off between the budget available and the desired survey precision. Aliaga et al investigated and described the optimal DHS cluster size for achieving both economy and good precision, based on experiences of actual surveys, to be around 100-300 households and 20 women per cluster [60]. The 2010 Tanzania DHS involved a representative probability sample of 10,300 households from 475 clusters selected from

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a list of enumeration areas of the 2002 Population and Housing Census [26]. The survey interviewed a total of 10,139 women [26]. This averages to 21 women per cluster which is in line with Aliaga et al recommendations above.

5.1.3 Validity of the findings

An account is valid or true if it represents accurately those features of the phenomena, that it is intended to describe, explain or theorise [61]. In quantitative research, standard approaches to account for validity of the study findings has been long accepted. In qualitative research, discussions of validity have been more contentious and different typologies and terms have been produced [62-64]. In mixed methods research, where quantitative and qualitative approaches are combined, discussions about “validity” issues are in their infancy [65]. Generally speaking, validity of the research findings is primarily linked to the manner in which the researchers sought to address the study objectives, making sure that multiple realities of those studied were captured [66:78]. In both the quantitative and qualitative research, the distortion of truth can occur at any stage of the research process: study design, data collection, data analysis, and/or data interpretation. Our discussion below is based on the criteria used in assessing validity for quantitative and qualitative research findings.

Validity of the quantitative findings

To ensure that questions were clear and were well understood by both the interviewers and interviewees, the questionnaire for the hospital-based study was discussed among the principle investigator and the interviewers, and was as well pretested among a sample of care seekers prior the main data collection. To maximize the quality of the data collected, the study utilized clinicians who had experience in clinical paediatric care and research and who had previously worked or were currently working at the same hospitals in other clinical researches. Furthermore, the principal investigator knew the clinicians well as she had previously worked at Korogwe district hospital and had visited

Muheza district hospital a couple of times. The data were double-entered and checked for correctness by the principal investigator.

Potential biases and confounding

Bias refers to the unintentionally random or systematic, or worse, the willful, distortion of truth [67]. Almost all research projects are at risk of biases. It is a task of the researcher to be aware of the potential biases at every stage of the research process and to try as much as possible to minimize them so as to have a clearer picture of the true relationship between the predictors and the outcomes. In this section we will discuss the potential biases in our study and how we tried to control or minimize them at various stages of our research project. Two major biases are discussed: selection bias and information bias.

Selection bias: The current thesis has as much as possible tried to use different data sources in order to minimize the impact of selection bias. Most of the findings from the hospital-based quantitative and qualitative interviews are well supported by findings from the DHS and community-based FGDs. Papers I and III are however purely based on the hospital-based data and hence prone to selection bias. Children of caretakers who utilized their nearer PHC facilities or other sources of care and who did not proceed to the district hospitals were not studied. The bypassing frequency of PHC observed among the hospital-based study participants in paper I will thus be over-estimated, since we do not know how many attended the lower level facilities and return home. Still, however, associations with factors influencing the odds of bypassing PHC facilities should be valid. This is supported by findings from the DHS, where similar factors were found to influence utilization of PHC facilities and higher level hospitals as the first option for child care (paper IV). With regard to paper III, we think that the factors found to be associated with severe disease from the hospital-based study would also be related to severity at the community level, with an exception of PHC utilization. Community-based studies on risk factors for early childhood deaths support the latter statement [68-70].

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We may have missed a few children who came to the out-patient departments of the two hospitals after 2pm and required no admission. However, as mentioned in the data collection section above, we had previously investigated and established that extremely few caretakers brought children to the hospitals after 2pm, unless the child was severely ill, in which case he/she would require admission. The interview would then be carried out later the same day if the clinician was on call or the next morning. Caretakers of fifteen children with severe disease who died before interviews were conducted were not included. However, the worse and best case scenarios in sensitivity testing showed that this did not significantly affect our point estimates.

Information bias: The hospital-based study inquired care-seeking information related to the current child illness. By using this approach, we believe we were able to pick up easily forgettable care-seeking information which community based studies may miss, often relying on past illness episodes of preceding weeks. The findings from the DHS are however prone to recall bias, since it inquired information on child's illness episode during the two weeks preceding the survey. The misclassification of severe and non-severe cases in the hospital-based study was minimized by utilizing trained clinicians with a good experience in pediatric care.

By utilizing clinicians who were involved in child care as interviewers might have however influenced the responses given. The respondents may have given answers in order to please the clinicians which might have resulted in under-estimation of some of the undesirable practices, such as the use of traditional healers. However using clinicians as interviewers have also advantages when doing hospital-based studies that utilize patients and which inquire similar information as that asked for in the normal consultations. Having an interviewer different from the clinician would require asking the same patient the same questions twice, which is boresome and tiring and could result in poor responses. In addition, using clinicians with good knowledge of the problem addressed as interviewers may reduce the risk of misunderstanding of the questions and the answers and thus contribute to increased validity.

Confounding: Potential confounding in the relationships studied were minimized by adjustment for potential confounders in the multivariate analyses of the different relationships studied, as discussed in the individual papers

Validity of the qualitative findings

Lincoln and Guba argue that validity (trustworthiness) of the qualitative research findings involves establishing four criteria: Credibility, dependability, confirmability and transferability [62]. We discuss the validity of our findings based on these four criteria.

Credibility is a replacement for the quantitative concept of *internal validity*. Credibility in qualitative research refers to the confidence in the truth value or believability of the study's findings [62]. This can be demonstrated through various strategies, including data triangulation i.e. use of multiple data sources, repeated contact with participants and where possible, returning findings to participants to determine if the findings reflect their experiences [71]. In the current thesis, both the hospital-based qualitative interviews and the community-based FGDs revealed similar findings. This strengthens the validity of our findings. Digital recording of all the qualitative interviews and FGDs maximized the amount and accuracy of the information captured, and even though the transcriptions were done by one of the clinicians involved in data collection, they were counterchecked by the PI, through listening to the audios while reading the transcripts. All the qualitative interviews were conducted by the principal investigator (PI) while she also fully participated in all the FGDs as a moderator, which ensured the amount and appropriateness of the information intended to be captured.

Confirmability (auditability) is a replacement for the quantitative concept of *objectivity* i.e. a degree of neutrality or the extent to which the findings of a study are shaped by the respondents and not researcher bias, motivation, or interest [62]. Well documented field notes, recorded audios of the qualitative interviews and FGDs and transcripts may allow the readers to follow our decision making [71]. The researcher's reflexivity presented below may also contribute to demonstrate the degree of neutrality during data collection.

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Dependability is replacement for the quantitative concept of *reliability* i.e. showing that the findings are consistent and could be repeated [62]. Because many qualitative methods are tailored to the research situation, there are no methodological shorthand descriptions, such as inter-rater reliability, commonly used in quantitative studies. Hence the exact methods of data gathering, analysis, and interpretation in qualitative research must be described [72]. The detailed description of the methods of qualitative data collection above may provide information on how repeatable the study might be or how unique was our situation. Lincoln and Guba also suggested that a single audit of the research can enhance both the dependability and confirmability of the project [62].

External validity/Transferability of the findings

External validity or transferability of the study findings examines whether or not an observed causal relationship can be generalized to and across different persons, settings and times [73]. While external validity is important in quantitative research, in qualitative research transferability to populations may not be a significant research goal [64]. One of the strategies used in establishing the transferability of the research findings, according to Krefting, is through comparing the study sample to demographic data [72]. In our case, the proportions of participants in various categories of the background characteristics for the qualitative interviews did not significantly differ from those of the hospital-based study (table 1, paper I), which were also similar to those of the DHS (table 1, paper IV). With respect to the study setting, the two districts where the data materials for papers I-III were collected are predominantly rural, representing most of the Tanzanian population.

5.1.4 Researcher's reflexivity

Reflexivity means sensitivity to the ways in which the researcher and the research process have shaped the collected data, including the role of prior assumptions and experience, which can influence even the most avowedly inductive inquiries [74]. "A researcher's background and position may affect what they choose to investigate, the

angle of investigation, the methods judged most adequate for this purpose, the findings considered most appropriate, and even the framing and communication of conclusions" [75]. The researcher's reflexivity contributes to the study's credibility as it helps to make the reader more aware of possible influences on the study.

The principal investigator had previously worked as a study physician in a clinical trial that was testing the efficiency of artesunate versus quinine for the treatment of severe malaria in underfive children at Korogwe district hospital (one of the study hospitals). During her nearly two years of seeing children with severe malaria, the PI had identified through patients' history, several delays in care seeking and treatment which was the motivation for the current study. The researcher's prior knowledge and assumptions might have influenced the angle of investigation and interpretation of the findings. This might have resulted in putting more emphasis on some issues and downplaying others. However, this may as well be seen as strength of the study, as the researcher was able to probe more and provide detailed information on some of the pre-identified problems.

Having worked at one of the study hospitals and being familiar with both hospitals and most of the hospital's staff is seen as an advantage. Familiarity with the hospitals' environment and procedures somehow simplified the data collection processes. The PI also believes that by utilizing clinicians that she well knew for data collection could have added to the quality of the collected data. However, we admit that by utilizing clinicians who were as well involved in managing patients might have influenced the consenting process: making the respondents feel that they had to accept.

5. 2 Discussion of the main findings

The main findings from the four papers comprising the current thesis are related to the reduced access to quality health care services in Tanzania. In paper I, caretakers reported to experience multiple lacks at the initially visited primary care facilities: including lack of diagnostic facilities, lack of drugs and lack of staff. These were also mentioned as reasons for bypassing such facilities among caretakers who did not utilize such facilities. Similar and other concerns were raised by participants of the FGDs (paper II). In paper III, children who had been initially attended at the primary care level for the same illness had a higher chance of presenting at the district hospital with severe disease compared to those who did not. Results from the DHS (paper IV) showed that children reported to be attended at PHC facilities had the lowest rate of blood testing compared to those attended elsewhere.

5.2.1 Early symptoms recognition

Early recognition of symptoms by caretakers is a crucial initial step in achieving prompt treatment for malaria, pneumonia and diarrhoea, and hence preventing child deaths from these illnesses. The finding that 91.6 % of the hospital-based study participants reported to have taken some action within the first 24 hours is a positive finding, demonstrating that most caretakers are able to recognize the very early symptoms of their children's illnesses. In line with this finding, several other studies have reported a high proportion of caretakers having taken some action within 24 hours of onset of child's symptoms [14, 77-79]. In one of the studies conducted in southern Tanzania, 78 % of visits to any kind of care took place within 24 hours of the onset of fever/malaria symptoms irrespective of the caretakers' SES groups [77].

5.2.2 Drug shops the most common first option of care

Almost 7 in 10 caretakers from the hospital-based study reported giving a sick child some treatments at home as their first action, commonly purchased from local or drug shops (52.1%), or that had remained from previous consultations (14.5%). In line with

this finding, the 2003 report “Improving the Supply, Distribution and Use of Antimalarial Drugs by the Private Sector in Tanzania” showed that the private pharmacies or shops were the source of 60% of the drugs bought to treat suspected cases of malaria in Tanzania [80]. Results from the DHS (paper IV) showed that private pharmacies were the first option for child care for one in four women, which could have been under-reported if caretakers may not have considered private pharmacies worth mentioning as an option of care.

Unless associated with other danger signs, “fever”, referred to as “homa” in Tanzania, which is the commonest symptom for most of the childhood illnesses and particularly malaria is seen by most caretakers as a condition that can be managed at home with medicines available from shops [15]. Hospital care is sought only when home treatment fails or if the caretakers perceive the illness as severe. Delays in seeking hospital care is among the major obstacles to children receiving appropriate and prompt treatment for malaria, as well as pneumonia and diarrhoea, resulting in loss of many child lives. A study in Uganda showed that, even though the median reported duration from illness recognition until home care was initiated was 4 hours (IQR 1–24), the median duration was 2 days (IQR 0–4) until care was sought outside the home [14]. Drug shops are very poorly regulated in Tanzania and some of them sell unregistered, substandard and even expired drugs [81, 82]. The use of these facilities as the first option of care may result in treatment failure and progression to severe disease and even child deaths from potentially treatable illnesses.



An example of a local drug shop

All staff serving customers at drug shops are, according to the pharmaceutical regulations in Tanzania, required to have basic medical knowledge, which is a minimum of 4 years training (e.g. pharmacy assistant or nurse) [81]. However, in practice drug shops are typically staffed by nurse assistants who have just one year of training. Still, however, they give medical advice to customers, and are often treated like doctors by the local community [80]. One study in Tanzania found most drug shops to be stocked with unregistered drugs, and none of the staff met the qualification requirements [81]. Not surprisingly, children who received their first treatment from drug shops in the hospital-based study had a higher chance of presenting at the district hospital with severe disease compared to those whose first treatments were obtained from public hospitals (paper III). Preference for “over-the-counter” drugs as the first option of care is a common findings [14, 83-86]. Several factors have been found to influence this practice. In one review of literature on behavioral issues related to malaria control in Sub-Saharan Africa, drugs sellers (drug shops, general shops stocking drugs and itinerant vendors) were found to be closer than the nearest public health facility and, unlike the public health facilities, they had a reliable supply of drugs [86]. In addition, drug sellers were also perceived as friendly and responded to community pressure (e.g. offering certain tablets or injections perceived to be strong) [86].

Having acknowledged the role played by the private medicine retailers in the management of common childhood illnesses, several interventions have been targeted to this option of care in some of the African countries and Asia, most of them with success [87-92]. Findings from a study that evaluated the impact of the Kenyan Ministry of Health training programs on the knowledge and practices of medicine retailers showed that, 30.7% and 5.2% of program and control retailers, respectively, sold Ministry of Health (MoH) Amodiaquine with correct advise on use to clients. Furthermore, 61.8% and 6.3% of program and control retailers, respectively, reported correct knowledge on dosing with Amodiaquine [91]. In Tanzania, an intervention which provided subsidized artemisinin-combination therapies (ACTs) to the accredited drug dispensing outlets resulted into an increase in use of ACTs from 3% to 26%, while the use of non-ACT antimalarials declined [87].

The practice of giving children left over drugs from previous consultations needs further investigations as it could be associated with treatment failures resulting from use of expired drugs. Suspensions of some of the commonly prescribed oral antibiotics like amoxicillin and cotrimoxazole can only be used for a maximum of 7 days after which period they must be discarded. The latter two antibiotics were among the left over drugs from previous consultations mentioned to be given to sick children at home among the hospital-based study participants. Use of left over drugs from previous illness episodes have also been reported by studies in other countries [93-95].

5.2.3 Bypassing of PHC facilities

PHC facilities are the intended first contact for uncomplicated health problems. If correctly diagnosed, mild cases of malaria, pneumonia and diarrhoea can be effectively treated with first line drugs at this level of care. Six in ten caretakers seen at the district hospital and who reported having nearer PHC facilities than the district hospital had not at all utilized them for the index child's illness episode. Half of these children had presented at the district hospital with mild forms of malaria, pneumonia and diarrhoea

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which could have been effectively managed this level of care. Bypassing of PHC facilities may lead to overcrowding and hence affect the quality of care at higher level hospitals which are designed to manage more complicated cases.

The most common reason given for bypassing PHC facilities among the hospital-based study participants was the lack of diagnostic facilities at this level of care (paper I). Caretakers in the FGDs as well expressed their high demands for such services at the primary care level (paper II). The health policy of Tanzania requires PHC facilities to provide basic diagnostic services [41], however, such services are almost never available [96]. Most clinicians at this level of care solely rely on history and clinical findings to make a diagnosis [96, 97], which may be possible for diseases like pneumonia and diarrhoea. However, to correctly diagnose malaria, which remains the number one killer of children under the age of five in Tanzania [26:193, 96:19, 98], a confirmatory test is necessary.

Malaria prevalence has decreased during the last decade in Tanzania as well as in other parts of sub-Saharan Africa [99]. This may indicate that, if not properly investigated, many children with fever may wrongly be clinically diagnosed as malaria cases and treatment given may then not lead to recovery. Findings from a study that evaluated the diagnostic accuracy and case management of clinical malaria in the primary health services in a rural area of south-eastern Tanzania well demonstrated the importance of blood testing [97]. In that study, the attending clinicians clinically diagnosed 640 (41.1%) of all consultations as malaria cases while the study showed that only 397 (25.5 %) of all consultations were confirmed malaria cases based on a blood slide [97]. Furthermore, 118 (30.2%) of confirmed malaria cases that were misdiagnosed as other infections by the attending clinicians went home without antimalarial drug prescription while some children who were misdiagnosed as malaria cases by clinicians went home with only an antimalarial, which obviously was not going to help. Caretakers with such experiences may lose trust and bypass facilities that does not provide diagnostic services the next time the seek care.

Realizing the necessity of blood testing in the fight against malaria, the WHO Global Malaria Programme in 2010, issued revised guidelines for the treatment of malaria [100]. In these guidelines, it was recommended that all suspected cases of malaria receive a diagnostic test prior treatment. This was further stressed in the World Malaria Report 2011, which recommended prompt parasitological confirmation by microscopy or rapid diagnostic test (RDT) for all patients with suspected malaria before treatment is started [101:XI]. Among the 1754 children with fever in two weeks preceding the 2010 Tanzania DHS, only 284 (26.6%) had reported to receive any blood testing during the illness, with the lowest proportion being observed among children solely attended at PHC facilities (paper IV).

Other reasons given for bypassing PHC facilities among the hospital-based study participants were lack of drugs, shortage of health workers and the facility being closed at the time the need arose. These deficiencies were well demonstrated by the reported experiences of primary care services among caretakers who underwent qualitative interviews (paper I), and also through the FGDs (paper II). Some of the reported practices like skipping of injections and inadequate dosage provision at PHC facilities need further investigations. These practices may not only be associated with treatment failures and child deaths from treatable illnesses but may also lead to drug resistance.

Tanzania has a very low availability of health care staff compared to similar countries [102]. The Tanzania Ministry of Health staff guidelines recommends two clinicians and two nurses for each dispensary and four clinicians and nine nurses for each rural health centre [103]. The shortage of staff is worse in rural areas due to the fact that the majority of health staff are concentrated in towns and big cities [104, 105]. The situation is further aggravated by the frequent absenteeism of health workers. Results from a survey of 134 health facilities conducted in five districts of southern Tanzania in 2004 (of which 127 were PHC facilities) found that only 14% of the recommended number of nurses and 20% of the recommended number of clinical staff has been employed at the facilities [106]. Furthermore, 44% of clinical staff was not available on the day of the survey. Various reasons were given for their absenteeism: 38% attendance to seminar sessions, 8% long-training, 25% official travel, 20% on leave.

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The poor provider-patient relations reported in this study have been previously documented in Tanzania [39, 107, 108]. The need for improved knowledge on how provider behaviors' impacted treatment seeking behaviors was in the WHO commissioned review of literature on treatment seeking behaviors for malaria, pointed to as being among the important knowledge gaps [109, 110]. However, not much has been done on this issue. The lack of urgency, unnecessary delays and lack of sympathy with sick children reported by caretakers in our study may not only lead to under-utilization of services but may also result in unnecessary child deaths.

The issue of informal payments for free health services is not a new finding [39, 111, 112]. Maternal and child health services are supposed to be provided free of charge at all levels of public health facilities in Tanzania [40, 41]. However, in our study, caretakers claimed to be denied of various services at the primary care level when they could not pay for them. Another study found that nearly three quarters of women who delivered in a facility in a rural district of Tanzania had paid for delivery [113]. Unofficial payments may be slowing down the national efforts to reduce deaths among vulnerable populations and needs serious action.

Bypassing of PHC facilities is not a new finding [19, 21-23]. Similar factors, as those mentioned in the current study, have been reported to influence bypassing of PHC facilities in most of the above mentioned studies. A critical review of behavioral issues related to malaria control in sub-Saharan Africa (2004) showed that, utilization of various sources of care was highly driven by practical concerns, including the easier access due to longer and more flexible operating hours, dependable and adequate levels of supplies and drugs, staff comprised of known local community members (often relatives, sometimes even children) and in some instances, perceived cheaper costs [86]. Results of a baseline nationwide Service Delivery Survey (SDS) carried out by Tanzania Development Research Group (TADREG) indicates that even though three-quarters (75%) of the villagers were concerned about the costs of health care, a majority (71%) still expressed a readiness to pay more for health services, provided the quality of services improved [114].

5.2.4 Caretakers' level of education the most important factor influencing care seeking behaviors

While the level of caretakers' SES did not seem to influence the type of facility first visited for child care in our study, caretakers' level of education significantly influenced care seeking behaviors, both among the hospital-based as well as DHS study participants: Bypassing of PHC facilities was significantly increasing with increasing caretakers' level of education (paper I) and the utilization of higher level facilities as the first option for child care significantly increased with increasing caretakers' level of education (paper IV). Furthermore, findings from the DHS showed that, private pharmacies were more commonly utilized as the first option for child care by caretakers with lower level of education while religious and private facilities were more commonly utilized by caretakers with higher level of education (paper IV). Not surprisingly, lower level of education, having obtained the first treatment other than paracetamol from drug shops and having utilized a nearer PHC facility for the same illness were all positively associated with children's' presentation with severe forms of malaria, pneumonia or diarrhoea at the district hospital (paper III). In line with these findings, a study in Vietnam found that patients with higher education tended to choose healthcare providers rather than self-treatment while self-treatment was more common among the poor and less educated [115]. Several other previous studies have reported both level of education and SES status to significantly influence care seeking behaviors [115, 116].

Poor quality of services at the primary care level have been reported by studies in other parts of Tanzania [24, 38, 39, 117, 118], as well as other countries in Sub-Saharan Africa [119, 120]. A study that evaluated the availability and use of emergency obstetric care in six districts in northern Tanzania found that, only one of the 18 health centers and three of the 93 dispensaries surveyed qualified as a Basic Emergency Obstetric Care (BEmOC) facility based on the United Nations guidelines [121]. Furthermore, the study showed a significant urban/rural variations in terms of availability of such services, ranging from around 4 facilities per 500,000 population in urban areas to zero facilities per 500,000 population in rural districts [121]. The same study showed a higher

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utilization of government facilities for delivery in urban districts compared to rural, which may indicate that some women travelled long distances to receive adequate services at facilities in urban areas [121]. Several other studies have documented the voluntary agency services and the private sector to generally provide better quality health services than the public sector in Tanzania [121-123]. The issue of poor health workers performance has been associated in some studies with poor motivation resulting from low salaries and poor working conditions in general [124, 125].

6. Conclusions and recommendations

6.1 Conclusions

1. Our findings, supported by literature, show that the perceived quality of care at the primary care level in Tanzania remains sub-optimal. PHC facilities and drug shops were more commonly utilized in rural compared to urban areas, and among caretakers with lower level of education. Higher level hospitals and private facilities, which are perceived to provide better quality care, were more commonly utilized by caretakers in urban areas and those with higher level of education. Lack of diagnostic facilities came out as the main reason for bypassing PHC facilities in this study and should be addressed in order to increase the utilization of such facilities.
2. Reported experiences by caretakers at the PHC level such as the lack of clinical examinations even when tools were available, skipped injections due to closed facilities, insufficient dosage administrations because of shortage of drugs and unofficial charges preventing access to various services could be accounting for many child deaths and needs serious attention.
3. Caretakers' reasons for their preference for drug shops as the first option of care were such as their closer proximity, their reliable availability of drugs, as well as the friendliness of the drug dispensers. Similar factors should be considered in order to increase the utilization of PHC facilities as the first option for child care.
4. Caretakers with no formal education, with lower SES and with more children had a higher risk of presenting at the district hospital with children having severe forms of malaria, pneumonia and diarrhoea. These could be target groups in order to further reduce child mortality from treatable illnesses.

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The conclusions from this study indicate that quality care is less accessible to the economically disadvantaged population who can not afford the costs of accessing quality care. This is a major equity issue which may partly explain the higher contribution to child mortality by children from this group.

6.2 Recommendations

6.2.1 Policy recommendations

1. The observation that people are willing to travel long distances to get better quality services calls for health policies that prioritize quality of care before quantity. In a situation with limited resources, utilizing the available resources to improve the quality of care at the available health facilities may result in better health gains than increasing the number of facilities with poor quality care.
2. We recommend for provision of malaria diagnostic tests at all PHC facilities in Tanzania. This may not only improve the management of malaria, which is the leading killer of underfive children in Tanzania, but may also improve the management of non-malaria fevers and reduce the unnecessary prescriptions of antimalarial drugs. Malaria Rapid diagnostic tests can be performed by a lay person and do not require electricity hence holds a great potential for achieving this goal in remote areas.
3. We argue for proper mechanisms for close monitoring of essential drugs and making sure that these are always available at the primary care level in Tanzania. Among the main reasons given by caretakers for their preference for drug shops is their reliable supply of drugs.
4. Private pharmacies should be among the targets for interventions to improve access to quality care, owing to the fact that they are among the most common first contact for sick children. We recommend for strict regulations and close monitoring of drug

shops. There is also a need to making sure that drug shops receive new guidelines, attend trainings and are facilitated to sell standard drugs.

5. Policy interventions are needed to address some of the reported health workers' behaviors in this study, such as the use of abusive and impolite language, lack of urgency and unnecessarily delays, unofficial payments and frequent absenteeism. These behaviors may not only affect the utilization of health services but may also lead to adverse effects such as child deaths resulting from delays to receive care.
6. PHC facilities opening days and hours need to be revised and monitored in order to avoid some of the reported practices like skipping of injections due to closed facilities in the evenings and on weekends and holidays. Lack of call allowances was mentioned by a village leader in one of the FGDs as a reason given by the health staff at this level of care for not providing services after the official working hours. The Tanzanian government should reconsider call allowances for health workers at this level of care which were initially provided but withdrawn.
7. We recommend for mechanisms for community involvement in quality care provision. Community empowerment may assist in achieving some of the above mentioned goals. Health education to the general population for example may not only improve utilization of appropriate health care services but may also empower people to know the right services and demand for them when they are available but not provided by health workers. This must however be coupled with accountability mechanism at the health care system level.
8. There is an urgent need for mechanisms to monitor the availability of qualified health workers at the PHC level in Tanzania. We urge for improved training and continued education to health staff working at this level of care, particularly in respect to the identification and urgent referral of children with danger signs.

9. Increasing the funding for health care services in Tanzania may be necessary in order to achieve most of the above mentioned items.

6.2.2 Recommendation for practice

1. We recommend for the health care staff to utilize the available health care resources efficiently to maximize the health outcomes of patients. When available, laboratory tests and simple patients' examination tools such as stethoscopes and thermometers should be utilized in order to minimize case misdiagnosis.
2. The reported practice among PHC staff of distributing one bottle of syrup among several children should be immediately abolished. In cases where it is not possible to provide full drug dosage because of drug shortages, we recommend that it is better to advice caretakers to purchase a full dose elsewhere. When necessary to provide a starting dose, for example while the caretaker is awaiting to get money for purchasing more drug, then the importance of completing the dosage must be stressed.
3. Health services must be respectful of medical ethics, culturally appropriate and gender sensitive. We recommend that health workers should observe these three criteria while providing services to people who need them. Health services users should be treated with respect at all times.

6.2.3 Recommendation for future research

1. Very few studies exist on the actual structural quality of PHC facilities in Tanzania in relation to the reported deficiencies. Studies are needed to establish the actual availability of drugs and laboratory services at different levels of care in Tanzania.

2. Further studies are needed to ascertain the extent to which the mismanagements of sick children at drug shops, PHC facilities and even higher level hospitals are actually contributing to child's progression to severe disease and death.

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Papers I-IV & Appendices

Paper I

Kahabuka C, Kvåle G, Moland KM, Hinderaker SG:

Why caretakers bypass Primary Health Care facilities for child care? - A case from rural Tanzania.

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RESEARCH ARTICLE

Open Access

Why caretakers bypass Primary Health Care facilities for child care - a case from rural Tanzania

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Abstract

Background: Research on health care utilization in low income countries suggests that patients frequently bypass PHC facilities in favour of higher-level hospitals - despite substantial additional time and financial costs. There are limited number of studies focusing on user's experiences at such facilities and reasons for bypassing them. This study aimed to identify factors associated with bypassing PHC facilities among caretakers seeking care for their underfive children and to explore experiences at such facilities among those who utilize them.

Methods: The study employed a mixed-method approach consisting of an interviewer administered questionnaires and in-depth interviews among selected care-takers seeking care for their underfive children at Korogwe and Muheza district hospitals in north-eastern Tanzania.

Results: The questionnaire survey included 560 caretakers. Of these 30 in-depth interviews were conducted. Fifty nine percent (206/348) of caretakers had not utilized their nearer PHC facilities during the index child's sickness episode. The reasons given for bypassing PHC facilities were lack of possibilities for diagnostic facilities (42.2%), lack of drugs (15.5%), closed health facility (10.2%), poor services (9.7%) and lack of skilled health workers (3.4%). In a regression model, the frequency of bypassing a PHC facility for child care increased significantly with decreasing travel time to the district hospital, shorter duration of symptoms and low disease severity. Findings from the in-depth interviews revealed how the lack of quality services at PHC facilities caused delays in accessing appropriate care and how the experiences of inadequate care caused users to lose trust in them.

Conclusion: The observation that people are willing to travel long distances to get better quality services calls for health policies that prioritize quality of care before quantity. In a situation with limited resources, utilizing available resources to improve quality of care at available facilities could be more appropriate for improving access to health care than increasing the number of facilities. This would also improve equity in health care access since the poor who can not afford travelling costs will then get access to quality services at their nearer PHC facilities.

Background

Limited access to available health interventions, especially for children from poor families and communities, is among the main factors suggested to be associated with child deaths worldwide and especially in Africa [1]. Approximately 8.8 million children under the age of five die every year worldwide, the majority from infectious diseases (malaria, pneumonia and diarrhoea) largely amenable to currently available preventive and curative

interventions [2]. A neonatal series report published in the *Lancet* in 2005 estimated that a reduction in neonatal deaths of up to 72% could be achieved through already available interventions, if provided at high coverage [3]. Furthermore, many studies have demonstrated a significant decrease in child mortality following general improvements in primary health care coverage. In Liberia and Zaire, sharp declines in child death (19% and 32%, respectively between 1984 and 1989) coincided with the introduction of intensive child health care programmes [4]. In a region of Senegal the child death rate fell from 350 to 81 per 1000 live births over a 25-year period in parallel with the implementation of modern

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health services [5]. Studies showing a large fraction of children dying at home also indicate under-utilization of health care services [6].

To facilitate access to health care, many low-income countries have assigned village-level PHC facilities as the main point of care for uncomplicated health problems. These are usually run by non-physician clinicians, such as clinical officers and/or nurses who are trained to attend simple cases and refer complicated ones to hospitals. However, research suggests that patients frequently bypass these facilities in favour of higher level hospitals despite substantial additional time and financial costs. A study in Kenya found that half or more of survey respondents bypassed their nearest (usually lower level) facility for antenatal care, immunization and child illnesses [7]. High bypass for outpatient care of episodic common illnesses has also been observed in Sri-Lanka and Namibia [8,9].

In recent years, Tanzania has significantly increased the number of health facilities across the country with the primary aim of improving access to health care for its entire people. The new Tanzanian health policy proposes establishment of a dispensary in every village, a health centre in every ward and a district hospital in every district. By 1992 about 72% of the population lived within 5 km of a health facility and 93% lived within 10 km [10]. However, the problem of bypass has also been reported in Tanzania [11,12].

The main reasons given for bypassing PHC facilities in the studies mentioned above were poor services (including lack of drugs and diagnostic services) and lack of trust in health workers at the bypassed facilities [7,11,12]. None of the studies explored in-depthly the actual user's experiences at such facilities in relation to the reported deficiencies. Focusing on utilization of PHC facilities among care-takers seeking care for their under-five children in rural Tanzania, this study aimed to 1) establish the frequency of bypassing such facilities 2) identify factors influencing bypass and, 3) explore experiences, at such facilities, of caretakers seeking care for their under-five children.

Methods

Study area

The study was conducted at Korogwe and Muheza district hospitals of Tanga Region in north-eastern Tanzania. The two hospitals serve as referral hospitals in the two districts. Korogwe district is located about 100 km inland from Tanga. Based on the 2002 Census and a population growth rate of 1.2% per year [13], the projected population in 2009 was 282,901. The district is served by 47 dispensaries, four health centres and three hospitals (the study hospital and two church owned hospitals). Muheza district is around 25 km from the city of

Tanga and about 70 km from Korogwe. Based on 2002 census and a population growth rate of 1.4%, it had a projected population of 306,862 in 2009 [13], which is served by 54 dispensaries, four health centres, and one district hospital. The two districts were purposely selected because they are endemic for malaria which is the leading cause of admissions and deaths among under-five children in both districts [6,14]. They are also predominantly rural, but were still easy to access.

Study design

The study employed concurrent mixed method approach applying both quantitative and qualitative research methods. The quantitative part focused on establishing the frequency and reasons for bypassing PHC facilities. This was complemented by in-depth interviews which explored perceptions and experiences related to the quality of care offered at PHC facilities. The actual sample size for the quantitative part of this study was calculated for another purpose. Analysis of the 348 children included in this study gave a power of 80% to determine a PHC bypassing difference of 15% between two equally large groups of children (60% versus 45%), granted a 95% CI. Data were collected between July 2009 and January 2010.

Quantitative data collection

The target population were care-takers of sick children between 1 month and 5 years, with a diagnosis of malaria, pneumonia or diarrhoea seeking care at the outpatient departments (OPDs) of the two district hospitals. We identified all sick children presenting at the OPD, between 9 am and 2 pm, with a history of one or more of the following symptoms; fever, cough, difficulty in breathing/fast breathing, diarrhoea or vomiting. These were reviewed and assigned diagnosis as per WHO guidelines [15] by the principal investigator or a trained clinical officer. Children with a diagnosis of malaria, pneumonia or diarrhoea were included in the study. Some children with a provisional diagnosis of malaria were also included even if the subsequent result of malaria rapid test was negative. Caretakers of children who needed admission to the hospital were interviewed later in the ward after the children had received treatment. Caretakers of severely ill children who died before the interviews could be conducted were not included.

Interviews were conducted by trained clinical officers using a pre-tested questionnaire after obtaining a written informed consent. We obtained detailed care-seeking information pertaining to the current child's sickness episode including all treatments received and their sources, as well as availability and use of PHC facilities. When the caretaker had reported presence of a PHC facility nearer than the district (study) hospital but had not at all utilized it during the index child's sickness

episode, an open-ended question was used to investigate reasons for bypassing it. Other information collected included questions on indicators of socio-economic status such as household characteristics, composition and assets.

In-depth interviews

In-depth interviews were conducted with the primary aim of exploring possible contributions of different potential factors (including quality of services offered at PHC facilities) to child's progression to severe disease. Hence, these were only conducted with caretakers who at the day of admission presented with a severely ill child. All children with a confirmed diagnosis of severe malaria, very severe pneumonia or acute watery diarrhoea with severe dehydration qualified to be interviewed. Caretakers were asked to recall details on actions taken from when they recognised the first symptom of the current child's sickness until the day of admission. Those who utilized their nearer PHC facilities were asked to give full details of what happened at these facilities while those who did not utilize them were asked to give reasons for bypassing them. A total of 30 in-depth interviews were conducted at around which point nothing new seemed to be coming out of the interviews. The interviews lasted between 25 and 45 minutes and were all performed by the principle investigator in Swahili, the national language. All interviews were digital-recorded and all the interviewees were also part of the quantitative survey.

Ethical consideration

Ethical approval was obtained from the National Institute for Medical Research in Tanzania. Informed written consent was obtained from all study participants prior to conducting the interviews. No caretaker refused to participate, neither for the quantitative nor the qualitative interviews. All study procedures were conducted with caution not to interfere with the patient's ordinary consultations and only after the child had received all the necessary treatment.

Data analysis

The quantitative data were double-entered and validated using Epidata version 3.1. SPSS version 18 was used for final analysis. A bypasser was defined as a caretakers who reported to have a PHC facility (dispensary or health centre) nearer than the district hospital but did not utilize it at all during the current child's sickness episode. When the district hospital was the nearest facility, the care-taker was classified as a non-bypasser.

We performed bivariate analysis to examine associations between bypassing a nearer facility and potential predictors, and multivariate analyses to determine which predictors remained associated with bypass when

adjusted for other factors. The variables selected for the multivariate model were either significant (p -value < 0.05) in the bivariate analysis or shown to be significant in previously published studies [16-18].

The analysis of the qualitative data followed the principles of thematic content analysis. The interviews were transcribed and analysed in Swahili language. The data material was coded and categorised according to the recurrent themes. Translation into English was done at a later stage after identifying meaningful themes.

Results

Socio-demographic characteristics

Table 1 depicts some of the background characteristics of our study participants. A total of 560 caretakers were interviewed in the hospital survey, 52.5% from Muheza and 47.5% from Korogwe. The majority of respondents were biological mothers (92.1%), were married (78.6%) and peasants (59.8%). The overall mean age of respondents was 28.3 years, with the majority (85.5%) between

Table 1 Characteristics of interviewed child-caretakers in Korogwe and Muheza districts in 2009/2010 (n = 560)

Characteristic	Quantitative No. (%)	Qualitative No. (%)
Study site		
Korogwe	294 (52.5)	17 (56.7)
Muheza	266 (47.5)	13 (43.3)
Child sex		
Male	301 (53.8)	14 (46.7)
Female	259 (46.3)	16 (53.3)
Child age (in months)		
0-11	210 (37.6)	3 (10.0)
12-23	151 (27.1)	7 (23.3)
24+	197 (35.3)	20 (66.7)
Care-taker's level of education		
No formal education	101 (18.0)	10 (33.3)
Primary education (std I-VII)	420 (75.0)	18 (60.0)
Post-primary education	39 (7.0)	2 (6.7)
Care-taker's occupation		
Housewife/Househusband	106 (18.9)	2 (6.7)
Peasant	335 (59.8)	25 (83.3)
Small scale business	96 (17.1)	1 (3.3)
Employed	17 (3.0)	2 (6.7)
Others	6 (1.2)	0 (0)
Care-taker's relationship to the child		
Biological mother	515 (92.1)	22 (73.3)
Biological father	17 (3.0)	4 (13.3)
Grandmother	15 (2.7)	2 (6.7)
Grandfather	1 (0.2)	0 (0)
Others	11 (2.0)	2 (6.7)
Total	560 (100)	30 (100)

We have full information everywhere except for 1 child under "care-taker's relationship to the child" and 2 children under "child age".

18 and 35 years. The majority (75.0%) had primary school education and 58.8% had completed it. Only 83 (14.8%) reported to have electricity and the majority (72.7%) used firewood as the main fuel for cooking. Approximately half of children were male (53.8%) and the majority (64.7%) were less than two years of age.

The background characteristics of the 30 caretakers participating in the qualitative study were very similar to the bigger study group except for the age distribution of the children, a majority (66.7%) being two years or more.

The majority of children whose caretakers underwent in-depth interviews had a diagnosis of severe malaria (17/30). Five had very severe pneumonia, five had acute watery diarrhoea (AWD) with severe dehydration, one had both severe malaria and AWD with severe dehydration while two had both very severe pneumonia and AWD with severe dehydration.

Care seeking patterns

Almost all caretakers (91.6%) reported taking some action within the first 24 hrs after recognizing the first child's symptom. The majority (52.1%) gave simple treatment, mainly paracetamol, purchased from local or drug shops. A few (14.5%) gave some treatments available at home, commonly from previous consultations. Only 20.9% went to public hospitals within the first 24 hrs.

For the majority, the main reason given for the first action taken was that it was the closest available care (55.6%). However, a larger proportion of those who utilized public hospitals as the first option of care said it was the care they trusted more as compared to those who used other forms of care (36.8% versus 5.3%).

Treatment given at home originating from previous consultations included paracetamol, oral rehydration fluid, metronidazole, zinc, salbutamol, cotrimoxazole, quinine, co-artem and amoxicillin. Most of these drugs were also reported to be purchased from local shops.

Bypass of PHC facilities

In the Quantitative survey, 348 caretakers (62.7% of the total material) reported having a nearer facility other than the study hospital. Of these, 206 (59.2%) had bypassed them during the current child's sickness episode. Among 30 caretakers interviewed qualitatively, 26 reported to have a PHC facility closer to home than the district (study) hospital. Similarly 12 had bypassed this facility.

Table 2 below depicts associations between potential factors associated with bypass among caretakers who reported a nearer PHC facility in the quantitative survey. The results showed no significant difference between the frequency of caretakers bypassing their nearest facility according to child's age and sex, and caretaker's socio-

economic status (Table 2). We found significant associations between bypassing a PHC facility and study site (66.1% in Korogwe district compared to 52.5% in Muheza district) and caretaker's level of education (83.3% among caretakers with post-secondary education compared to 52.7% among those with no formal education). However, the association with education disappeared after controlling for other factors. We found persistent inverse associations between bypassing a PHC facility and travel time to the district hospital, child's duration of symptoms and child's disease severity (Table 2).

At the district hospital, majority of children (81.7%) seen with non-severe disease had bypassed their PHC facilities, as compared to less than half (45.8%) among those with severe disease.

Reported quality of care at PHC facilities

Similar concerns related to availability and quality of care at PHC facilities were raised in the quantitative survey as well as the qualitative interviews. In the quantitative survey, lack of diagnostic facilities was mentioned most frequently by study participants as the main reason for bypassing the PHC facilities (42.2%). This was followed by lack of drugs (15.5%), the PHC facility being closed (10.2%) and services at the PHC facility not being good (9.7%). A few caretakers (3.4%) mentioned unavailability of staff as one of the reasons for bypassing PHC facilities while eighty participants (38.8%) gave other numerous reasons different from above, each comprising less than one percent.

The recurrent themes of the interviews also revealed lack of diagnostic facilities and drugs as being among the multiple deficiencies that care takers expected to encounter or had encountered at their nearer PHC facility. The following case is based on a mother's account of the care offered to her sick child at PHC facilities and illustrates how these 'multiple lacks' cause delays that may be fatal.

Case 1

A mother was seen at the district hospital 4 days after the onset of symptoms of her 4 months old female baby. On admission the child was semiconscious, dyspnoeic and had severe hypoglycaemia. The child died 8 hrs after admission. Below is a day to day account of the development of the sickness based on the mother's experiences of the care received at the PHC facilities where she first sought help for her sick baby.

Day 1: *The child started having diarrhoea and vomiting. The mother took her child to a nearby public dispensary. At the dispensary, mother was given metronidazole tablets to give the child at home.*

Day 2: *Observing no improvement in the child, the next morning mother went back to the same dispensary.*

Table 2 Factors influencing the odds of bypassing a nearer facility by caretakers in the two districts (n = 348)

Risk factor for bypassing	Reported nearer facility n = 348	Bypassers n = 206	OR ¹ (95% CI)	AOR ² (95% CI)
Study Site				
Korogwe	171	113 (66.1)	1.8 (1.1-2.7)*	1.8 (1.0-3.3)*
Muheza	177	93 (52.5)	Ref	Ref
Child sex				
Female	155	88 (56.8)	Ref	Ref
Male	193	118 (61.1)	1.2 (0.8-1.8)	1.5 (0.8-2.8)
Child age (months)				
0-11	127	73 (57.5)	Ref	Ref
12-23	88	55 (62.5)	1.2 (0.7-2.1)	1.4 (0.6-3.0)
24+	132	77 (58.3)	1.0 (0.6-1.7)	1.1 (0.5-2.3)
Number of living children				
1 child	86	59 (68.6)	2.0 (1.1-3.8)*	1.1 (0.5-2.7)
2-3 children	168	98 (58.3)	1.3 (0.8-2.2)	1.1 (0.5-2.4)
4 or more	91	47 (51.6)	Ref	Ref
Caretakers Level of Education				
No formal education	74	39 (52.7)	Ref	Ref
Primary education	256	152 (59.4)	1.3 (0.8-2.2)	1.0 (0.5-2.2)
Post-primary education.	18	15 (83.3)	4.5 (1.2-16.8)*	1.4 (0.3-6.9)
SES				
Low	108	59 (54.6)	Ref	Ref
Middle or high	240	147 (61.2)	1.3 (0.8-2.1)	1.5 (0.8-2.8)
Travel time to district hospital				
0-59 minutes	73	56 (77.0)	3.1 (1.6-5.8)*	3.5 (1.5-8.2)*
60-119 minutes	110	80 (72.7)	2.4 (1.4-4.2)*	2.4 (1.2-4.8)*
120+ minutes	126	66 (52.4)	Ref	Ref
Symptoms duration				
1-2 days	167	131 (78.4)	8.0 (4.4-14.4)*	11.0 (5.1-23.7)*
3-4 days	98	49 (50.0)	2.2 (1.2-4.0)*	5.0 (2.2-11.2)*
5 or more days	85	28 (31.3)	Ref	Ref
Disease Severity³				
Non-severe	120	98 (81.7)	5.3 (3.1-9.0)*	4.5 (2.2-9.1)*
Severe disease	203	93 (45.8)	Ref	Ref

* - Significant findings

¹ Unadjusted Odds Ratio from bivariate analysis

² Adjusted Odds Ratio for all other variables

³ Non-severe disease above includes: Non-severe malaria, non-severe pneumonia and acute watery diarrhoea with no dehydration

Severe disease included: Severe malaria, moderately severe and very severe pneumonia, and acute watery diarrhoea with some and with severe dehydration.

This time she was given one packet of oral rehydration solution and was told to continue giving metronidazole tablets as well.

Day 3: *The diarrhoea and vomiting was getting worse. The child was getting weaker and started breathing fast. The mother decided to go straight to the health centre (next higher level facility). On arrival, she was ordered by the clinician to go and buy an injection (antibiotic) from the local drug store which she was told was going to help the fast breathing. After the child had received the injection she was then asked to take her to be investigated for malaria at a nearby private laboratory. There she paid, had the child tested and brought back the*

results which revealed malaria parasites. She was then told to go and buy quinine syrup. Later on the same day, the mother was told that her child's condition wasn't improving and that she should go to buy a second drug (antibiotic).

Day 4: *The child was getting worse and was breathing very badly. The mother was sent to buy a third drug (antibiotic). The mother requested to be referred to the district hospital, but she was told even there they would give the child the same drug so she should rather go and buy the drug as advised. Later in the evening the quinine syrup the mother was giving her child by mouth was coming back through the nose. By that time the child*

could no longer breastfeed or eat but was still conscious. That is when she was referred the child to the district hospital. The mother was given a driver to bring her and her child to the district hospital, but no nurse was willing to accompany her. The child died 8 hrs after admission

Similar experiences of inadequate care were shared by other informants. In the following section the different deficiencies related to investigations, drugs, qualified health staff and services are further illustrated through the health seeking accounts of care takers.

Lack of diagnostic facilities

In line with the quantitative results, unavailability of investigations emerged as the main reason for bypassing PHC facilities among caretakers interviewed qualitatively. Most caretakers were keen to get their children investigated so that they could be sure of which disease their children were suffering from before receiving treatment. The following quote illustrates:

"... even if you take your child there, there is no service. If you arrive with a child with fever she will just be given ALU (current first line anti - malaria drug). There is no investigation that can tell you what's wrong with your child." (Bypasser, Kwamhosi village, Muheza district).

In this malaria endemic area, the most important investigations as perceived by the interviewees was the tests for malaria and haemoglobin level. At PHC facilities in Tanzania these investigations are almost always unavailable [19]. The expectation of no investigations for malaria was reported to be a major reason for bypassing such facilities as expressed by the caretaker in the quote below:

"We usually go there, and it's free but sometimes they don't have malaria investigation. They tell you to go and do it at a private hospital and come back with results. I find it bothersome so I decided to go straight to the private hospital..." (Bypasser, Majengo village, Korogwe district).

As a way of dealing with lack of diagnostic facilities at the PHC facilities, one caretaker reported to have his child investigated elsewhere before going to the public dispensary:

"I started at a research centre because I wanted to know what was wrong with my child and whether he had malaria, there they have investigations. After they discovered that he had malaria that's when I took him to the public dispensary to get treatment..." (Non-bypasser, Kerenge village, Korogwe district)

Lack of drugs

The problem of lack of drugs at PHC facilities is well illustrated as one of the 'lacks' in the mother's account

presented in the case above. In addition, other caretakers who utilized their nearer PHC facilities reported:

"... After arriving at the dispensary we were told to go buy intravenous fluids, because they had none. They gave the baby one drip, the other one wasn't finished and that's when they told us to go to the district hospital" (Non-bypasser, Makiyumbi village, Muheza district)

Even a simple drug like paracetamol was sometimes not provided as reported by one caretaker who requested it at a health centre:

"Back there, they didn't give me any help, even paracetamol. Because my child had fever, we requested for paracetamol but they told us to go and buy. But we decided to go straight to look for transport to take us to this hospital as we were afraid we might be late and lose the child, it was around 8.30 pm..." (Non-bypasser, Kwadoya Village, Korogwe district).

The above caretaker presented at the district hospital with a convulsing, unconscious child. The child was diagnosed with severe malaria and received emergency care including blood transfusion and survived.

Lack of qualified health workers

Unavailability of qualified health workers at PHC facilities was mentioned by some caretakers as a reason for their decision to bypass such facilities. This was encountered in two situations, either no health worker was available or that the trusted health worker was no longer available at a given facility:

"I didn't take him there because there is no one to give drugs. The woman (nurse) has gone for a seminar and the man (clinical officer) is away, I guess he has gone to Tanga. I was told drugs are there but nobody to give you". (Bypasser; Kwamndolwa village - Korogwe district).

Another caretaker from the other district had these to say:

"You know at the dispensary, those times Dr. N was around. At least when you went he would examine the child, I think he also has left. Now when you go there someone just looks at you and prescribes drugs for you, they tell you they have no investigations. So I decided to come straight here where I can get investigations." (Bypasser, Kwafungo village, Muheza district).

Lack of qualified health workers at PHC facilities was as also reported to be encountered by a care-taker who utilized her nearer facility:

"The main doctor is no longer there, he was brought to this hospital. Back there, we have remained with no one. I was given this drug to give at home but after seeing the way my child was breathing I decided not to give but come straight here" (non-bypasser from Kerenge village - Korogwe district)

Lack of services on weekends and holidays

Most dispensaries and some health centres in Tanzania do not operate during weekends and caretakers are forced to turn to other available options of care when need arises. As a result children may not receive appropriate care, as the case below illustrates.

Case 2

A mother was seen at the district hospital 3 days after the onset of symptoms of her 46 months old female child. On admission the child was unconscious and was diagnosed with severe malaria. Below is the mother's account of what happened.

Day 1: Mother was worried that her child was weak and did not eat well. At night the child developed fever.

Day 2: Next day the mother took the child to a private dispensary. The clinician diagnosed malaria and treated the child with SP (old first line anti-malarial drug, no longer in use).

"Usually I don't take my child there, that day I went because it was Saturday and the public hospital wasn't operating", the mother reported.

The same night the child developed high fever and started making noise with abnormal movements (fits). The mother thought it was the result of the drug fighting the malaria parasites and gave her child paracetamol. The fever went down and the child continued to sleep.

Day 3: The next morning the child seemed OK. She was playing but did not take much of her tea and chapati for breakfast. In the afternoon the child refused to eat anything.

"We prepared ugali for lunch and when she refused I cooked her rice which she likes but still she did not eat even a little, then I told myself my child must be real ill", the mother reported. Later during the day, the child's condition became worse as reported below by the mother; "Around 2 pm, she started making noise, very much noise, and was shaking strongly (convulsions). I tried to make her stand but she couldn't, I tried to make her sit, she couldn't either. In a short while her face changed completely and was not that of Mahija (child's name). I was so afraid and I asked myself, "What's wrong with my child?" I told her father who told me to get prepared to go to the hospital and that's when we came here..."

The child died later the same day.

Discussion

The study found that almost 6 in 10 caretakers seen at the district hospital had bypassed their nearer PHC facilities. The majority had opted to give drugs purchased from local and drug shops prior to coming to the district hospital, a practise that poses several dangers and may often lead to delays in seeking appropriate care. First of all, the drugs are given without prior examination of the child which may result in ineffective

treatment. Secondly, the inexperienced prescribers at local and drug shops may give wrong dosage, which may lead to ineffective or harmful effects of the drugs given. Furthermore, most of these shops are very poorly regulated and sometimes sell unregistered and expired drugs [20].

The main reason given for bypassing the PHC facilities in our study was the lack of diagnostic facilities at such facilities, particularly lack of equipments to test for malaria and blood haemoglobin level. The above two investigations are commonly unavailable at most PHC facilities in Tanzania [19]. Health workers generally make a diagnosis based on symptoms only and tend to prescribe anti-malarial drugs to most children with a history of fever. Malaria prevalence has decreased during the last decade in Tanzania as well as in other parts of Sub-Saharan Africa [21]. This may indicate that if not properly investigated, many children with fever may wrongly be diagnosed as malaria cases, and the treatment given may then not lead to recovery. Care-takers with such experiences may then tend to bypass these facilities the next time they seek care.

The second most common reason given for bypassing PHC facilities was the lack of drugs. Having travelled for some distance to reach a dispensary or a health centre, some of which charge unofficial fees for consultation [22], caretakers reported that their children commonly had not undergone any investigation. Furthermore, they were often told that drugs were out of stock and therefore given prescriptions to buy them elsewhere. In the first case described above, the caretaker was told to buy drugs three times, which in addition to taking her precious time, was very costly. The mother spent a lot of money and ended up losing her child. This could explain why many caretakers in our study opted to use other options of care and bring children straight to the hospital if the condition did not improve. It may as well explain the ongoing reported preference for the "over-the counter drugs" as the first option of care reported from several previous studies [23-26].

Another reason for bypassing PHC facilities given by caretakers in our study was lack of qualified personnel at such facilities, which is not a new finding. The main problem has been poor distribution where a majority of health staff are found in towns and big cities leaving the rural areas under-staffed [27]. A recent survey conducted in six districts of Northern Tanzania concluded that there were actually adequate human resources for health care provision in the area according to national standards. However, most qualified staff were concentrated in a few centralized locations [28].

Preference for higher level facilities has been reported in several other studies in Tanzania [11,12], as well as from other low-income countries [7-9]. In a study

conducted in Tanzania, 44% of the women seeking birth care had bypassed their nearest facility while 59.8% of women who lived in a village with a functioning health facility had delivered at home [11]. In this study, the women reported that quality of care (e.g. best provider, availability of drugs) and a greater trust in health workers at the facility chosen for delivery were the main reasons for selecting the facility. Results from a household survey carried out in Lushoto district in Tanzania showed that patients bypassed their lower level of health care to seek hospital treatment because of poor quality of services and poor availability of drugs [12].

Results from a population based discrete choice experiment to evaluate factors influencing women's preferences for place of delivery in rural Tanzania supports the above findings (29). The experiment established that the most important facility attributes influencing women's preferences for place of delivery were a respectful provider attitude and availability of drugs and medical equipment. Policy simulations suggested that if these attributes were improved at existing facilities, the proportion of women preferring facility delivery would rise from 43% to 88% [29].

Poor quality of services at PHC facilities has previously been reported from several other studies in Tanzania [12,30-33]. In one of the studies, it was found that a typical dispensary had a 40% probability of having the required level of drugs for injections and shortages of diagnostic and dressing equipments were very common [31]. In the same study above it was found that, the only real curative care advantage of health centres compared to dispensaries was their laboratory services. However, these laboratories were characterised by frequent shortage of reagents and other materials. Drugs availability in health centres was found to be even worse as compared to dispensaries. In a study carried out in Morogoro rural and Kilombero region, health centres and dispensaries were characterized by very long waiting times and shortage of staff and medicines [33].

From Kenya, Audo et al. reported that between 46.3% and 59.5% of mothers in a rural district had bypassed their lowest level hospitals in favour of district or provincial hospitals when seeking antenatal care, child immunizations and other child health services [7]. The most frequent reasons for bypassing PHC facilities given by the women in this study were poor care (21%), lack of drugs and supplies (17%) and poor laboratory services (12%). In Sri-Lanka, 66.5% of survey respondents with a minor or major illness in the past month reported bypassing their nearest health facility [8].

Our quantitative survey found shorter travel time, lower disease severity and shorter duration of symptoms to be associated with increasing frequency of bypassing a PHC facility for child care (Table 2). Several previous

studies have shown that distance is an important barrier to health care access [34,35]. It is worth noting that in our study, 52.4% of caretakers who reported to have travelled for two or more hours to reach the district hospital had bypassed their nearer PHC facilities. The substantial higher proportion of children with severe disease among non-bypassers (83.3%) as compared to bypassers (48.7%) could in part be a result of selection bias. Children with non-severe disease and who improved after utilizing their nearer PHC facilities obviously needed not to go to the district hospital and are hence under-represented. However, the higher disease severity and longer delays among those who first visit PHC facilities may indicate that treatment given at these facilities is not appropriate and that the use of these facilities may delay caretakers from seeking appropriate care. The findings from the qualitative interviews support this explanation.

The observation that the majority of children (81.7%) seen with non-severe disease at the district hospital had actually bypassed their nearer PHC facilities, suggests strong over-utilization of higher level facilities that are intended to treat severe cases referred from PHC facilities. When PHC facilities are bypassed, children are treated at higher costs than necessary, PHC facilities become under-utilized and higher level facilities become overburdened and diverted from their primary purpose of providing specialized care for more complicated cases [36,37].

Methodological strengths and limitations

This study inquired care-seeking information related to the current child illness. By using this approach, we believe we were able to pick up easily forgettable care-seeking information which community based studies may miss, often relying on past illness episodes of preceding weeks. The use of both quantitative and qualitative research methods which supported one another strengthens the validity of our findings.

The study was hospital-based and thus prone to selection bias. Caretakers who utilize PHC facilities or other options of care and did not proceed to the district hospitals could not be studied. Therefore, only the frequency of bypass among those reaching the district hospitals could be established, and not the overall frequency of bypass based on all who went for treatment at any facility in the area. However the bypassing frequency established in our study was somewhat similar to the bypassing frequencies reported in community-based studies referred to above. In addition, this was the most practical way to study bypass in relation to severe disease, since disease severity could possibly not be well established from merely a history of previous sickness episode at household level.

Owing to the ethical consideration that the interviews were only to be conducted after the child had received emergency care and was stable, very severely ill children who died within a few hours after admission were missed. However we believe this did not affect our findings as the numbers were small (we missed only 24 children who were confirmed to have died from malaria, pneumonia or diarrhoea).

We had no refusals, neither for the quantitative nor the qualitative study. This may be partly because the study was hospital-based and interviews were done among caretakers of sick children by clinicians who were involved in the treatment of the children. Furthermore, care-takers may have had no objection to participate because the study involved no alteration in the standard care and only inquired care-seeking information which is usually obtained in any normal consultation.

Conclusions

Our study has shown that people are willing to travel long distances to reach facilities perceived to provide services of better quality. This is a major equity issue indicating that quality health care is less accessible to the economically disadvantaged population who can not afford travelling costs to access quality care at higher level hospitals. Improving the quality of care at PHC facilities could also reduce delays in seeking appropriate care. Making simple investigations like rapid malaria diagnostic tests available and securing essential drugs at PHC facilities would improve case diagnosis and management which in turn may increase trust in the care provided at these facilities. Hence, we argue that in a situation of scarce resources, strengthening already existing PHC facilities to provide better quality services to rural populations should be prioritised before increasing the number of such facilities. We however acknowledge that provision of drugs and diagnostic facilities alone may not necessarily result in increase in services uptake, other factors such as provider-user interrelations also need to be addressed.

Abbreviations used

PHC: Primary Health Care; OPD: Out-Patient Department; WHO: World Health Organization; ORS: Oral Rehydration Solution; ALU: Artemether Lumefantrine (first-line antimalaria drug).

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Authors' contributions

CK planned and wrote the protocol, collected and analysed data, and was the lead author of the manuscript. GK had substantial contribution to the protocol development as well as data analysis and writing the manuscript. SGH and KMM supervised data analysis and contributed in writing the manuscript. All authors have read and approved the final version.

Competing interests

The authors declare that they have no competing interests.

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Paper II

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Unfulfilled expectations to services offered at primary health care facilities: Experiences of caretakers of underfive children in rural Tanzania.

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RESEARCH ARTICLE

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Unfulfilled expectations to services offered at primary health care facilities: Experiences of caretakers of underfive children in rural Tanzania

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Abstract

Background: There is growing evidence that patients frequently bypass primary health care (PHC) facilities in favour of higher level hospitals regardless of substantial additional time and costs. Among the reasons given for bypassing are poor services (including lack of drugs and diagnostic facilities) and lack of trust in health workers. The World Health Report 2008 "PHC now more than ever" pointed to the importance of organizing health services around people's needs and expectations as one of the four main issues of PHC reforms. There is limited documentation of user's expectations to services offered at PHC facilities. The current study is a community extension of a hospital-based survey that showed a high bypassing frequency of PHC facilities among caretakers seeking care for their underfive children at two district hospitals. We aimed to explore caretakers' perceptions and expectations to services offered at PHC facilities in their area with reference to their experiences seeking care at such facilities.

Methods: We conducted four community-based focus group discussions (FGD's) with 47 caretakers of underfive children in Muheza district of Tanga region, Tanzania in October 2009.

Results: Lack of clinical examinations and laboratory tests, combined with shortage of drugs and health workers, were common experiences. Across all the focus group discussions, unpleasant health workers' behaviors, lack of urgency and unnecessary delays were major complaints. In some places, unauthorized fees reduced access to services.

Conclusion: The study revealed significant disappointments among caretakers with regard to the quality of services offered at PHC facilities in their areas, with implications for their utilization and proper functioning of the referral system. Practices regarding partial drugs administrations, skipping of injections, unofficial payments and consultations by unskilled health care providers need urgent action. There is also a need for proper accountability mechanisms to govern appropriate allocation and monitoring of health care resources and services in Tanzania.

Background

To facilitate access to health care, many low-income countries have delegated care for uncomplicated health problems to primary health care (PHC) facilities. In Tanzania, these are termed dispensaries or health centres. According to Tanzania health policy 2003, dispensaries are designed to offer outpatient services including reproductive and child health services, and basic diagnostic services [1]. Health centres offer outpatient and

inpatient services, maternity care, laboratory, dispensing and mortuary services [1]. Dispensaries in Tanzania are usually run by non-physician clinicians called clinical officers, who are trained to attend simple health conditions and refer complicated ones to hospitals. These are assisted by one or two nurses. Health centers are staffed by a wider range of more qualified health workers. If effectively utilized by the targeted population, these facilities serve to reduce overcrowding at higher level hospitals that are designed to manage more complicated cases through the provision of more specialized care.

It is well known that providing quality care to sick children particularly at an early disease stage is crucial for

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attaining better health outcomes including preventing child deaths from treatable illnesses. However, the quality of care provided at most PHC facilities in developing countries continues to be questionable [2,3]. Problems of frequent shortages of drugs, diagnostic equipments and health workers characterize most of such facilities [2,3]. As much as 72% of Tanzania's population live within 5 km and 93% within 10 km of a health care facility [4]. With this density of PHC facilities, access in terms of distance is reasonable but the problems of care-seekers bypassing these facilities have repeatedly been reported [5-7]. In a population-based survey, in rural western Tanzania, it was reported that 44% of women seeking institutional delivery had bypassed their nearest PHC facility [5]. In this study, the women reported that quality of care (e.g. best provider, availability of drugs) and trust in health workers were the main reasons for selecting the health facility for delivery. Results from a household based survey in Lushoto district showed that patients bypassed their lower level of care to seek hospital treatment because of poor quality of services and poor availability of drugs [6]. The problems of bypassing lower level facilities have also been reported in Kenya, Sri-Lanka and Namibia [8-10]. Reasons given for bypassing PHC facilities in all the above mentioned studies can be summarized as "unfulfilled expectations", referring to dissatisfaction and disappointment from the quality of the services offered at such facilities.

Organizing health services around people's needs and expectations was strongly emphasized in the World Health Report of 2008 as one of the major four PHC reforms termed "services delivery reforms"[11]. The report brought into attention the fact that the PHC movement had underestimated the speed with which the transition in demand for professional care would bypass the initial attempts to expand rapidly access to health care by relying on sub-optimal care provided at most of the PHC facilities. The report further claimed that, "neglecting people's needs and expectations is a recipe for disconnecting health services from the communities they serve".

There is limited documentation of the user's expectations to services offered at PHC facilities. The current study is a community extension of a hospital-based survey that showed a high bypassing frequency of PHC facilities among caretakers seeking care for their underfive children at two district hospitals in the study area [12]. Our study objective was to explore caretakers' perceptions and expectations from the quality of services offered at PHC facilities in their area with reference to their experiences at such facilities.

Methods

Study context

The study was carried out in Muheza district of Tanga region in north-eastern Tanzania. Muheza district is

located about 25 km from the city of Tanga. Based on the 2002 census and an annual population growth rate of 1.4%, the district had a projected population of 306,862 in 2009 [13]. This population is served by 59 dispensaries (49 public, 10 private), six health centres (4 public, 2 private), and one district hospital [14]. The district is predominantly rural, and the people are mainly subsistence farmers of maize, cassava, oranges, coconut, rice and banana. Malaria is the leading cause of admissions and deaths among under-five children [14,15]. In 2005, the underfive mortality rate in Muheza district was 150/1000 live births (140/1000 live births in the whole region of Tanga). The above features make the region as well as the district similar to most of the rural Tanzania [16].

Study design and data collection

Due to its exploratory nature, the study employed qualitative research methods. We conducted four focus group discussions (FGDs) in four villages of Muheza district in September 2009 (Table 1). The villages were purposely selected from a list of eleven villages where the hospital survey participants reported to live. We used three main criteria for villages selection; 1) A village must be at least 10 km from the district hospital, 2) It must have a dispensary or health centre nearer than the district hospital and 3) It should have a significant number of bypassers (caretakers who did not at all utilize their nearer dispensary or health centre during the index child's sickness) and non-bypassers (caretakers who utilized their nearer dispensary or health centre prior to coming to the district hospital) as documented in the hospital survey [12]. In addition to above, we also selected villages in different geographical directions from the district hospital.

FGD participants were recruited one week before the meeting, through a village leader who was informed of the criteria for the selection of the study participants. The inclusion criteria were that the participants 1) should have at least one child less than five years under their care and 2) there should be only one caretaker participating per household. We advised the village leader to pick households skipping several in between even if they had a potential participant so as to have a wider area represented. A total of 47 women and men

Table 1 Composition of FGDs

FGD number	Participants	
	Men	Women
Village 1	0	9
Village 2	7	5
Village 3	4	10
Village 4	0	12

participated in four focus groups, each comprising of 9–14 participants. The majority were women reflecting the fact that women are the ones who commonly take children to the hospital within the study setting. Two FGDs were mixed while two were with women only. The discussions were held either in village government halls or a school classroom.

A guide was used to introduce topics for discussion in the form of questions. We left caretakers to discuss among themselves with the principal investigator as a moderator. Topics discussed included available health care options, quality of available primary health care services, barriers and obstacles faced by caretakers while seeking care for their sick under-five children at the PHC facilities in their areas, and reasons for bypassing PHC facilities. We added emerging new issues in the guide as the discussions progressed and we asked them in subsequent FGDs. The discussions were conducted in Swahili (the national language) by the principal investigator as a facilitator and two research assistants and were all tape-recorded. The discussions lasted between 55 and 90 minutes. At the end, participants were given an opportunity to ask general questions on health issues, and the principal investigator and one research assistant who was a clinician responded accordingly.

Ethical consideration

We obtained verbal consent for participation and audio taping from all the study participants prior to commencement of the discussions and after having explained the aim of the study. To secure confidentiality and facilitate an open discussion, we did not ask for a written consent and did not record the names of the participants. Only their sex was recorded. The study was approved by the Medical Research Coordinating Committee at the National Institute for Medical Research in Tanzania.

Data analysis

Data was manually analysed using the principles of thematic content analysis [17]. Audio materials were transcribed and analysed in the original discussions language, Swahili. Analysis commenced by examining the data material thoroughly so as to identify units in the text that were relevant to the subject in question. The identified units were then coded, categorized and later grouped under meaningful themes. Initial word to word transcription of the audio materials was done by one of the research assistants. Translation into English was done by the principal investigator at a later stage when meaningful themes had been identified. The second author took part in the analysis.

Results

Unfulfilled expectations

The findings reveal that caretakers had certain expectations to the quality of care to be offered when they brought their children to a health facility. When these expectations were not met, caretakers became dissatisfied. The study established substantial frustrations among caretakers related to availability, accessibility and acceptability of the services offered by PHC facilities in their area. Experiences not only of lack of quality services but also unacceptable health workers' behaviours dominated the discussions. In the following section, we present the findings as caretakers' unfulfilled expectations to the health services provided at the primary care level.

Expecting examinations before treatment

No tools, no touch

Our study established a growing demand among caretakers wanting to know for sure what's wrong with their children before they are given treatments. Caretakers expressed their disappointments regarding the common practice among clinicians of prescribing drugs to their children without having any investigation performed. This was also given as the main reason for bypassing PHC facilities, as one female caretaker expressed: "Nowadays people are civilized, they are afraid of giving the child drugs before she is investigated. They want to be sure if it's real malaria. The fever could be just a result of the teething process. So they go there (district hospital) to get the child investigated". (Woman, Village 2).

Although health centres and even dispensaries are supposed to provide basic diagnostic services, such services were reported to be almost never available. Caretakers in this study expressed their high demand of such services: "The main thing that bothers us and makes us go to town is the lack of diagnostic services. They should at least bring diagnostic services to our dispensaries. Because we know even if you go there (dispensary), the child will just be given ALU (first line anti-malarial drug) but may be the sickness is not even for ALU." (Woman, Village 2).

In one village, caretakers claimed to previously be provided with diagnostic services at their facility. However, the laboratory is no longer running because of the frequent shortage of laboratory reagents. She explained: "When they first brought the diagnostic services, people were being investigated normally for malaria, fever etc., but now they tell you that there is no reagent. Even temperature is not taken. They will just touch the child, and if the body is warm then you are told she has malaria. You will just be given drugs to give the child at home". (Woman, Village 3).

In addition to not receiving diagnostic services caretakers also reported that even basic clinical examinations were sometime not performed by the attending clinician. Commonly, the attending clinicians asked questions and prescribed drugs without even touching the child as expressed in the quote below: "There used to be that thing they put in your mouth or armpit, for checking temperature. Now even temperature is not taken. They do not even touch the child, you talk they write" (Woman, Village 3).

Medical tools as table decorations

Caretakers claimed that, even when the tools for clinical examination were available, they were often not utilized by the attending clinicians. Sometimes they were just displayed/left on the table as the following quote illustrates: "Another thing is that thing they wear around the neck, for examining the chest and the heart (stethoscope). For them, it is a table decoration. Every time you go with your child you find it stuck on the table. He just writes, he does not even look at your face. They should take it back to Teule (district hospital), if they do not know its use" (Woman, Village 3).

Expecting drugs to be available and sufficient

Frequent shortage of drugs was reported to be commonly encountered at PHC facilities. Caretakers reported often to be provided with the antimalarial ALU[®] (which was commonly available) and ordered to buy other drugs. Occasionally, even this malaria drug was not available at the facility nor in drug shops, in which case caretakers were forced to buy other types of malaria drugs, like Fansidar[®] which is no longer recommended by the Ministry of Health and Welfare (MoHW). One caretaker reported: "Antimalarial drugs are as well not available sometimes. We are used to go and buy these old ones like fansider. The drug will help the child for three, four days, and then malaria comes back very severe" (Woman, Village 1).

Unsafe drug dispensing practices

In connection with drug shortages, an alarming drug dispensing practice was reported in two villages where FGDs were conducted. In one of the villages, a woman said: "They ask if you brought a bottle, if you do not have they tell you to go and buy. They pour you some amoxicillin and you go. One bottle is divided among two to three children" (Woman, Village 3).

A caretaker in another village reported the same experience: "You may reach there and be told to go and bring a container. The mother is supposed to go back home and bring a container so that they pour you some drug. They measure mills and distribute one bottle among two to three children" (Woman, Village 1).

Caretakers raised several concerns pertaining to the above practice. First, they complained that most of the time the drug provided was not sufficient for the number of days prescribed: "You are told to give the child drug for five days, after three days the drug finishes and you do not know what to do" (Woman, Village 3).

Secondly, caretakers expressed their worry about the hygiene of the containers they used for taking the drug, since most of them were obtained under emergency conditions: "You are told to go look for a container at home or shops. You do not know of the safety of that container where you obtained it. They pour you drug, you give the child and diarrhoea becomes worse" (Woman, Village 1).

Health worker dependent drug availability

In one of the villages caretakers reported a sudden change pertaining to the availability of drugs after having new clinicians at their facility. One male caretaker reported: "Before they could bring drugs, but after five or ten days you are told drugs are out of stock. But since they brought these ladies, we are thankful because you could go even the whole month and drugs are available. It takes a long time before you are told drugs are out of stock" (Man, Village2).

Expecting health workers to be available

Unreliable availability of health workers at PHC facilities was another issue raised across all the four FGDs. The number of staff at most facilities was claimed to be insufficient to provide the expected services, and this was even more aggravated by their frequent absenteeism. Commonly only one nurse was available who had to do everything, as the quotes below points out: "Sometimes you find that the main doctor is not around and only one nurse is doing everything. She then will become the doctor. She will be the one taking care of the MCH clinic services, she will be the one working at the Antenatal clinic etc." (Woman, Village 4).

The same concern was raised by caretakers from a different village as reported by this woman: "Sometimes there is only one nurse, when others have gone on holiday. The same nurse has to give drugs to patients, attend children at MCH, and take care of pregnant women. By the end of the day she is very tired. She can't do her job properly." (Woman, Village 1).

Expecting facilities to be open

Dispensaries in Tanzania operate between 8 am and 4 pm and are closed on weekends and public holidays. However, it was reported that sometimes the facilities were closed even during the week days when no health staff was available to provide services. Ideally when the dispensary is closed, the health staffs who are supposed

to reside within the same community can still be contacted at their homes and are expected to provide services if the need arises. However, staffs are usually inaccessible after opening hours since most of them do not live within the communities they serve. One woman complained: "If your child gets sick at night, there is nowhere to run to until morning. If you have money then you will look for transport and take her to Teule (district hospital) the same night. If you can't afford then your child might die while you are watching her (Woman, Village 3).

Skipped injections due to facilities closure

If a child was prescribed hourly injections and the dosage fell on weekends, caretakers reported that the injections were skipped until the next working day: "On weekends the situation is even worse. Lets say today is Friday and your child has been prescribed hourly injections. When it reaches Friday evening, all nurses leave, as most of them live in Muheza (district centre). So the dose will be stopped until Monday when they come again. There is no service on weekends" (Woman, Village 1).

Wellbeing of newborn babies

The problem of unavailability of services in the evenings, weekends and holidays, was also reported as being of major concern for pregnant women and the outcome of the newborns in the area. It was reported that it was always a big challenge when a woman went into labour when the facility was closed, and most of the time there was no health staff available to assist with the delivery process as they did not reside within the community. One woman expressed: "... There is no nurse here to deliver the child at night. If labour starts at night you have to look for transport to go and deliver at Teule hospital, even if its 2 am. Nurses are only available during the day, when it reaches 4 o'clock they close and leave until the next day. That's why we are always full at Teule (District hospital). When you start feeling bad you decide to go straight to Teule as early as possible (Woman, Village 4).

In one village, a male village leader reported assisting pregnant women in labour at night several times, either to look for transport to take them to the district hospital or to mobilize funds from neighbours to pay for the transport costs. He also claimed that there were several occasions when there was no enough time to look for transport before the baby came out, in which case, himself and his wife had to assist with the delivering process. Below are his words: "I must tell you, I have delivered women, not once. I am not a nurse but sometimes a woman is brought to me and she is ready to deliver. It's not possible to put her in the car and there is no nurse

to assist, so I have to do it. In this case I don't know whose fault to say it is" (Man, Village 2).

Unavailability of electricity as a reason for facilities closure at night

Even when the health worker was willing to work at night, the working environment was reported not to be supportive. Caretakers in one of the villages reported that even when they got assistance from the nurse who lived within the village, they were supposed to bring a lamp to the dispensary since there was no electricity or any other alternative source of light. One caretaker reported: "When you knock at the nurse's door, before she even comes out she asks if you brought a lamp. If you don't have she tells you she can't work because the dispensary does not have light. That has happened to me three times. But because I have relatives closeby I go to them and they give me a lamp. Sometimes they tell me it has no kerosene, so I have to look for kerosene elsewhere" (Woman, Village 3).

In one village, a village leader reported that nurses in his area were being paid night allowances, and he was even requested to monitor their presence at night. However, the allowances were discontinued, and nurses are no longer working at night.

Expecting to be treated well

Undesirable health workers behaviours was another main complain raised by caretakers across all FGDs. Caretakers expressed their concerns on the way nurses and sometimes doctors treated them. Below are some of the behaviours that were of concern:

Unnecessary delays

Unnecessary delays particularly among the nurses came as one of the main complaints. Caretakers reported leaving their homes early so as to get to the facility early but most of the time they were left waiting in queues for long periods without any good reason as one caretaker expressed: "You might reach there and find two nurses, one cleaning and other arranging files. You went so early, lets say you arrived a few minutes before 8 am, but you may not be touched or even spoken to until 11 am" (Woman, Village 3).

Another woman from the same village added: "They also have a habit of going for tea like students. You may be told the doctor has gone for tea and you may wait for 3 hours and he may not be back. Or they may just be talking inside and you are waiting outside. That's why it is always full at Teule because of nurses' ignorance here" (Woman, Village 3).

Lack of urgency

It was reported that even when caretakers requested for immediate attention due to the seriousness of their

children's condition, still lack of urgency dominated. Caretakers reported sometimes to receive impolite answers from the nurses and doctors when they approached them to request for urgent care. The quotes below illustrate: "When you approach the nurse and tell her that my child's condition is not good she tells you 'do not teach me my job'. Then you remain with nothing to do but wait while observing your child until when she feels like helping your child by herself." (Woman, Village 3).

Another woman in a different village added: "Sometimes when you see that your child's condition is not good and approach the nurse she may chase you away and even yell at you 'go sit and wait outside'." (Woman, Village 4).

A man from the third village reported his experience, related to the above complains, at one primary health care facility in his area: "I guess two years ago, while we were on our way to the facility, my child got very high fever. While at the facility waiting for our turn to see the doctor, my child started convulsing. I requested other patients ahead of me so that I go in first, and due to my child's obvious condition they allowed me. However, soon after I entered the doctor's room he yelled at me "get out, who told you to come in". I told him to look at my child's condition and that my child was convulsing but he yelled at me "go away, do you know what a convulsion is?" I went back outside with my convulsing child. Fortunately a nurse was passing by and got to see my child's condition and took him to the doctor and that's when he got to attend him" (Man, Village 2).

Lack of sympathy

Lack of compassion by health workers to sick children was among other complains raised by caretakers. The latter story is a good example of this. It was as well reported that clinicians referred to by caretakers as doctors, commonly did not even touch the child. This was a big disappointment to most caretakers who expected their children to be properly examined. One caretaker expressed: "Your child's name might be called when it is your turn to see the doctor but when you get to sit near the doctor he may tell you to move away and that your child smells urine, claiming that we don't clean them properly. But you tell me, from the time I left my house, all the way to the hospital, if my child doesn't pass urine then wouldn't that be a sickness? And when you tell him the child's problem he just writes without even touching the child because he smells bad" (Woman, Village 3).

A man from a different village had these to say: "I will just give an example; there was a doctor here who has been recently transferred. No matter how serious your child was, when you requested for help outside working hours, he would just tell you, while sitting on his house

veranda, this is neither a hospital nor working hours. But thank God that we now have very kind women who are ready to assist us any time" (Man, Village 2).

Expecting services without payments

According to Tanzanian health policy, health care services to children below five years is supposed to be provided free of charge at public health facilities. However, caretakers claimed to incur some costs for various services when they brought their children to the primary care facilities. This was reported in three villages while in one village caretakers reported not to pay at all. The payments were reported to be for various services and were differed from one facility to another. Payments could be for consultation, drugs, investigations (when available) and facility guard. The quotes below illustrate: "To see a doctor is two hundred, the drug that you are poured in a container costs two hundred and five hundred for malaria investigation, total nine hundred. There at Mkanyageni children are not free" (Woman, Village 4).

Another woman from the same village added: "Here at our facility the only investigation available is that for malaria, which costs five hundred. If you don't have five hundred they will just give you ALU (first line antimalarial drugs) to give the child at home. We also pay one hundred for the guard" (Woman, Village 4).

In one village, caretakers reported to pay for the "free-of-charge maternal and child health (MCH) services", like monthly child weighing. The quote below illustrates: "Consultation and treatment costs one thousand and we pay two hundred for the guard who watches the dispensary. Weighing a child at the clinic costs two hundred" (Woman, Village 1).

However, Village 1 was the only village where caretakers reported paying for monthly child weighing. Other villages claimed not to pay for this service. We probed further to find out what happened when caretakers were not able to pay for these services and below was a response from one of the villages: "If you don't have two hundred they will not weigh your child and if you don't have one thousand you won't get any service" (Woman, Village 1).

Inaccessibility of services resulting from the inability to pay was also mentioned in the quote above by a woman from Village 4, who claimed that even though malaria investigation was available at their nearer PHC facility children were just prescribed ALU if caretakers were not able to pay for them. Occasionally, caretakers reported to pay and still be told that the drugs were out of stock and given a prescription to go and buy them elsewhere. Caretakers complained that this caused a lot of inconveniences as they had to look for other funds to buy the drugs which could take sometime while the child continues to suffer.

Expecting written referral information

Another thing complained about by caretakers was the lack of proper referral services when their children were referred to a higher level hospital. Across all the focus group discussions, caretakers complained of the fact that they were only given verbal referrals, and no written document was provided for them to take to the referred hospital. Caretaker's main concern was that they were not able to answer correctly some of the questions that were asked at the referred facility. They expressed their wish to have some sort of a written report from the primary care facility which would assist them. The quotes below illustrate: "He just tells you to take the child to Teule. Its only words while he is the one who treated the child without improvement. Why not give me any introduction so that when I reach there they know where I started. When I arrive at Teule (district hospital) I have to start afresh while his introduction would have helped." (Man, Village 2).

Another caretaker from a different village had this to say: "No arrangements, its just verbal, 'take a child to Teule', finish. Whether you went or not they don't care. You won't even be given a nurse to accompany you or even a piece of paper to say this child we failed, help her there, its just words. Also if you ask questions you may be answered rudely." (Woman, Village 3).

Discussion

Concerns raised by caretakers in this study, related to their unfulfilled expectations from services provided at PHC facilities, provide an insight into barriers to services utilization other than geographical accessibility. The findings provide relevant information on outcome indicators of access i.e. utilization and satisfaction, by the targeted population [18]. Obrist et al. defined access to health services as five dimensions namely availability, accessibility, affordability, adequacy and acceptability [19]. He claimed that, these dimensions directly influence the course of the health seeking process and hence utilization of the services. We argue that the same dimensions define quality of care as perceived by users of a given facility. Hence, in the following section we discuss our findings based on the above five dimensions of access.

Availability and adequacy of services

The current study was conducted among caretakers who lived within an area with a good geographical access to a PHC facility (dispensary and/or health centre); however, the facilities were reported to be characterized by frequent shortages of staff and equipments (including essential medicines and diagnostic services).

The discussions established a growing demand among caretakers regarding the provision of diagnostic services at PHC facilities in their area. This was found to be the

most common reason for bypassing PHC facilities also in the study at the two district hospitals in the area [12]. This could be explained by the raising awareness among caretakers regarding standard childhood infection management, which requires confirmation of diagnosis through diagnostic tests. It could also simply be a result of caretakers' previous experiences of treatment failures, when their children were provided drugs at such facilities without having any tests performed. Some diseases like pneumonia and diarrhoea can be correctly diagnosed by thorough history taking and clinical examination. Instruments like IMCI and WHO guidelines for the management of common illnesses with limited resources have been proven successful in achieving this goal [20,21]. However, for a disease like malaria a confirmatory test is very crucial in ascertaining the correct diagnosis. Most PHC facilities in Tanzania lack diagnostic equipments and it is a common practise for clinicians to rely solely on history and clinical findings to make a diagnosis [22]. As a malaria endemic area, many clinicians in Tanzania prescribe antimalarials to children presenting with a history of fever, often without a thorough clinical examination to rule out other infections (sometimes even when tools are available to enable them to do so). Many of these children receive no additional antibiotics. Malaria prevalence has been going down in Tanzania as well as in other parts of sub-Saharan Africa [23], and this may indicate that if not properly investigated children with fever may wrongly be diagnosed as malaria cases and the treatment provided may not necessarily lead to recovery.

Findings from a study that evaluated the diagnostic accuracy and case management of clinical malaria in the primary health services of a rural area in south-eastern Tanzania provide a good example [24]. In this study, a representative sample of pediatric consultations was carefully examined at peripheral health facilities throughout Kilombero District. While the attending health workers diagnosed 640 (41.1%) of all consultations as clinical malaria cases, the study established only 397 (25.5%) of all consultations to be malaria cases by using a blood slide [24]. Furthermore, 118 (30.2%) of confirmed malaria cases that were misdiagnosed as other infections by the attending clinicians went home without antimalarial drug prescription. Likewise, some children who were misdiagnosed as malaria cases by clinicians went home with only an antimalarial which obviously was not going to help. In another study conducted in rural areas of Morogoro and Dodoma regions in Tanzania, on average only 22% of the assessment tasks required by the IMCI guidelines were performed by the attending clinicians [25].

The reported shortage of drugs and health workers is not a new finding [7,26,27]. According to the MoH

Sector Strategic Plan (2003), the majority of skilled health workers in Tanzania work in large cities, and as a result, rural facilities are left understaffed [27]. Caretakers experiences related to drugs and health workers shortage in this study were disturbing. The reported practice regarding distributing one syrup among several children is unacceptable. This practice may not only lead to severe disease and death of insufficiently treated children but also development of drug resistance. In Tanzania, low cadre nurses working at PHC facilities are trained to work under instructions from clinical officers or medical doctors. Caretakers in this study reported the nurses to be the ones making the diagnoses and prescribing drugs at some of the PHC facilities when the clinicians were not present. This practice could result in mismanagement of children as the attending nurses may not have sufficient knowledge to make the correct diagnoses and give correct treatment. In a study mentioned above on misdiagnosis of malaria, 121 (7.9%) and 71 (4.6%) of consultations were made by the untrained nurses and trained nurses respectively [24].

Accessibility and affordability of services

Caretakers reported inaccessibility of services at night from dispensaries in their area. This does not seem to support the primary objective of PHC facilities, which is to improve access of care to poor people who can not afford to travel to distant hospitals. As opposed to day time, it is always a challenge to travel to a higher level hospital at night if the need arises, due to lack of public transport. In addition, other alternatives of care like drug shops are also closed. This leaves poor people with fewer options. Caretakers in this study expressed their concerns about this problem at the dispensary level especially in relation to the safety of the newborn babies when pregnant women go into labour at night. The reported occasional skipping of hourly injections until the next working day as a result of inaccessibility of services at night and during the weekends and holidays is another example of the dangers implied.

Children below five years are exempted from the official user fees under the cost-sharing policy of Tanzania [28,29]. However, caretakers in this study reported being denied of certain services when they could not pay. Caretakers from different villages reported paying for different services, while in one of the villages they reported not to pay at all. The issue of unofficial payments is not a new finding; it has been documented previously by other studies in Tanzania [30-33]. This indicates poor monitoring of PHC facilities.

Acceptability of services

Health services must be respectful of medical ethics, culturally appropriate and gender sensitive [34]. Several

concerns were raised by caretakers in this study regarding how health workers treated them. Concerns regarding the lack of urgency, unnecessary delays and lack of sympathy to sick children may not only lead to under-utilization of services at such facilities but could also result in unnecessary child deaths. The issues of poor provider-patient relations in Tanzania have previously been documented [30]. A study in Kenya also reported similar findings [35]. Patients in this study complained of indecent behaviour by the attending nurses at the studied government hospitals, such as discrimination, lack of respect, and impolite languages and ignorance.

Referral, which is a process by which a health worker transfers the responsibility of patient care, temporarily or permanently, to another health professional [36], is a critical part of appropriate primary care and the Integrated Management of Childhood Illness (IMCI) strategy [37]. As a rule, the referring physician should clearly specify the objectives of the referral in the referral letter. The use of verbal referral without any written documentation was another practice at PHC facilities that was complained about by caretakers in our study. Caretakers' wish of having a written document to present to the referred hospital is valid. This document could prevent giving the same treatments at a referred hospital that might have failed at a referring facility, hence avoiding unnecessary delays in the provision of appropriate care.

Poor quality of services at PHC facilities in Tanzania, characterized by the chronic shortage of equipments, supplies and staff, has previously been documented in other studies [6,7,26,30,38]. This not only affects care-seekers but could also be demotivating for health workers working at this level of care. In a study conducted in three districts of Kilimanjaro region in northern Tanzania, it was reported that clinical officers described the lack of laboratory services as "gambling with the health of patients" [39]. They claimed that people in their communities knew what quality of services they wanted, and some community members looked for the quality they simply could not provide.

At the same time, caretakers in this study acknowledged the fact that health workers were not sufficient and that it is impossible for the same health worker to work day and night without rest. Several other studies have attributed poor health workers' performances with poor working conditions, including low salaries [40,41]. Our study findings indicate that, the quality of care could be solved by focusing on both the individual health workers and the conditions under which they work.

Methodological strengths and limitations

The current study was complementary to the hospital-based survey [12] and was designed to provide the

community views on the quality of care offered by PHC facilities in their area. The results from this qualitative study were similar to the findings from the hospital-based quantitative survey. The fact that the two studies from the same area applying different methodology give similar conclusions adds to the validity of the findings from both studies.

The focus groups were somewhat bigger than what is the standard. This was because more than expected of the caretakers that were approached were willing to participate. However, we did not encounter any difficulties during the discussions as a result of group size. The higher number of female caretakers participating as compared to male caretakers was expected, and it can be seen as strength of the study, since women are commonly the ones taking children to health facilities in the study area.

Conclusion

Our findings support the observations made in the World Health Report of 2008 [11], that neglecting people's needs and expectations may contribute to making health care services less relevant to the communities they serve. Caretakers in this study have pointed out important weaknesses in services provided at the PHC level. Practices regarding partial drug administrations, skipping of injections, unofficial payments and consultations by unskilled health care providers need urgent action. These practices hamper the quality of services at PHC facilities, previously defined in terms of availability, affordability and acceptability, and hence perpetuate the problem of bypassing this level of care. Good procedures for referrals which is crucial to a functioning PHC, were also reported to be deficient. There is also a need for proper accountability mechanisms to govern appropriate allocation and monitoring of health care resources and services in Tanzania.

Abbreviations

MoH: Ministry of Health; MOHW: Ministry of Health and Welfare; PHC: Primary Health Care; WHO: World Health Organization.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

CK planned and wrote the protocol, collected and analysed data, and drafted the manuscript. GK had substantial contribution to the protocol development as well as data analysis and writing the manuscript. SGH and KMM supervised data analysis and contributed in writing the manuscript. All authors have read and approved the final version.

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Paper III

Kahabuka C, Kvåle G, Hinderaker SG:

Factors associated with severe disease from malaria, pneumonia and diarrhea among children in rural Tanzania--A hospital-based cross-sectional study.

BMC Infectious Diseases 2012, **12**(1):219

RESEARCH ARTICLE

Open Access

Factors associated with severe disease from malaria, pneumonia and diarrhea among children in rural Tanzania – A hospital-based cross-sectional study

Catherine Kahabuka^{1,2*}, Gunnar Kvåle¹ and Sven Gudmund Hinderaker¹

Abstract

Background: Mild cases of malaria, pneumonia and diarrhea are readily treatable with complete recovery and with inexpensive and widely available first-line drugs. However, treatment is complicated and expensive, and mortality is higher when children present to the hospital with severe forms of these illnesses. We studied how care seeking behaviours and other factors contributed to severity of malaria, pneumonia and diarrhoea among children less than five years in rural Tanzania.

Methods: We interviewed consecutive care-takers of children diagnosed with malaria, pneumonia and/or diarrhea at Korogwe and Muheza district hospitals, in north-eastern Tanzania, between July 2009 and January 2010, and compared characteristics of children presenting with severe and those with non-severe disease.

Results: A total of 293 children with severe and 190 with non-severe disease were studied. We found persistent associations between severity of disease and caretaker's lack of formal education (OR 6.6; 95% confidence interval (CI) 2.7-15.8) compared to those with post-primary education, middle compared to high socio-economic status (OR 1.9; 95% CI 1.2-3.2), having 4 or more children compared to having one child (OR 2.5; 95% CI 1.4-4.5), having utilized a nearer primary health care (PHC) facility for the same illness compared to having not (OR 5.2; 95% CI 3.0-9.1), and having purchased the first treatment other than paracetamol from local or drug shops compared to when the treatment was obtained from the public hospitals for the first time (OR 3.2; 95% CI 1.9-5.2). The old officially abandoned first line anti-malaria drug Sulfadoxin-pyrimethamine (SP) was found to still be in use for the treatment of malaria and was significantly associated with children's presentation to the hospital with severe malaria (OR 12.5; 95% CI 1.6-108.0).

Conclusions: Our results indicate that caretakers with no formal education, with lower SES and with many children can be target groups for interventions in order to further reduce child mortality from treatable illnesses. Furthermore, the quality of the available drug shops and PHC facilities need to be closely monitored.

Keywords: Severe, Non-severe, Malaria, Pneumonia, Diarrhea, Dehydration

Background

Mild cases of malaria, pneumonia and diarrhea are treatable with complete recovery from the widely available and inexpensive first line drugs. However, the three diseases still account for the majority of

child deaths among children between one month and five years of age in sub-Saharan Africa, including Tanzania [1,2]. Mortality is higher when children present to the hospital with severe compared to mild forms of these illnesses [3,4]. In one of the studies, conducted among children admitted to a Pediatric Emergency Room in India, it was found that the case fatality rates for non-severe, severe and very severe pneumonia were 0%, 8.7% and 47.0% respectively [4].

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There have been many efforts to prevent infections in children through vaccination programmes and other community interventions, some with success. One example is the reduction of malaria incidence following the wide distribution of insecticide-treated mosquito nets [5,6]. However, primary prevention of infectious diseases is still difficult to achieve particularly for children in poor families who are continuously exposed to health risks and other hazards typical in poor communities. In addition, many children from poor families are undernourished, making them less resistant to infections. This makes early disease detection and timely management crucial in preventing deaths of these children from treatable illnesses.

There has been an unacceptable widening gap in child mortality between rich and poor countries as well as between wealthy and poor children within many countries [9]. Within countries child mortality is often higher in rural areas, and among the poor and less educated families [7,8]. These inequities are compounded by the reduced access to available preventive and curative interventions by children from poor families. Public subsidies for health services frequently benefit rich people more than the poor [8]. Health interventions targeting children from poor families may significantly contribute to further reduction in child mortality from treatable illnesses.

We wanted to know what characterizes children who are more likely to develop severe disease from malaria, pneumonia and diarrhoea. Hence, we conducted a hospital based cross-sectional survey in two predominantly rural districts of Tanzania, and compared children presenting at two district hospitals with severe from those presenting with mild forms of malaria, pneumonia and diarrhoea. Our main objective was to assess determinants of severe disease, particularly health care seeking factors, among under-five children in the study area.

Methods

Study area

The study was conducted at Korogwe and Muheza district hospitals of Tanga Region in north-eastern Tanzania. The two hospitals serve as referral hospitals in the two districts. Korogwe district is located about 100 km inland from Tanga. Based on the 2002 Census and a population growth rate of 1.2% per year [9], the projected population in 2009 was 282,901. The district is served by 47 dispensaries, four health centres, one district hospital and two church owned hospitals. Muheza district is around 25 km from the city of Tanga and is about 70 km from Korogwe. Based on 2002 census and a population growth rate of 1.4%, it had a projected population of 306,862 in 2009 [9], which is served by 54 dispensaries, four health centres, and one district hospital. The two districts are predominantly rural and the

people are mainly subsistence farmers of maize, cassava, oranges, coconut, rice and banana. Malaria is the leading cause of admissions and deaths among under-five children in both districts [10,11].

Study design and sample size

This was a cross-sectional hospital based survey among care-takers who brought their sick children at Korogwe and Muheza district hospitals. The target population was care-takers of children between 1 month and 5 years, with a diagnosis of malaria, pneumonia or diarrhoea seen at the outpatient clinics in the two hospitals. In order to detect a difference of 15% in risk of having severe disease, assuming that the risk factor is present in 35% severe and 20% non-severe cases, granted 80% statistical power and a 95% confidence level, we needed at least 296 cases.

Data collection

Data was collected between July 2009 and January 2010. We identified all sick children presenting with symptoms suggestive of our diseases of interest to the outpatient department between 09am and 02pm i.e. fever, cough, difficult or fast breathing, diarrhoea and vomiting. These were reviewed and assigned diagnosis as per WHO guidelines [12] by the principal investigator or a trained clinical officer. Children with a diagnosis of malaria, pneumonia or diarrhoea were included in the study. While the diagnosis of pneumonia and diarrhoea was reached clinically, malaria diagnosis was confirmed with a rapid malaria diagnostic test (Paracheck[®]).

Interviews were conducted by trained clinical officers after obtaining a written informed consent. Children who did not need admission were interviewed in a room located near the outpatient department while caretakers of children who were admitted to the hospital were interviewed later within their respective wards, after the child had received initial treatment. The information collected included care-seeking information with all treatments received and places they were obtained from, availability and use of primary care facilities and referral information. Other information collected included questions about indicators of socio-economic status such as household characteristics, composition and assets. All children were also assessed for weight and mid-upper arm circumference (measured at the mid-point between the tip of the shoulder and the tip of the elbow). Caretakers of fifteen severely ill children who died before the interviews could be conducted were not included.

Ethical consideration

Ethical approval was obtained from the National Institute for Medical Research in Tanzania. Prior to conducting the interviews, informed written consent was obtained from all caretakers for their participation and

participation of their children, and none refused. All study procedures were conducted with caution not to interfere with the patients' ordinary consultations and only after the child had initiated all the necessary treatment.

Data analysis

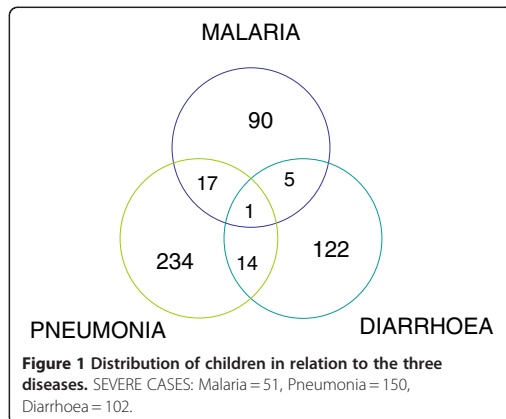
Data was double-entered and validated using Epidata version 3.1 and SPSS version 18 was used for analysis. Severe disease included all children with one or more of the following diagnoses: severe malaria, severe and very severe pneumonia, and acute watery diarrhoea (AWD) with some and with severe dehydration. Mild disease included non-severe malaria, mild pneumonia and AWD with no dehydration. We performed bivariate analysis to examine associations between child's disease severity status and potential predictors. Multivariate analyses were used to determine predictors that remained associated with severe disease when adjusted for other factors. The variables selected for the multivariate model were either significant (p -value <0.05) in the bivariate analysis or shown to be significant in previously published studies.

Results

We completed interviews with 560 caretakers of children with a history of symptoms suggestive of malaria, pneumonia or diarrhoea. Out these children, 483 qualified for one or more of above diagnoses and 293 were classified as severe cases. Thirty seven children had more than one diagnosis and if one or more of the diagnoses were severe then the child was categorized as a severe case. Figure 1 summarises the proportion of children with the three diseases together and their severity classification.

The number of study participants enrolled from each district was fairly equal; 258 (53.7%) from Korogwe versus 225 (46.3%) from Muheza. Children were fairly equally distributed by sex and 37% were below one year (Table 1). The majority of caretakers had primary education (75.8%) and were peasants (61.1%). Most caretakers reported having two to three living children and 121 (25.1%) had experienced at least one child death (aged less than five years) in the past.

We used logistic regression to explore any potential associations between participants' background characteristics and severe disease in our sample of children (Table 1). We found severe disease to be slightly more common among younger compared to older children (64.8% among infants versus 52.3% among children aged two or more years) as well as among children with smaller mid-upper arm circumference (70.6% among children with MUAC between 8.0-13.9 cm compared to 53.7% among those with MUAC of 15 cm and above). Caretakers with no formal education had significantly higher chances of presenting with a severely ill child compared



to those with primary and post-primary education (82.1% versus 57.9% and 43.6% respectively). Risk of severe disease was also positively associated with lower socioeconomic status, increasing number of caretakers' own alive children and increasing travel time from home to the district (study) hospital (Table 1).

Almost all care-takers (442/483; 91.5%) had taken some action within the first 24 hours after recognizing the first child's symptom. Fever was most frequently reported to be among the first symptoms (61.7%), followed by cough (44.5%). Diarrhea and vomiting was reported to be among the first symptoms in 23.4% and 21.6% of children respectively. Convulsions was experienced by 45 (9.3%) children but was only mentioned as the first symptom in 15 (3.1%) children.

The first option of care for the majority (50.5%) was giving treatment purchased from local and drug shops, mainly paracetamol. A few (15.3%) had given treatments available at home, commonly from previous consultations. Only 104 (21.5%) caretakers reported to have taken their children to the public hospitals within the first 24 hours of onset of symptoms.

Medications given at home were commonly leftovers of previous consultations but were also reported to be purchased from local shops. These included, apart from paracetamol and oral rehydration fluid, tablets like metronidazole, zinc, salbutamol, cotrimoxazole, and syrups like quinine and amoxicillin. Drug shops had more medications and also the specially-packed first line anti-malaria drug (ALu[®]) that was only to be obtained from public facilities at the time of data collection.

The majority of caretakers (60.5%) who reported not to utilize their nearer PHC facilities had obtained their first treatment other than paracetamol at the study hospital, most of them (77.6%) within 1-2 days of onset of child's symptoms. Likewise, majority of caretakers (84.5%) who

Table 1 Multiple logistic regression of possible background risk factors for severe disease among studied children (n = 483)

Risk factor for disease severity	Total cases**	Severe disease cases (%)	OR	AOR
Child's Sex				
Female	230	146 (63.5)	1.3 (0.9-1.8)	1.3 (0.9-2.0)
Male	253	147 (58.1)	ref	ref
Child's Age				
0-11 months	179	116 (64.8)	1.7 (1.1-2.6)*	1.8 (1.1-2.8)*
12-23 months	131	87 (66.4)	1.8 (1.1-2.9)*	1.9 (1.1-3.0)*
24+ months	172	90 (52.3)	ref	ref
Child's Weight				
0-9.9 kg	253	169 (66.8)	1.8 (1.2-2.6)*	1.6 (0.9-3.0)
10.0-14.9 kg	204	109 (53.4)	ref	ref
15.0-20+ kg	22	12 (54.5)	1.0 (0.4-2.5)	1.2 (0.5-3.2)
Child's MUAC				
8.0-13.9 cm	160	113 (70.6)	2.1 (1.3-3.3)*	1.6 (1.0-2.6)*
14.0-14.9 cm	139	80 (57.6)	1.2 (0.7-1.8)	1.0 (0.6-1.7)
15.0-20.0 cm	177	95 (53.7)	ref	ref
Caretaker's Education				
No formal education	78	64 (82.1)	5.9 (2.5-13.9)*	6.6 (2.7-15.8)*
Primary education	366	212 (57.9)	1.8 (0.9-3.5)	2.0 (1.0-4.0)*
Post-primary education	39	17 (43.6)	ref	ref
Caretaker's SES				
Low	174	106 (60.9)	1.6 (1.0-2.7)*	1.5 (0.9-2.6)
Middle	217	142 (65.4)	1.9 (1.2-3.2)*	1.9 (1.2-3.2)*
High	91	45 (49.5)	ref	ref
No. of own alive children				
1 child	137	69 (50.4)	ref	ref
2-3 children	240	149 (62.1)	1.6 (1.1-2.5)*	1.7 (1.1-2.7)*
4 or more children	103	74 (71.8)	2.5 (1.5-4.3)*	2.5 (1.4-4.5)*
Home-hospital travel time				
0-59 min	164	81 (49.4)	ref	ref
60-119 min	136	79 (58.1)	1.4 (0.9-2.2)	1.4 (0.9-2.3)
120+ min	143	99 (69.2)	2.3 (1.4-3.7)*	2.1 (1.3-3.4)*

OR – Unadjusted odds ratio (from bivariate analysis). AOR- Adjusted for child's **Age** and **Sex**, and Caretakers **Education** and **socio-economic status (SES)**.

* - significant findings.

** - Varying total due to missing cases . MUAC – Mid Upper Arm Circumference.

reported having utilized their nearer PHC facilities had also obtained their first treatment, other than paracetamol, from the public hospitals (PHC facility visited first or study hospital). However, only 24.8% had received this treatment within 1–2 days after the child got symptoms; 35.8% had received it on the 3rd or 4th day while the remaining 39.4% got it on the 5th day or later.

Severe disease was more common among children with longer symptoms duration and among children who had utilized Primary Health Care (PHC) facilities for the same illness (Table 2). Children who had received treatments other than paracetamol for the same illness

before coming to the district hospital had a higher probability of presenting with severe disease as compared to those who had received paracetamol only (67.9% versus 51.8%). Severe disease was also more common among children who had obtained the first treatment other than paracetamol from local sources or drug shops.

Table 3 below depicts results from multiple logistic regression analysis to compare risk factors for disease severity in individual diseases. The findings indicate that caretaker's number of living children was strongly associated with malaria severity while it was weakly associated with diarrhoea severity and not with pneumonia severity.

Table 2 Multiple logistic regression of potential care-seeking risk factors for severe disease among studied children (n = 483)

Risk factor for disease severity	Total number of cases **	Cases with severe disease (%)	OR	AOR
Symptoms duration				
1-2 days	246	121 (49.2)	ref	ref
3-4 days	137	102 (74.5)	3.0 (1.9-4.8)*	2.9 (1.8-4.7)*
5 or more days	100	70 (70.0)	2.4 (1.5-4.0)*	2.1 (1.3-3.6)*
First Rx PCM alone for 24 hrs or more				
No	299	203 (67.9%)	2.0 (1.3-2.9)*	1.8 (1.2-2.7)*
Yes	170	88 (51.8%)	ref	ref
Source of first Rx other than PCM				
Home/local or drug shop	123	95 (77.2)	2.9 (1.8-4.7)*	3.2 (1.9-5.2)*
Private hospital	25	16 (64.0)	1.5 (0.7-3.5)	1.9 (0.8-4.8)
Public hospital	330	178 (53.9)	ref	ref
Local herbs use				
No	433	259 (59.8)	ref	ref
Yes	50	34 (68.0)	1.4 (0.8-2.7)	1.4 (0.7-2.8)
Use of nearer PHC facility				
No	191	93 (48.7)	ref	ref
Yes	132	110 (83.3)	5.3 (3.1-9.0)*	5.2 (3.0-9.1)*

OR – Unadjusted odds ratio (from bivariate analysis). AOR – Adjusted for child's **Age** and **Sex**, and Caretakers **Education** and **socio-economic status (SES)**.

* - significant findings.

** - Varying total due to missing cases.

PCM = paracetamol. Rx = treatment. PHC = primary health care.

On the other hand, caretaker's SES and travel time to district hospital was associated with severity of pneumonia and diarrhoea but not with severity of malaria. Use of a nearer PHC facility was the only factor that was found to be significantly associated with disease severity from all the three diseases.

SP (sulphadoxine-pyrimethamine or Fansidar[®], formerly first line anti-malaria drug) was reported by 19 caretakers as the only drug provided to their children for the treatment of malaria (suspected or confirmed by tests). Five caretakers reported receiving this drug from public facilities, 6 from drug shops, 7 from private hospitals and 1 from unknown source. Eight out of nine children who received SP and who were confirmed having malaria by tests at the district hospital, had presented with severe malaria, two of them died. SP use for confirmed malaria treatment was highly associated with severe malaria; 89% of children treated with SP had presented with severe malaria compared to only 42% among those who had not received SP ($P < 0.01$).

Discussion

In this study from rural Tanzania, we found that children had a higher probability of presenting at the district hospital with severe disease if they had utilized PHC facilities for the same illness, had obtained the first

treatment other than paracetamol from local sources and drug shops, and if they had received SP as the only treatment for malaria. Presenting with severe disease was also associated with caretakers' low level of education and poor nutritional status of children.

An increased risk of severe disease among children of caretakers who reported having utilized their nearer PHC facilities for the same illness might have resulted from selection bias. Caretakers of children who improved after having utilized PHC facilities obviously needed not to come to the district hospital. In addition to that, caretakers of children with severe disease who do not recover after utilizing PHC facilities might be more often referred to and seen at the district hospitals than those with severe disease who do not seek care at PHC facilities. However it is worth noting that, the majority of caretakers who reported having utilized their nearer PHC facilities had obtained the first treatment other than paracetamol much later (on the third day or later) as compared to those who did not utilize them. Delays in treatment initiation among PHC users could be explained by the reported frequent shortages of drugs at these facilities [13], also reported in the study area [14]. Unavailability of drugs at PHC facilities may result in delays of several days, from the time drugs are prescribed until when caretakers are able to purchase

Table 3 Comparison of potential background risk factors for disease severity among individual diseases (n = 483)

Risk factor for disease severity	AOR (All cases)	AOR (Malaria cases)	AOR (Pneumonia cases)	AOR (Diarrhoea cases)
Caretaker's Education				
No formal education	6.6 (2.7-15.8)*		1.8 (0.7-4.7)	3.5 (0.6-21.4)
Primary education	2.0 (1.0-4.0)*	§	1.7 (0.7-3.9)	2.2 (0.4-10.6)
Post-primary education	ref		ref	ref
Caretaker's SES				
Low	1.5 (0.9-2.6)	1.2 (0.4-3.7)	1.8 (0.9-3.8)	1.7 (0.6-4.8)
Middle	1.9 (1.2-3.2)*	1.0 (0.4-2.8)	2.2 (1.1-4.2)*	1.2 (0.4-3.5)
High	ref	ref	ref	ref
No. of own alive children				
1 child	ref	ref	ref	ref
2-3 children	1.7 (1.1-2.7)*	3.2 (1.0-10.4)*	0.7 (0.4-1.4)	2.0 (0.8-4.9)
4 or more children	2.5 (1.4-4.5)*	8.5 (2.3-30.6)*	1.5 (0.6-3.3)	1.1 (0.4-3.2)
Home-hospital travel time				
0-59 min	ref	ref	ref	ref
60-119 min	1.4 (0.9-2.3)	0.4 (0.1-1.5)	1.5 (0.8-2.7)	2.1 (0.7-6.2)
120+ min	2.1 (1.3-3.4)*	0.9 (0.3-2.9)	1.6 (0.9-3.1)	3.9 (1.4-10.9)*
First Rx PCM alone for 24 hrs or more				
No	1.8 (1.2-2.7)*	0.9 (0.4-2.2)	1.8 (1.1-3.3)*	1.7 (0.7-4.4)
Yes	ref	ref	ref	ref
Source of first Rx other than PCM				
Home/local or drug shop	3.2 (1.9-5.2)*		2.4 (1.3-4.5)*	1.2 (0.5-2.8)
Private hospital	1.9 (0.8-4.8)	§	1.7 (0.5-5.5)	0.3 (0.1-1.5)
Public hospital	ref		ref	ref
Use of nearer PHC facility				
No	ref	ref	ref	ref
Yes	5.2 (3.0-9.1)*	4.2 (1.7-10.5)*	5.2 (2.3-11.9)*	4.4 (1.2-15.8)*

AOR- Adjusted for child's Age and Sex, and Caretakers Education and socio-economic status (SES).

§ - Numbers too small to enable any comparison across groups.

* - significant findings.

PCM = paracetamol. Rx = treatment. PHC = primary health care.

them from the drug shops. This finding needs further investigation.

The preference for drugs from local shops as the first option of care shown in this study is not a new finding [15-17]. The positive association between obtaining the first treatment other than paracetamol from these shops and severe disease in children is worth noting. Drug shops in Tanzania are very poorly regulated and some of them sell unregistered and sometimes expired drugs [18]. On the other hand, the reported use of drugs kept at home from previous consultations needs further investigation as this practice could be associated with treatment failures resulting from the use of expired drugs. Oral suspensions of some of the commonly prescribed syrups like amoxicillin and cotrimoxazole should be used only for a maximum of 7 days and then

discarded. Caretakers might be using these syrups for extended periods of time.

A quarter of our study participants had experienced at least one child death in the past. This depressing finding calls for urgent measures to improve the situation. The high number of deaths among children may be linked to some of the reported unexpected practices at PHC facilities in the study area [19], including the ongoing provision of SP for malaria treatment in children. Malaria is still the number one killer of children below five years in Africa [20], as well as in Tanzania [21]. Resistance of malaria parasites to SP was commonly reported in many parts of Africa as well as Tanzania between 1999-2000 [22]. In a study conducted in 2000 in Muheza district (one of our study districts), it was found that 45% of the patients treated with SP

failed to clear their parasitemias to below patency levels on day 7 [23]. In 2004, the World Health Organization (WHO) recommended that all countries revise their malaria treatment policies and opt for a combination treatment, preferably an artemisinin-based combination therapy (ACT) [24]. Hence, Tanzania changed its first-line treatment for malaria from sulphadoxine-pyrimethamine (SP) to artemether-lumefantrine (ALu[®]) in 2005 [25]. With funding from the Global Fund, Tanzania began, in December 2006, providing ACTs through public and mission health facilities free of charge to all children under five years and at a subsidized price for the rest of the population [26]. Surprisingly, five out of nineteen children who received SP as the only treatment for malaria reported having received it from public hospitals.

At the time of this study (2009/2010), subsidized ALu[®] was not yet available outside public facilities in the study area [27]. Hence we predict that SP use for malaria treatment at the community level could be even higher than we have reported in this hospital – based study, and even much higher among caretakers who do not utilize public health facilities (not represented in this study). Further research is needed to ascertain the extent to which this drug is still in use for malaria treatment in children, as this drug was highly associated with severe malaria and death in our sample of children.

Availability of ACT products in the private sector has generally been limited to registered pharmacies in urban areas where the price of a course of therapy is around 8–10 U.S. dollars [28]. The new treatment is well beyond the reach of individuals living in rural and peri-urban communities who need them the most. This has left millions of Tanzanians in rural areas, including the study area, to rely on public sector facilities for access to the recommended first-line treatment for malaria. If they seek treatment from other sources they may end up receiving suboptimal therapies, such as SP, which is more affordable and widely available. However, a few caretakers in our study had reported to occasionally having bought the specially packed subsidized ALu[®] for public facilities in their nearby local drug shops when these drugs were out of stock at their nearby PHC facilities. This finding raises an alarm.

There have been efforts to make subsidized ACTs available through Accredited Drug Dispensing Outlets (ADDOs) after realizing an important role played by this sector in provision of malaria treatment [28]. In 2007, using funding from the President's Malaria Initiative (PMI) and technical support from Rational Pharmaceutical Management Plus (RPM Plus) Program, Tanzania Food and Drugs Authority (TFDA) and National Malaria Control Programme (NMCP) began a pilot program to make subsidized ACTs available through ADDOs in 10

districts of Morogoro and Ruvuma regions [28]. The program resulted in a gradual increase in the number of malaria patients treated with ACTs, from 3% of all anti-malarials sold in July 2007 to 26% in June 2008. At the same time, the use of non-ACT antimalarials like SP declined. Currently, the government of Tanzania is trying to expand the provision of the subsidized ALu[®] through ADDOs countrywide.

In line with our findings, several previous studies had established severe disease to be more common among younger children and children of caretakers with lower level of education and SES [3,29,30]. In one hospital-based study conducted in southern Kerala, India, they found that severe pneumonia was less frequent in children over 2 years [30]. Likewise in our study severe disease was found to be more common in children less than two years as compared to those aged two years and above. In the Indian study above [30], paternal and maternal education of up to middle school and above was found to be protective against development of severe pneumonia. Similarly, our study showed an inverse association between severe disease and caretakers' level of education. One community-based study in rural southern Tanzania found that it was more likely for caretakers with higher SES to seek care from an appropriate provider as compared to those with lower SES [8]. In the same study, the frequency of antibiotic use for probable pneumonia among children with the lowest SES was less than half of those with the highest SES, and children in the lowest SES group were half as likely to have been given antimalarials as those in the highest SES category.

The observed positive association between severe disease and more number of children may be due to confounding; explained by the fact that caretakers with low education and SES also tend to have more children. However, the association persisted even after controlling for education and SES. This finding needs more investigation as it could provide another target group for the fight towards child mortality from treatable illnesses.

Methodological strengths and limitations

The present study has reported factors associated with severe disease from the three main childhood killers (malaria, pneumonia and diarrhea), thus providing more areas for further intervention towards child mortality from treatable illnesses. This study inquired care-seeking information related to the current child illness. By using this approach, we believe we minimized recall bias as we were able to pick up easily forgettable care-seeking information which community based studies may miss, often relying on past illness episodes of preceding weeks.

Our study was hospital-based and was conducted at district referral hospitals because this was the most convenient way to study factors associated with severe

disease. To avoid the selection bias, the study should ideally have been community-based, including all children with the three diseases in the area. However, it would be very difficult to identify and include a high enough number of severely ill children at the community level. Hence, we acknowledge that we missed mild and severe cases that used other options of care and did not come to the district hospitals. However, biased associations would only arise if an interaction is present between severity of disease and potential predictors in relation to the frequency of seeking hospital care. As discussed above, this might be the case when attending PHC facilities is studied as a risk factor, but seems less likely to influence the findings of the other predictors. Furthermore, our findings are similar to findings from previously community-based studies on risk factors for early childhood deaths [8,31,32].

Thirty seven children had more than one diagnoses; one child had all three diagnoses. We do not think this influenced our findings significantly as the number of children with more than one severe disease was very small. The fact that we did not include caretakers of fifteen children who died before the interviews could be conducted could have biased our findings towards milder disease. However since the number is too small we think the bias should be minimal.

Conclusions

Our study has identified some factors that are associated with severity of disease from malaria, pneumonia and diarrhea. We argue that health interventions addressing the factors and risk groups identified in this study would be important for further reduction of child mortality from treatable illnesses. The findings also indicate the strong need for district health systems strengthening, including strict regulations and close quality monitoring of the available PHC facilities and drug shops. Further studies are needed for providing more evidence of the ways and extent by which low quality of services at the existing PHC facilities and drug shops contribute to high mortality among children in developing countries.

Abbreviations

SP: Sulfadoxine-pyrimethamine (old-first line antimalarial drug same as Fansider[®]); ALU[®]: Artemether Lumefantrine (current first-line antimalarial drug); AWD: Acute watery diarrhoea; PCM: Paracetamol; PHC: Primary Health Care; WHO: World Health Organization; ADDOs: Accredited Drug Dispensing Outlets.

Competing interests

The authors declare that they have no competing interests.

Author's contributions

CK planned and wrote the protocol, collected and analysed data, and drafted the manuscript. GK had substantial contribution to the protocol development as well as data analysis and writing the manuscript. SGH supervised data analysis and contributed in writing the manuscript. All authors have read and approved the final version.

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Paper IV

Kahabuka C, Kvåle G, Hinderaker SG:

Care-seeking and management of common childhood illnesses in Tanzania – Results from the 2010
Demographic and Health Survey.

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Care-seeking and management of common childhood illnesses in Tanzania

– Results from the 2010 Demographic and Health Survey

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Abstract

Background

Malaria, pneumonia and diarrhoea continue to kill millions of children in Africa despite the available and effective treatments. Correct diagnosis and prompt treatment with effective drugs at the first option consulted for child care is crucial for preventing severe disease and death from these treatable illnesses. Using the 2010 Demographic and Health Survey data, the present study aims to assess care-seeking and management of suspected malaria, pneumonia and diarrhoea at various health care facilities in Tanzania.

Methods

We analyzed data for 8176 children born within a 5 years period preceding the survey. The information was collected by interviewing 5519 women aged 15-49 years in 10,300 households selected from 475 sample points throughout Tanzania.

Results

The most common first option for child care was PHC facilities (54.8 %), followed by private pharmacies (23.4 %). These were more commonly utilized in rural compared to urban areas: 61.2 % versus 34.5 % for PHC facilities, and 26.5 % versus 17.7 % for pharmacies. Women in urban areas and those with higher level of education more commonly utilized higher level hospitals and private facilities as their first option for child care. Only one in four children with fever had received a blood test during the illness with lowest proportion being reported among children solely attended at PHC facilities. Use of abandoned drugs for malaria treatment was also observed in public health facilities and antibiotics use for diarrhoea treatment was high (49.0 %).

Conclusions

PHC facilities and pharmacies most commonly provided sub-optimal care. These facilities were more commonly utilized as the first option for child care in rural areas and among the poor and non-educated families. These are groups with the highest child mortality which calls for interventions' targeting improvement of care at these facilities to further reduce child mortality from treatable illnesses in Tanzania.

Introduction

Even though the number of deaths among children under the age of five has fallen globally, still one in eight children dies before age five in Sub-Saharan Africa [1]. Malaria, pneumonia and diarrhoea account for the majority of these deaths, despite available and effective treatments. Pneumonia and diarrhoea diseases are the two biggest killers of children under the age of five globally, accounting for 18 % and 15 % of all deaths respectively in 2008 [2], while every minute a child dies from malaria in Africa [3]. Primary prevention of these infections is important but often difficult to achieve, particularly for children from poor families. Hence correct diagnosis and prompt treatment with effective drugs is very crucial in preventing child deaths from these illnesses.

Primary health care (PHC) facilities, i.e. dispensaries and health centres, are the closest and most often first contact for sick children when the disease is still mild. Proper case management at this level of care is critical in order to prevent severe disease and deaths from these illnesses. However, several studies in Sub-Saharan Africa have reported poor quality of services including mismanagement of sick children at this level of care [4,5,6]. Other studies have reported bypassing of this level for child care in preference for higher level hospitals which are believed to provide better services [7,8,9].

A significant reduction in child mortality have been observed in Tanzania during recent years [10]. However, according to the 2010 Tanzania Demographic and Health Survey (TDHS) report, still one out of 20 children dies before their first birthday, and one out of 12 before their fifth birthday [11]. Malaria, pneumonia and diarrhoea as well account for the majority of child deaths in Tanzania [11]. Tanzania has a high density of PHC facilities with 72% of its populations living within 5 km and 93% within 10 km of a health care facility [12]. According to Tanzanian referral system, PHC facilities are supposed to be the first contact for mild conditions. However, several studies have documented poor quality of services at most of these facilities [13,14,15,16,17], causing some of the care-seekers to bypass them while seeking care [18,19,20].

Using the most recent national survey data the current study aims to assess 1) the utilization of PHC facilities as the first option for child care in relation to caretakers' background characteristics, and 2) management of the common childhood conditions above (malaria,

pneumonia and diarrhoea) at various types of health care facilities consulted for child care in Tanzania.

Materials and Methods

Our study utilized data from the 2010 Tanzania DHS which is the eighth and most recent in a series of national sample surveys that measure levels, patterns, and trends of demographic and health indicators in Tanzania. DHS are nationally-representative cross-sectional household surveys (involving between 5,000 and 30,000 households) that are performed in many developing countries at regular intervals and which provide data for a wide range of monitoring and impact evaluation indicators. The 2010 TDHS included 10,300 households that were selected from 475 sample points throughout Tanzania.

Our study utilized the children's recode file (KR) which defines the unit of analysis as all children born within 5 years period preceding the survey (age 0-59 months). The data file contains information related to the child's pregnancy, delivery, postnatal care, immunization and health in general. The information for this data set was collected by interviewing women aged 15-49 years who had given birth to a live infant in 5 years period preceding the survey. Care-seeking information for child illnesses was collected by asking mothers whether their children had been ill with fever, diarrhoea or cough in the two weeks period preceding the survey. The types of facilities attended and the treatments received by sick children were recorded. The file also contains data for the mother of each of these children, including indicators for socio-economic status. Details of the data collection has been described elsewhere [11].

Using the DHS recode manual [21], which lists and describes all variables used in DHS data, we carefully studied the data set and made the necessary categorizations. Analysis was done using SPSS version 19 taking into account the clustering effect. The proportions of children reported with fever, diarrhoea and/or acute respiratory infection (defined by history of cough and difficult in breathing), were studied in relation to caretakers' background characteristics. Furthermore, we calculated the proportions (with 95% confidence intervals) of caretakers who utilized different types of health care facilities as their first option for child care in relation to background characteristics. Multiple logistic regression analyses were used to further study the observed associations and adjust for potential confounders i.e. residence, socioeconomic status (SES), education and number of living children below five years.

Ethics Statement

The data collection procedures for the Demographic and Health Surveys are to a large extent standardized and widely accepted. The broad goals of the exercise are explained to the respondents by fieldworkers during their introduction in the household. Written consent is obtained from all participants prior all the data collection procedures. With the consent of the host-country government, standard recode data files for all DHS data are made publicly available to researchers free of charge.

Results

Of the 8176 children studied, 4135 (50.8 %) were born at home, 4097 (50.1 %) were males and 7667 (93.8 %) were still alive at the day of the interview. Of the alive children, 3192 (43.7 %) were below 24 months and 7324 (95.5%) were living with the respondent. Almost half, 226 (45%), of children that were reported dead, had died before the age of one month while 459 (90.2 %) had died before their second birthday.

The survey interviewed a total of 5519 women. The majority were below 36 years (75%), were married (76.5%) and were from rural areas (77%). Most women had some or completed primary education (54.6%) and were farmers or self employed (65.5%). Seventy eight percent of women had given birth to a total of five or less children. Almost one in three women (28.7 %) had lost at least one child in the past while 476 (8.6%) had lost at least one child below the age of five in five years preceding the survey.

Table 1 shows the prevalence of the three common childhood illnesses (fever, diarrhoea and acute respiratory infection, ARI) versus the background characteristics of the studied women and children. According to the mothers' report, 1754 children (22.9%) had experienced fever, 1109 (14.9 %) had experienced diarrhoea and 589 (7.7 %) had experienced cough with short rapid breathing during the two weeks preceding the survey. The proportion of children with fever, diarrhoea and ARI was higher in urban areas and among children aged 12-23 months. Fever, diarrhoea and ARI were also slightly more commonly reported by women in the higher, compared to lower SES group, as well as among those with higher compared to no education.

[Table 1]

More than half of the sick children were taken to a health care provider: 64.3 % with fever, 53.3 % with diarrhoea and 60.8 % with symptoms suggestive of ARI. Table 2 shows the proportion of children reported being attended at different types of health care facilities as the first option for the three disease conditions studied. The most common first option for child care was PHC facilities, followed by private pharmacies.

[Table 2]

Only twenty women reported having utilized both PHC facilities and higher level hospitals for the same child illness episode and none of the respondents reported having received traditional care. In total, 115 women (6.6 %) reported having utilized higher level hospitals, among which more than 90 percent also reported them as their first option of care.

Management of common childhood illnesses

Among the 1754 children with a history of fever in two weeks preceding the survey, only 284 (26.6 %) were reported to have received a blood test during the illness. Blood testing was more commonly reported among children who were attended at non-public compared to public facilities; 71.7 % and 81.1 % among those who were solely attended at religious and private facilities respectively compared to 25.6 % and 43.1 % among those who were solely attended at PHC facilities and higher level hospitals respectively.

Figure 1 summarizes the treatments received for fever among our sample of children. Seventy five percent of all children with fever had received some antimalarials. However, only 47.8 % had received a proper antimalarial drug as defined by WHO guidelines for malaria treatment in children. Fifteen percent of children had received no treatment for fever.

[Figure 1]

Among children who had received any antimalarial, 36.7% had received the drug the same day, 32.1 % on the next day, while the rest had received it two days or later. The proportion of children who received prompt treatment with any antimalarial i.e. during the same or second day after onset of fever, was found to be higher among children in urban areas (74.3% compared to 66.6 % in rural areas), among children of mothers with secondary education or higher (70.5 % compared to 64.9 % among those with no education) and in children of

mothers with only one child below five years (76.0 % compared to 51.5 % among those with 3 or more children).

Table 3 shows the proportion of children who received proper antimalarials and the promptness of treatment with any antimalarial with respect to the type facility attended for the sick child. For this analysis we only selected children who were attended at only one type of facility. We found that the proportion of children who received proper antimalarials was higher among children solely attended at higher level hospitals (76.5 %) followed by PHC facilities (62.1%), and was lowest among children attended at pharmacies only (37.9%). Use of drugs according to the old guidelines for malaria treatment were more commonly reported by caretakers solely attended at private facilities (15.6) followed by pharmacies (12.8). Use of these drugs was also reported by those solely attended at PHC facilities (5.2 %) and higher level hospitals (2.9 %). Promptness of treatment with any antimalarial did not differ much with respect to the type of facility consulted (between 47-55%) except for children attended at pharmacies where only 32.1 % had received any antimalarial within the first or second day of fever onset.

[Table 3]

Figure 2 summarizes the treatments received by children for diarrhoea. Almost 90 percent of all children with diarrhoea had received some treatment. Six in ten children had received oral rehydration salts (ORS) or home rehydration solution (HRS). About half of the children had received antibiotics; in 31 % as the only treatment for diarrhoea. Intravenous fluids and Zinc use for diarrhoea treatment was very low.

[Figure 2]

The proportion of children who received ORS/HRS for diarrhoea was highest among those solely attended at higher level hospitals (75.9 %) followed by PHC facilities (73.4 %) and was lowest among children solely attended at pharmacies (57.5 %). The proportion of children who received ORS or HRS was also higher among caretakers with higher SES (68.0 % versus 53.6 % among children of caretakers with lower SES). We did not have sufficient information to study treatments received for acute respiratory infection.

Factors associated with the first option of care attended for fever and/or cough

Table 4 and 5 shows associations between background characteristics of the participating women in relation to the first option of care consulted for a sick child with cough and/or fever. We found PHC facilities utilization as the first option for child care to be more common in rural compared to urban areas and among women with higher number of living children below five years. PHC facilities utilization was also found to be more common among women with lower education and SES in the univariate analysis but the association disappeared after adjusting for potential confounders. On the other hand, higher level hospitals were more commonly utilized as the first option for child care by women in urban areas as well as among those with higher level of education. Higher level hospitals utilization as the first option for child care was also found to be higher among women with higher education and SES in the univariate analysis, but these associations as well disappeared after adjusting for potential confounders.

[Table 4]

Private pharmacies were more commonly utilized as the first option for child care by women with lower compared to higher education, as well as among those having more children below five years under their care. Religious and private health care facilities were more often utilized by women in urban areas as well as those with higher level of education.

[Table 5]

Discussion

PHC facilities were by far the most commonly reported first option for child care in this study. However further analysis showed that PHC facilities and private pharmacies were more commonly utilized by women in rural compared to urban areas, with lower level of education and those with a higher number of underfives under their care. On the other hand, women in urban areas and those with higher level of education more commonly utilized higher level hospitals and private facilities as their first option for child care.

More than 90 percent of the 115 women who reported having utilized higher level hospitals in this study, as well reported them being their first option for child care where only 20

women reported having utilized both PHC and higher level hospitals for the same illness. If valid, these findings may indicate poor functioning of the referral system and inequity in quality care access with the better off tending to utilize higher level hospitals which are believed to provide better services. These findings are in line with a hospital-based survey conducted in Tanga [20], which established a significantly higher bypassing frequency of PHC facilities among caretakers with higher level of education in preference for the district hospitals while seeking child care.

Several previous studies have documented poor quality of services at the PHC level in Tanzania [17,18,19,20,22], including lack of diagnostic facilities and frequent shortages of drugs and health workers. Lack of diagnostic facilities was found to be the main reason for bypassing PHC facilities for child care in the above mentioned hospital-based study [20]. Diagnostic tests are crucial in reaching the correct diagnosis in clinical evaluations. In a country like Tanzania where malaria is the leading cause of morbidity and mortality [11], a blood test to rule out this major childhood killer is important to all children presenting with a history of fever. However, in this study only one in four children with a history of fever had received a blood test, with PHC facilities having the lowest rate of blood testing.

Most clinicians at PHC level in Tanzania rely solely on history and clinical findings to make a diagnosis. This may be appropriate for the diagnosis of diarrhoea and pneumonia. However, to correctly diagnose malaria a confirmatory blood test is important. Findings from a study that evaluated the diagnostic accuracy and case management of clinical malaria in the primary health services in a rural area of south-eastern Tanzania demonstrated the importance of blood testing [14]. In that study, the attending clinicians clinically diagnosed 640 (41.1%) of all consultations as malaria cases while the study showed that only 397 (25.5 %) of all consultations were confirmed malaria cases based on a blood slide [14]. Furthermore, 118 (30.2%) of confirmed malaria cases that were misdiagnosed as other infections by the attending clinicians went home without antimalarial drug prescription while some children who were misdiagnosed as malaria cases by clinicians went home with only an antimalarial.

Realizing the necessity of blood testing in the fight against malaria, the WHO Global Malaria Programme issued in 2010, revised guidelines for the treatment of malaria [23]. In these

guidelines, it was recommended that all suspected cases of malaria receive a diagnostic test prior to treatment. The availability of inexpensive, quality assured rapid diagnostic tests for malaria means that parasite-based diagnosis can be achievable at peripheral health care facilities as well as at the community level. Provision of malaria diagnostic tests at PHC level in Tanzania could significantly improve case diagnosis, management and outcome at this level of care, which serve the majority of children from poor families and who contribute to the majority of child deaths. This could also improve utilization of such facilities among those initially bypassing them and hence reduce the overcrowding that is affecting the quality of care at most higher level hospitals.

Private pharmacies are very poorly regulated in Tanzania, and have been reported to sell unregistered, abandoned and sometimes expired drugs [24]. Pharmacies were found to be the second most common first option for child care in this study, serving one in four children, commonly of women with no education. Preference for private pharmacies as the first option for child care has previously been documented in Tanzania [20,25], as well as in other parts of Sub-Saharan Africa [26,27,28,29]. This practice needs interventions as it could be associated with delays in receiving appropriate treatments and may be contributing to severe disease and deaths of children from treatable illnesses. In the present study, among the 111 children who received malaria treatment following old guidelines, 42 (37.8 %) were reported to be solely attended at private pharmacies. In another hospital-based survey, severe disease was found to be more common among children who received their first treatment other than paracetamol from private pharmacies compared to those who did not [30]. In the latter study, private pharmacies were also more commonly utilized as the first option for child care by women with lower level of education.

Despite the fact that diarrhoea continues to account for many child deaths globally [31], use of the simple and standard treatment for diarrhoea treatment (ORS) remains sub-optimal in many countries, including Tanzania [32]. In the current study, sixty percent of children with diarrhoea had received oral rehydration solution. This is a slight improvement as compared to the 2004-05 Tanzania DHS which reported ORS use among children with diarrhoea to be around 54 % [33].

Zinc has been proven to significantly reduce morbidity and mortality from diarrhoea in young children [34,35,36] and was incorporated in the diarrhoea management guidelines since 2005

[37]. In the current study, extremely few children (< 1 %) were reported to receive Zinc for diarrhoea treatment. Antibiotics use for diarrhoea treatment is not recommended as it may exacerbate the condition [38,39,40]. However, half of children with diarrhoea in this study had received antibiotics and in some cases as the only treatment for diarrhoea. Antibiotics use for diarrhoea treatment in the current study is 10 percent higher compared to the 40 percent reported in the 2004 national survey [33].

Despite the fairly good distribution of health care facilities in Tanzania [12], still half of our studied children were born at home. This poses a danger for the safety of newborns, not only from potential delivery complications but also from the risk of infections secondary to poor delivering environment in most homes. Half of our study children who were reported dead had died within the first month of life, which could be associated with lack of proper birth care.

Almost one in four women in the current study had experienced at least one child death in the past and one in ten had lost at least one child below the age of five in five years preceding the current survey. Ninety percent of the children who died in the five years period preceding the survey had died before their second birthday. Several other studies have documented higher child morbidity and mortality during the first year of life [41,42]. Interventions targeting this age group are particularly important in the ongoing fight against underfive mortality.

The finding that higher prevalences of fever, diarrhoea and ARI were reported by women in urban compared to rural areas and those with higher compared to no education, as well as those with higher compared to lower SES might be due to reporting bias. These women might be in a better position to remember and report mild cases compared to non-educated women and those in the lower SES group. We also think the observed positive associations between caretakers' number of underfives with PHC facilities and private pharmacies utilization may be due to confounding; explained by the fact that caretakers residing in rural areas and those with low education also tend to have a higher number of children.

Methodological strengths and limitations

The current study utilized data from a nationally-representative household survey and hence the findings can be generalized at the country level. The information on care-seeking and management of the common childhood illnesses in this study is however prone to recall bias. The completeness of reporting of the past illnesses may vary between different groups of

caretakers in relation to the level of education and SES. Hence, variations in prevalences of illnesses between groups as well as the reported treatments received by sick children should be interpreted with caution.

Conclusions

Management of the childhood diseases accounting for the majority of underfive deaths is still sub-optimal in public as well as private health care facilities in Tanzania. The observation that PHC facilities and private pharmacies which tended to offer the poorest services were more commonly utilized as the first option for child care by women in rural areas and with low level of education may in part explain the higher child mortality observed in these groups. Interventions targeting quality of care at facilities offering primary health care services are needed to further reduce child mortality from treatable illnesses in Tanzania.

List of abbreviations

DHS – Demographic and Health Survey, PHC – Primary Health Care, ORS – Oral Rehydration Salts, HRS – Home Rehydration Solution, SES – Socio-Economic Status, SP – Sulfadoxine-pyrimethamine.

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Table 1. Background factors as determinants of occurrence of common illnesses in children under the age of five in Tanzania, 2010.

	Total* (%) n= 7667	Fever (%) n= 1754	Diarrhoea (%) n= 1109	ARI¹ (%) n= 589
Residence				
Rural	6137 (80.0)	1300 (21.2)	833 (13.6)	449 (7.3)
Urban	1530 (20.0)	454 (29.7)	276 (18.0)	139 (9.1)
Child Age				
0-11 months	1644 (22.5)	384 (23.3)	316 (19.2)	148 (9.0)
12-23 months	1549 (21.2)	458 (29.6)	325 (21.0)	144 (9.3)
24+ months	4105 (56.3)	900 (21.9)	457 (11.1)	291 (7.1)
Child sex				
Females	3857 (50.3)	874 (22.7)	531 (13.8)	274 (7.1)
Males	3810 (49.7)	880 (23.1)	579 (15.1)	314 (8.2)
SES²				
Lower	3437 (44.8)	724 (21.1)	470 (13.7)	223 (6.5)
Middle	1710 (22.3)	360 (21.1)	243 (14.2)	139 (8.1)
Higher	2520 (32.9)	670 (26.6)	396 (15.7)	227 (9.0)
Caretakers' education				
No education	1959 (25.6)	445 (22.7)	267 (13.6)	114 (5.8)
Primary	5219 (68.1)	1172 (22.5)	752 (14.4)	435 (8.3)
Secondary/ higher	489 (6.3)	137 (28.0)	90 (18.4)	40 (8.2)

1 Acute Respiratory Infection

2 Socioeconomic status

* Different total secondary to missing responses

Table 2. First option of care attended for common childhood illnesses in Tanzania

	Fever (%) (n = 1754)	Diarrhoea (%) (n=1109)	ARI² (%) (n=589)
Place first sought treatment			
PHC ¹ Facilities	801 (54.0)	448 (59.3)	245 (51.1)
Private pharmacy	344 (23.2)	157 (20.8)	126 (26.3)
Private facility	116 (7.8)	45 (6.0)	33 (6.9)
Higher level hospitals	106 (7.2)	39 (5.2)	40 (8.3)
Religious facility	101 (6.8)	49 (6.4)	32 (6.7)
Other	14 (1.0)	17 (2.3)	13 (1.0)

1 Primary Health Care (Dispensaries or Health Centre)

2 Acute Respiratory Infections

Table 3. Only source of care versus timing and proper antimalarial for fever

Only facility attended	Frequency within fever (%)	Received a proper¹ antimalarial (%)	Received Old² antimalarial Drug (%)	Prompt³ treatment with any antimalarial (%)
PHC facility only	776	482 (62.1)	40 (5.2)	395 (50.9)
Higher level Hospital only	102	78 (76.5)	3 (2.9)	56 (54.9)
Pharmacy only	327	124 (37.9)	42 (12.8)	105 (32.1)
Religious facility only	100	59 (59.0)	7 (7.0)	47 (47.0)
Private facility only	109	59 (54.1)	17 (15.6)	54 (49.5)
Total ⁴	1426		111 (7.8)	

- 1- Children were categorized as having received proper antimalarials if they had received Quinine, Artesunate or a combination with Artemisinin.
- 2- Children were categorized as having received old antimalarials if they had received Fansider (SP), Chloroquine or Amodiaquine alone.
- 3- Prompt treatment is defined as having received an antimalarial on same or next day after of onset of fever.
- 4- The total number of children given here only includes those who reported to sorely having utilized one type of care (children who were seen at several facilities are not included).

Table 4. Public facilities as the first option of care for fever and/or cough versus background characteristics

Background characteristic	PHC facilities n=991 % (CI)	AOR²	Higher level hospitals n= 125 % (CI)	AOR²
Residence				
Urban	34.5 (26.8-43.1)	Ref	18.5 (11.5-28.4)	Ref
Rural	61.2 (56.0-66.2)	3.1 (1.8-5.5)*	2.6 (1.7-4.0)	0.1 (0.04-.0.5)*
Child Age				
0-11 months	55.4 (47.5-63.1)	Ref	6.6 (4.0-10.8)	Ref
12-23 months	56.7 (50.1-63.1)	1.0 (0.8-1.5)	8.0 (5.0-12.4)	1.2 (0.6-2.4)
24+ months	52.1 (46.4-57.7)	0.8 (0.6-1.1)	6.0 (3.8-9.4)	0.9 (0.5-1.6)
Child sex				
Male	53.0 (47.3-58.6)	Ref	7.3 (5.0-10.5)	Ref
Female	55.1 (49.7-60.5)	1.1 (0.9-1.5)	6.4 (4.0-10.2)	0.8 (0.5-1.2)
Caretakers' Age				
15-18 yrs	72.5 (54.0-85.5)	Ref	6.7 (1.9-20.8)	Ref
19-35 yrs	52.2 (47.0-57.3)	0.5 (0.2-1.2)	6.5 (4.4-9.4)	1.0 (0.3-3.7)
36-49 yrs	58.9 (51.0-66.3)	0.5 (0.2-1.3)	8.5 (5.2-13.7)	2.1 (0.5-8.4)
SES¹				
Lower	61.0 (54.6-67.0)	Ref	3.4 (1.4 -8.0)	Ref
Middle	58.0 (49.9-65.8)	0.9 (0.6-1.4)	2.3 (1.1-4.8)	0.8 (0.4-1.5)
Higher	45.5 (38.6-52.5)	0.8 (0.5-1.4)	12.5 (8.6-17.7)	0.7 (0.2-2.8)
Caretakers' Education				
No education	56.8 (48.8-64.5)	Ref	2.3 (1.1-4.8)	Ref
Primary	54.4 (49.0-59.7)	0.9 (0.7-1.3)	7.5 (5.2-10.8)	2.5 (1.3-4.9)*
Secondary or higher	44.8 (35.6-54.4)	1.0 (0.6-1.6)	12.5 (6.4-23.2)	2.0 (0.7-5.6)
Number of children below five years				
1 child	58.7 (53.3-63.9)	Ref	8.8 (6.0-12.6)	Ref
2 children	50.8 (43.9-57.6)	0.6 (0.4-0.8)*	5.5 (3.1-9.8)	0.8 (0.4-1.5)
3+ children	46.6 (35.1-58.4)	0.4 (0.3-0.7)*	3.4 (0.9-11.7)	0.7 (0.2-2.8)

* Significant findings

¹ – Socio-economic status

² – Adjusted Odds Ratio for residence, SES, Education and number of living children below five years.

Table 5. Non-public facilities as the first option of care for fever and/or cough versus background characteristics

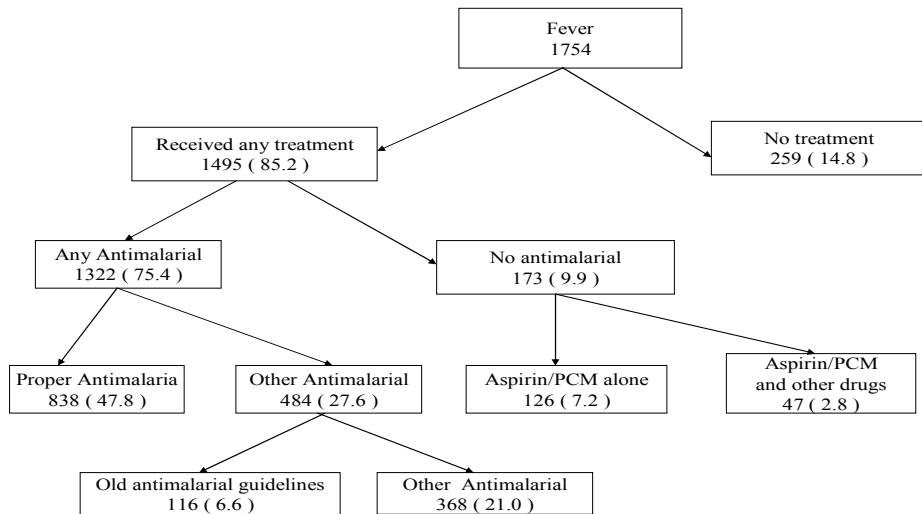
Background characteristic	Pharmacy n=443 % (CI)	AOR²	Relig/private n=257 % (CI)	AOR²
Residence Urban Rural	17.7 (9.5-30.4) 26.5 (21.8-31.8)	Ref 1.3 (0.5-3.1)	27.9 (21.4-35.4) 9.0 (6.7-11.8)	Ref 0.3 (0.2-0.7)*
Child Age 0-11 months 12-23 months 24+ months	21.9 (15.6-29.8) 20.3 (15.2-26.5) 27.5 (22.5-33.2)	Ref 1.0 (0.6-1.6) 1.5 (1.1-2.0)*	15.7 (11.8-20.6) 13.5 (9.7-18.5) 13.5 (10.4-17.3)	Ref 0.8 (0.5-1.3) 0.9 (0.6-1.3)
Child sex Male Female	24.6 (19.4-30.6) 23.7 (19.5-28.6)	Ref 1.0 (0.7-1.3)	14.5 (11.3 -18.6) 13.5 (10.2-17.6)	Ref 0.9 (0.6-1.3)
Caretakers' Age 15-18 yrs 19-35 yrs 36-49 yrs	14.4 (4.7-36.8) 25.1 (20.3-30.5) 21.8 (16.1-28.8)	Ref 1.3 (0.4-4.4) 1.1 (0.3-4.0)	6.4 (1.7-21.4) 15.2 (12.3-18.6) 10.3 (6.5-16.0)	Ref 3.1 (0.7-12.2) 2.5 (0.5-11.8)
SES¹ Lower Middle Higher	26.6 (21.7-32.2) 27.2 (20.5-35.0) 20.2 (13.4-29.3)	Ref 1.0 (0.7-1.6) 1.0 (0.6-2.1)	8.5 (5.3-13.3) 11.3 (7.3-17.0) 20.6 (16.4-25.7)	Ref 1.3 (0.7-2.4) 1.2 (0.5-2.8)
Caretakers' Education No education Primary Secondary or higher	27.2 (20.8-34.8) 25.5 (21.0-30.7) 6.5 (2.5-15.5)	Ref 0.9 (0.7-1.3) 0.2 (0.1-0.6)*	12.6 (8.0-19.4) 11.6 (9.1-14.6) 35.2 (25.0-47.0)	Ref 1.4 (0.7-1.2) 1.9 (0.9-4.1)*
Number of children below five years 1 child 2 children 3+ children	15.6 (12.6-19.1) 29.8 (23.3-37.3) 40.5 (30.1-51.8)	Ref 1.1 (1.5-3.0)* 3.3 (2.0-5.4)*	15.8 (12.5-19.8) 13.3 (9.8-17.9) 8.3 (4.0-16.4)	Ref 1.1 (0.7-1.6) 0.8 (0.3-1.8)

* Significant findings

¹ – Socio-economic status

² – Adjusted Odds Ratio for residence, SES, Education and number of living children below five years.

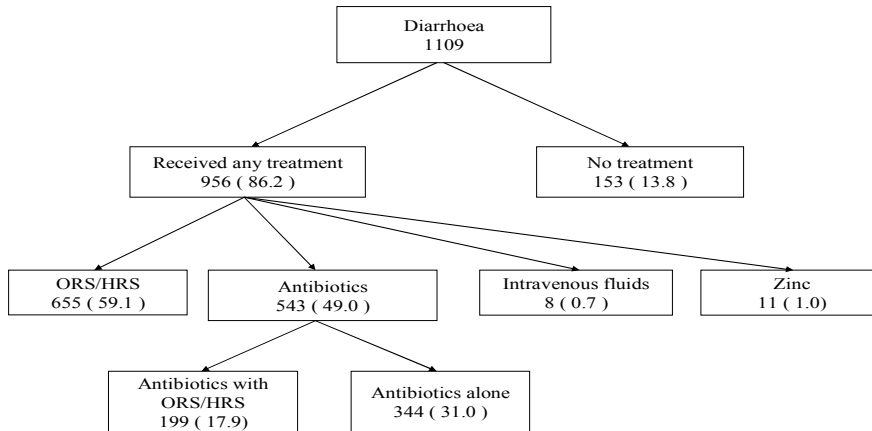
Figure 1. Treatments received for fever as reported by caretakers in Tanzania



- PCM - Paracetamol
- All proportions given above (in brackets), are calculated using all children with fever as a denominator.

Old antimalarial guidelines refer to drugs that are no longer recommended for malarial treatment due to resistance i.e. Fansider, Chloroquine or Amodiaquine alone.

Figure 2. Treatments received for diarrhoea as reported by caretakers in Tanzania



- ORS – Oral Rehydration Salts
- HRS – Home Rehydration Solution

All proportions given above (in brackets), are calculated using all children with diarrhoea as a denominator.

Appendices

THE UNITED REPUBLIC OF
TANZANIA



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08th July 2009

Catherine Kahabuka
C/O AQUAMAT Project
NIMR Tanga
P O Box 5004, TANGA

**CLEARANCE CERTIFICATE FOR CONDUCTING
MEDICAL RESEARCH IN TANZANIA**

This is to certify that the research entitled: Health seeking behavior and treatment in relation to severity of common diseases among children in rural Tanzania: A hospital based study in Korogwe, Muheza, Lushoto and Tanga (Bombo) district hospitals, (Kahabuka *C et al*), has been granted ethics clearance to be conducted in Tanzania.

The Principal Investigator of the study must ensure that the following conditions are fulfilled:

1. Progress report is made available to the Ministry of Health and the National Institute for Medical Research, Regional and District Medical Officers after every six months.
2. Permission to publish the results is obtained from National Institute for Medical Research.
3. Copies of final publications are made available to the Ministry of Health and the National Institute for Medical Research.
4. Any researcher, who contravenes or fails to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine.
5. Approval is for one year: 08th July 2009 to 07th July 2010.

Name: Dr Mwele N Malecela

Signature

ACTING CHAIRPERSON
MEDICAL RESEARCH
COORDINATING COMMITTEE

CC: RMO
DMO

Name: Dr Deo M Mtasiwa

Signature

CHIEF MEDICAL OFFICER
MINISTRY OF HEALTH, SOCIAL
WELFARE

11.4. INFORMED CONSENT

Participant Number: _____

ALL: INFORMED CONSENT

Hello. My name is _____ and I am a medical doctor who has interest in saving lives of children due to severe malaria, pneumonia and diarrhoea. I am conducting a study about risk factors for severe disease and death in children less than five years. I would very much appreciate your participation in this study.

I would like to ask you some questions concerning your child's current sickness. This information will help the government to plan and improve health services.

The questioning will not take too much time and whatever information you provide will be kept strictly confidential and will not be shown to other persons. The name of the child will only be taken to facilitate follow up after discharge.

Participation in this survey is voluntary and you can choose not to answer any individual question or all of the questions. However, we hope that you will participate in this survey since your views are important.

At this time, do you want to ask me anything about the study?
May I begin the interview now?

I _____ have understood the information given to me about the study and I agree to participate.

Name of the Child: _____

Relationship with the child: _____

Signature of respondent Date: Thump print of respondent Date:

Name of interviewer: _____.

Signature of interviewer: _____
Date: ____/____/____.

THANK YOU FOR YOUR COOPERATION

11.5. QUESTIONNAIRE

HEALTH CARE SEEKING BEHAVIOUR AND TREATMENT IN RELATION TO SEVERITY OF COMMON DISEASES AMONG CHILDREN IN RURAL TANZANIA

Zero draft questionnaire – June 2009

Participant Number: _____

Questionnaire Code: / ___ / ___ / ___ / ___ /

Interview date: ___ / ___ / ___.

Data entry date: ___ / ___ / ___.

District name: _____ District code: / ___ / ___ / ___ /

Facility name: _____ Facility Code: / ___ / ___ / ___ /

Interviewer's name _____

Questionnaire: To be used with caretakers of children five years and below with diagnosis of malaria, pneumonia and diarrhoea at health facility in the two sites.

PATIENT IDENTIFICATION
CHILD' NAME: _____ SEX: _____ RELIGION: _____
CHILD'S AGE: YEARS _____ MONTHS _____. PROBE for date of birth ___ / ___ / ___.
NAME OF THE RESPONDENT: _____ SEX: _____
AGE (respondent): _____. PROBE for date of birth ___ / ___ / ___.
RELATIONSHIP OF THE RESPONDENT WITH THE CHILD: a) Mother b) Father c) Grandmother d) Grandfather e) Sibling f) Other's (specify) _____
ADDRESS (Where the child lives) : _____
CHILD'S INITIAL ASSESSMENT
CHILD'S WEIGHT: _____ KG. MUAC: _____ CM.
CHILD'S HEIGHT: _____ CM.

SECTION 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS.

Now, I would like to ask you about your background -- your education, the work you do, your marital status, and things like that.

NOTE THAT: MAIN CARE-TAKER'S INFORMATION NEEDED HERE (If main care-taker not available skip Questions 1 to 5).

Serial no.	Question	Response	Data entry code
Q1.	Have you ever attended school?	A. YES B. NO	
Q2.	If YES, What is the highest level of school you attended: Primary, secondary, or higher?	A. PREPRIMARY B. PRIMARY C. POST-PRIMARY TRAINING D. SECONDARY E. POST-SECONDARY TRAINING F. UNIVERSITY	
Q3.	What is the highest (standard/form/year) you completed at that level?	GRADE.....	
Q4.	Are you currently married or living together with a man as if married?	A. MARRIED B. WIDOWED C. DIVORCED D. SEPARATED E. NEVER MARRIED F. LIVING LIKE M,ARRIED G. OTHER (SPECIFY)	
Q5.	What is your occupation, that is, what kind of work do you mainly do? As you know, some people take up jobs for which they are paid in cash. Others sell things, have small business or work on the family farm or in the family business. Are you currently doing any of these things or any other work?	A. HOUSEWIFE/HOUSEHUSBAN D B. FARMER C. SMALL SCALE BUSINESS D. EMPLOYED E. CURRENTLY STUDENT F. OTHERS (SPECIFY)	

SECTION 2. SOCIO-ECONOMIC STATUS

Now I would like to talk to you about your household (the household that this child lives) and what you own and things like that.

Q8.	How many people live in the same household that this child lives?	ADULTS _____ (15 years and above) CHILDREN _____ (Below 15 yrs)	
Q9.	Could you tell me the relationship of these people to this child?	ADULTS:	

		CHILDREN:	
Q10.	What are your household walls made of?	A. GRASS B. MUD C. BAKED BRICKS D. CEMENT BRICKS E. STONES F. TIMBER G. OTHER (SPECIFY)	
Q11.	What is your household roof made of?	A. GRASS/LEAVES/MUD B. IRON SHEETS C. TILES D. CONCRETE E. ASBESTOS F. OTHERS (SPECIFY)	
Q12.	What is your household floor made of?	A. NATURAL FLOOR (EARTH/SAND) B. WOOD C. CEMENT D. OTHER (SPECIFY)	
Q13.	What is the main source of energy for lighting in the household?	A. MAIN ELECTRICITY B. SOLAR C. GAS D. KEROSENE LAMP E. FIREWOOD F. CANDLES G. OTHER (SPECIFY)	
Q14.	What kind of toilet facilities does your household have?	A. FLUSH TOILET B. TRADITIONAL PIT TOILET C. VENTILATED IMPROVED PIT D. NO FACILITY/BUSH/FIELD E. OTHER (SPECIFY)	
Q15.	Do you share these facilities with other households?	A. YES B. NO	
Q16.	Do you own the house, rented or not yours but living for free?	A. OWN B. RENTED C. LIVING FOR FREE D. OTHER (SPECIFY)	
Q17.	What type of fuel does your household mainly use for cooking?	A. MAIN ELECTRICITY B. BOTTLED GAS C. BIOGAS D. PARAFFIN/KEROSENE E. CHARCOAL	

		F. FIREWOOD G. DUNG H. CROP RESIDUALS I. SOLAR J. OTHER (SPECIFY)	
Q18.	Does any member of your household own any of the following items? (Can tick one or more items)	A. BIKE OR BICYCLE B. MOTORCYCLE OR SCOOTER C. A CAR OR A TRUCK D. RADIO E. TV F. BOAT G. PLOUGH H. COWS I. SHEEPS J. GOATS	
Q19.	Does your household own land for farming or grazing?	A. YES B. NO	
Q20.	If YES, how many acres of land do you own?	.....
Q21.	How many meals does your household usually have per day? (MEALS including breakfast, lunch and dinner = 3)	MEALS	
Q23.	How often in the last year did you have problems in satisfying the food needs of the household?	A. NEVER B. SELDOM C. SOMETIMES D. OFTEN E. ALWAYS	
	SECTION 3: CARE SEEKING DURING CURRENT SICKNESS EPISODE. Now I would like to talk to you about your child's sickness. We are going to talk about everything that has happened so far from the moment you noted that your child was sick up to now.		
Q24.	What was the first sign that made you think that your child might be ill? (can tick more than one)	A. FEVER B. DIARRHOEA C. VOMITING D. COUGH E. DIFFICULTY IN BREATHING F. INABILITY TO EAT G. GENERAL BODY WEAKNESS H. OTHER (SPECIFY) 	
Q25.			

	When was that?	A. TODAY B. 1-2 day ago C. 3-4 DAYS AGO D. 5-6 DAYS AGO E. 1 – 2 WEEKS AGO F. 3 – 4 WEEKS AGO G. More than 1 month ago	
Q26.	What did you do in the first 24 hours starting from the moment you noted for the first time that your child was ill?	A. DID NOTHING B. GAVE SOME MEDICATION AVAILABLE AT HOME C. WENT TO BUY MEDICATION AT LOCAL DRUG SHOP D. WENT TO BUY MEDICINE AT PHARMACY E. TOOK THE CHILD TO TRADITIONAL HEALER F. TOOK THE CHILD TO A DISPENSARY G. TOOK THE CHILD TO PRIVATE HEALTH CENTRE/HOSPITAL H. TOOK THE CHILD TO PUBLIC HEALTH CENTRE/HOSPITAL I. OTHER (SPECIFY)	
Q.27	What was the second thing you did (if the child did not improve after the first option above)?	A. DID NOTHING B. GAVE SOME MEDICATION AVAILABLE AT HOME C. WENT TO BUY MEDICATION AT LOCAL DRUG SHOP D. WENT TO BUY MEDICINE AT PHARMACY E. TOOK THE CHILD TO TRADITIONAL HEALER F. TOOK THE CHILD TO A DISPENSARY G. TOOK THE CHILD TO PRIVATE HEALTH CENTRE/HOSPITAL H. TOOK THE CHILD TO PUBLIC HEALTH CENTRE/HOSPITAL I. OTHER (SPECIFY)	
	What was the third thing you did (if the child didn't improve after the second option above)	A. DID NOTHING B. GAVE SOME MEDICATION AVAILABLE AT HOME C. WENT TO BUY MEDICATION AT LOCAL DRUG SHOP D. WENT TO BUY MEDICINE AT PHARMACY E. TOOK THE CHILD TO TRADITIONAL HEALER F. TOOK THE CHILD TO A DISPENSARY	

		<p>G. TOOK THE CHILD TO PRIVATE HEALTH CENTRE/HOSPITAL</p> <p>H. TOOK THE CHILD TO PUBLIC HEALTH CENTRE/HOSPITAL</p> <p>I. OTHER (SPECIFY)</p>	
Q28.	<p>Did the child receive any medicines? If yes, can you remember the name of the medicine(s) he/she was given? And where were they provided?</p>	<p>1.</p> <p>Place: _____</p> <p>2.</p> <p>Place: _____</p> <p>3.</p> <p>Place: _____</p>	
Q29.	<p>For how many days did the child take the above medicines? (Write duration for each drug no. corresponding to above)</p>	<p>1.</p> <p>2.</p> <p>3.</p>	
Q30.	<p>Now, I want to ask you further about the first option of care you used the moment you realised that your child was sick (refer Qn. 26 above), could you tell me why you took that option?</p> <p>Elaborate: You know there are several options of health care, for example, self-treatment at home, drugs from local shops or pharmacy, traditional healers, public and private hospitals. Could you tell me why you selected that type of care FIRST and not others?</p>	<p>A. IT IS THE CLOSEST AVAILABLE CARE</p> <p>B. CHEAPEST CARE</p> <p>C. I TRUST IT MORE</p> <p>D. WAS ADVISED TO DO SO BY</p> <p>E. OTHER (SPECIFY)</p>	
Q31.	<p>IF went to hospital first, what is the name of the hospital?</p>	<p>.....</p>	
Q32.	<p>IF didn't take any action within the first 24 hrs after realising that the child was sick, could you tell me why was that?</p>	<p>A. WAS BUSY/ HAD WORK TO DO</p> <p>B. THOUGHT IT WAS NOTHING SERIOUS</p> <p>C. HAD NO MONEY</p> <p>D. WAS ADVISED TO WAIT AND SEE BY</p> <p>E. OTHER (SPECIFY)</p>	

Q33.	When you were bringing your child to this facility, what did you believe he/she was suffering from?	A. MALARIA B. PNEUMONIA C. DIARRHOEA D. OTHER (SPECIFY) 	
Q34.	Had (NAME) experienced convulsions any time during this illness?	A. YES B. NO	
Q35.	IF YES, what actions were taken when she/he was convulsing?	A. WAS GIVEN LOCAL HERBS B. WAS GIVEN INJECTION OR SUPPOSITORY AT THE HOSPITAL C. OTHER (SPECIFY)	
Q36.	Was he/she given any local herbs?	A. YES B. NO	
Q37.	If given local herbs, What is the name of the local herbs that was given to him/her?	.....
Q38.	What amount in approximation? E.g. teaspoonful, tablespoonful, tea cup etc	A. TEASPOONFUL B. TABLESPOONFUL C. HALF TEA CUP/GLASS D. FULL TEA CUP/GLASS E. OTHER (SPECIFY)	
Q39.	Was (NAME) given any other local herbs apart from the one mentioned above at anytime during this illness?	A. YES B. NO	
Q40.	IF YES, What is the name of the local herbs that was given to him/her?	.....
Q41.	What amount in approximation? E.g. teaspoonful, tablespoonful, tea cup etc	A. TEASPOONFUL B. TABLESPOONFUL C. FULL TEA CUP/GLASS D. HALF TEA CUP/GLASS E. OTHER (SPECIFY)	
Q42.	What was the herb given for?	.....
Q43.	Did your child receive SP anytime during this illness?	A. YES B. NO	
Q44.	IF YES, did you have SP at home or did you get it	A. HAD IT AT HOME	

	from somewhere else?	B. LOCAL DRUG SHOP C. PHARMACY D. PRIVATE HOSPITAL E. PUBLIC HOSPITAL F. DON'T KNOW G. OTHER (SPECIFY)	
Q45.	How much SP did your child take and how many times?	..... .....
Q46.	IF given from hospital, what is the name of the hospital where he/she was given SP?	.....
Q47.	Have you ever heard about ALU?	A. YES B. NO	
Q48.	IF YES, what is it?	.....
Q49.	IF NO, are you aware of the fact that there is a new drug for the treatment of malaria instead of SP?	A. YES B. NO	
<u>IF not aware of the new drug for malaria (ALU), skip Qn. 50 to 51:</u>			
Q50.	Do you think the new drug ALU is a good drug for malaria?	A. YES B. NO	
Q51.	If the answer is NO, could you tell me why you think so?		
Q52.	Has (NAME) had diarrhoea anytime during this illness?	A. YES B. NO	
IF the child had no diarrhoea, skip Qn. 53 to 57			
Q53.	<p>If had diarrhoea, Now I would like to know how much (NAME) was offered to drink during this diarrhoea episode. Was he/she offered less than usual to drink, about the same amount, or more than usual to drink?</p> <p>IF LESS, PROBE: Was he/she offered much less than usual to drink or somewhat less?</p>	A. MUCH LESS B. SOMEWHAT LESS C. ABOUT THE SAME D. MORE E. NOTHING TO DRINK F. OTHER (SPECIFY)	
Q54.	When (NAME) had diarrhoea was he/she offered	A. MUCH LESS	

	less than usual to eat, about the same amount, more than usual or nothing to eat? IF LESS, PROBE: Was he/she offered much less than usual to eat or somewhat less.	B. SOMEWHAT LESS C. ABOUT THE SAME D. MORE E. STOPPED FOOD F. OTHER (SPECIFY)	
Q55.	Have you ever heard of a special product called (LOCAL NAME FOR ORS) that you can get for the treatment of diarrhoea?	A. YES B. NO	
Q56.	IF YES, what do you think about its use in the treatment of diarrhoea?	A. VERY USEFUL B. SOMEHOW USEFUL C. NOT AT ALL USEFULL D. OTHERS (SPECIFY)	
Q57.	Was (NAME) given any of the following to drink?	A. FLUID FROM ORS PKT B. HOME MADE FLUID	
Q58.	Was anything else given to treat diarrhoea?	A. YES B. NO	
Q59.	What else was given to treat diarrhoea?	C. PILL OR SYRUP D. INJECTION E. INTRAVENOUS FLUID F. HOME REMEDIES (HERBAL/MEDICINES) G. OTHER (SPECIFY)	
	NOW LETS TALK ABOUT TODAY: MORE QUESTIONS HERE ON DELAY!!		
	Did you come straight from home to this hospital	A. YES B. NO	
Q60.	If the answer is YES, Can you approximate the amount of time it took you to arrive here at this hospital from where you live? IF THE ANSWER IS NO, GO TO QUESTION NO.	----- HOURS AND ----- MINUTES	
Q61.	What transport did you use?	A. BY FOOT B. BICYCLE C. PUBLIC BUS D. TAXI E. OTHER (SPECIFY)	

	IF DID NOT come straight from home, where did you come from?	A. ANOTHER HOSPITAL B. TRADITIONAL HEALER C. OTHER (SPECIFY)	
	Could you tell me how long it took you to reach here from the place mentioned above?	----- HOURS ----- MINUTES	
	What transport did you use?	A. BY FOOT B. BICYCLE C. PUBLIC BUS D. TAXI E. OTHER (SPECIFY)	
	How long did it take you to reach the place mentioned above, from the place you live?	----- HOURS ----- MINUTES	
	What transport did you use?	A. BY FOOT B. BICYCLE C. PUBLIC BUS D. TAXI E. OTHER (SPECIFY)	
Q61.	Was your child referred from another health facility?	A. YES B. NO	
	QUESTIONS Q 67 TO Q72. ARE FOR REFFERAL CASES ONLY		
Q62.	From which dispensary, health centre or hospital are you referred from? (NAME OF HOSPITAL)	.....
Q64.	What was done to the child at the hospital above before being referred here?	A. NOTHING B. GIVEN SOME IV FLUIDS C. GIVEN SOME INJECTIONS D. OTHERS (SPECIFY)	
Q65.	How long did you wait after arriving at the hospital above before the child received care / was attended?	----- HOURS ----- MINUTES	
	ALL CHIDREN		
Q68.	How long did you wait after arriving here before the child received care / was attended	----- HOURS AND ----- MINUTES	

Q69.	How long did it take for the child to receive other drugs, apart from paracetamol, after being attended by a doctor?	----- HOURS ----- MINUTES	
Q70.	Diagnosis made by attending doctor	1. 2. 3.	
Q71.	Treatments and doses recommended by the attending doctor	1. DOSE..... 2. DOSE..... 3. DOSE..... 4. DOSE.....	
	Now, I would like to ask you a few questions about other children you have had apart from this one.		
Q72.	How many children to whom you have given birth who are alive?	.....
Q73.	Have you ever given birth to any child who later died?	A. YES B. NO	
Q74.	If YES, how many?	.....
Q75.	Now I would like to ask you more about your child's death (If more than one child deaths, ask about the last one). Was the child sick or what was the cause of the death?	A. SICKNESS B. ACCIDENT C. DON'T KNOW D. OTHERS (SPECIFY) 	
Q76.	How old was he/she when died?	.....
Q77.	If was sick, was the child taken anywhere for advice or treatment?	A. YES B. NO	

Q78.	If YES, where did you seek advice or treatment?	A. TRADITIONAL HEALER B. PRIVATE HOSPITAL C. PUBLIC HOSPITAL D. PHARMACY E. OTHERS (SPECIFY)	
Q79.	What did they say she was suffering from where you took him/her?	.....
Q80.	If was taken to hospital, which hospital is it (name of the hospital)?	.....
Q81.	Yourself, what do you think she was suffering from (whether or not taken to hospital)?	.....
	CHILD RE-ASSESSMENT BY PRINCIPLE INVESTAGATOR		
,mm/.	FROM HISTORY:	1. 2. 3. 4. 5.	
	FROM CLINICAL EXAMINATION	1. 2. 3. 4. 5.	
	DIAGNOSIS ACCORDING TO IMCI AND WHO GUIDELINES	1. 2. 3. 4. 5.	

	TREATMENTS AND DOSES ACCORDING TO WHO GUIDELINES	1. DOSE..... 2. DOSE..... 3. DOSE..... 4. DOSE..... 5. DOSE.....	
	SECTION 6: FOLLOW UP		
	Permanent address	..... .....
	Care-taker's telephone number	.....
	Telephone no. 2 and Relationship to the child	..... .....
	Telephone no. 3 and Relationship to the child (Tel. numbers can be filled on subsequent days depending on their availability).	..... .....
	ANY OTHER USEFUL CONTACTS	..... ..... .....
	Follow-up information		
	Child's duration of hospital stay	..... DAYS	
	Child's final outcome	A. DISCHARGED B. DEAD	

	Child's survival at	D. 2WEEKS..... E. 1MONTH..... F. 2 MONTHS..... G. 3MONTHS..... H. 6MONTHS..... I. 12MONTHS.....	
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FOCUS GROUP DISCUSSION GUIDE

1. First I would like to know where do you usually go for help when your children are sick. (Probe to get different health care options available)
2. Of the options you mentioned, where do you think you get more help and hence you prefer to go there?
3. What do you think about the health services provided at your nearer public dispensary/health centre?
4. There are parents who bring their children straight to Teule district hospital without having utilized their nearby facilities. Why do you think they do so?
5. What troubles you most when it comes to the quality of services provided by your nearby PHC facilities? (PROBE about; Quality of care, availability of services and drugs, autonomy respect etc)
6. Are there community health workers in your areas, and if yes, how useful are they?
7. What would you like to change when it comes to services provided at the PHC level?
8. What obstacles do you face when seeking care for your sick children generally and at your nearby PHC facilities?
9. Lastly, I would like to hear what you think contributes to sick children losing lives in your area. Things that you think if they get solutions more children would survive treatable infections? (PROBE TO FIND ALL OBSTACLES TO HEALTH CARE FOR A SICK CHILD)

EXAMPLE OF QUALITATIVE INTERVIEW QUESTIONS

Now I would like you to give me details of daily actions taken since you noted the first symptom of your child's illness until today:

Record daily details of actions taken for the sick child (NOTE the names of hospitals attended if any, for confirmatory whether public or private and all treatment types, amount and frequency).

1. DAY 1-2

Would you explain to me why you did so?

2. DAY 3-4

Would you explain to me why you did so?

3. DAY 5-6

Would you explain to me why you did so?

4. DAY 7 or later

Would you explain to me why you did so?

THANK YOU FOR YOUR COOPERATION

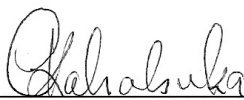
**Errata for:
Care seeking and management of common
childhood illnesses in Tanzania**

Questioning the quality of primary care services

Catherine Kahabuka



Thesis for the degree philosophiae doctor (PhD)
at the University of Bergen



(signature of candidate)

(signature of faculty)

15th Apr 2013

Errata

1. Page 11: Figure 1

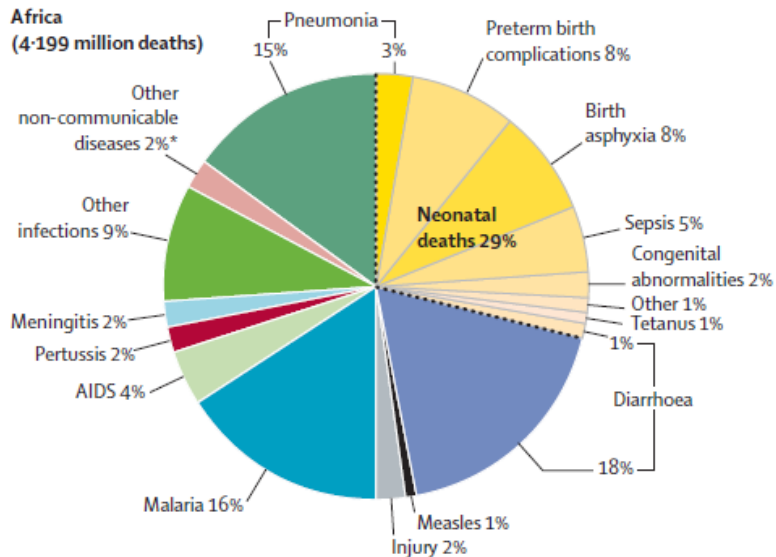


Figure 1: Causes of child deaths in African region [1]. Deaths are categorized in neonates (0-27 days) and children aged 1-59 months.

2. Page 70: Reference no. 36

Ministry of Health and Social Welfare - United Republic of Tanzania: **Primary Health Services Development Programme (PHSDP) 2007 - 2017**. Dar es salaam: Ministry of Health; 2007.