

**Beliefs, practices
and health seeking behaviour of female
caregivers related to the prevention
and care of paediatric burn injuries in
Arusha and Kilimanjaro Regions, Tanzania**

**Tanya Van Braekel
Belgium**

Master in International Health
11th March 2013 – 11th September 2015

Tanzanian Supervisor
Joseph Lekule
Tanzanian Research Assistants
Margereth Kimweri
Upendo Mamchony

KIT Health (Royal Tropical Institute)
Vrije Universiteit Amsterdam
Amsterdam, The Netherlands

May 2015
Word count: 13 031

Beliefs, practices and health seeking behaviour of female caregivers related to the prevention and care of paediatric burn injuries in Arusha and Kilimanjaro Regions, Tanzania

A thesis submitted in the partial fulfilment of the requirement for the degree of Master in International Health

By
Tanya Van Braekel
Belgium

Declaration:

Where other people's work has been used (either from a printed source, internet or any other source) this has been carefully acknowledged and referenced in accordance with departmental requirements.

This thesis *Beliefs, practices and health seeking behaviour of female caregivers related to the prevention and care of paediatric burn injuries in Arusha and Kilimanjaro Regions, Tanzania* is my own work.

Signature:

A handwritten signature in blue ink, consisting of several overlapping loops and a long horizontal stroke extending to the right.

Master in International Health (MIH)
11th March 2013 – 11th September 2015
KIT (Royal Tropical Institute)/Vrije Universiteit Amsterdam
Amsterdam, The Netherlands

September 2015

Organised by:

KIT (Royal Tropical Institute), Development Policy & Practice
Amsterdam, The Netherlands

Table of Contents

List of Abbreviations	i
List of Definitions	i
List of Figures	ii
List of Tables	ii
Acknowledgments.....	iii
Abstract.....	iv
1. Introduction.....	1
2. Paediatric burn injuries in the United Republic of Tanzania.....	1
2.1. Background.....	1
2.1.1. General background	1
2.1.2. Arusha and Kilimanjaro Region, the Under-five mortality rate (U5MR).....	2
3. Problem statement and justification.....	3
3.1. Problem statement	3
3.2. Justification	3
4. Study objectives and methodology	4
4.1. Study objectives	4
4.1.1. Specific objectives	4
4.2. Study design	4
4.3. Study area.....	5
4.4. Study population	5
4.5. Sampling.....	5
4.6. Recruitment.....	6
4.7. Data collection techniques.....	6
4.7.1. Literature review	6
4.7.2. In depth interviews.....	6
4.7.3. Focus group discussions	6
4.7.4. Observation	7
4.8. Data processing and analysis	7
4.9. Quality assurance	7
4.10. Ethical considerations	8
4.11. Limitations.....	8
4.12. Dissemination of results.....	9
4.13. Conceptual framework.....	9
4.14. Search strategy.....	10
5. Literature review	11
5.1. The pre-event phase and injury event.....	11
5.2. The post- event, a road towards adequate care.....	12
5.3. Prevention	13
6. Research Findings.....	13
6.1. Study characteristics of the respondents	14
6.2. General Paediatric health problems in the community.....	15
6.3. Burn injuries and their contextual factors	16
6.4. Health beliefs and health seeking behaviour.....	19
6.5. Barriers and enablers to the use of health facilities	24
6.6. Prevention	27
7. Discussion	29

8. Conclusion	32
9. Recommendations.....	32
References	34
Annex 1: Additional background information	38
Annex 2: Topic guide IDI's.....	39
IDI female caregiver (KCMC).....	39
IDI health care provider (nurse)	40
IDI community leader/village leader	42
Annex 3: Topic guide FGD	44
Annex 4: Subthemes and categories as identified by the research team	46
Annex 5: Haddon Matrix	47
Annex 6: Characteristics of the respondents.....	49
Annex 7: A strategy towards action.....	51

List of Abbreviations

BTC	Belgian Technical Cooperation
FGD	Focus Group Discussion
HCW	Health Care Workers
IDI	In Depth Interview
IMR	Infant Mortality Rate
KCMC	Kilimanjaro Christian Medical Centre
KCMU	Kilimanjaro Christian Medical University
KIT	Koninklijk Instituut voor de Tropen
LMIC	Low and Middle Income Countries
NIMR	National Institute for Medical Research
REC	Research Ethical Committee
ROAR	Regional Office Arusha Region
ROKR	Regional Office Kilimanjaro Region
UNICEF	United Nations International Children's Emergency Fund
U5MR	Under-five Mortality Rate
WHO	World Health Organisation

List of Definitions

First aid	First aid treatment is emergency care or treatment given before regular medical aid can be obtained. It must be readily available, easy to use by the general public and not hinder professional examination or treatment of the wound on a later date (WHO, 2011)
Hospital- based care	Hospital-based care includes initial measures to stabilize burn patients and offer definite care (WHO, 2011)
Inhalation injuries	Are the result of breathing in superheated gases, steam or noxious products of incomplete combustion. They cause thermal or chemical injury to the airway and lungs and accompany a skin burn in approximately 20% to 35% of the cases. Inhalation burns are the most common cause of death among people suffering fire-related burns (Peden et al., 2008)
Pre hospital care	Pre hospital care includes first aid performed by members of the lay public and more formal hospital care provided by emergency medical services (WHO, 2011)
Rehabilitation	Rehabilitation overlaps with hospital-based care and continues sometimes for long periods afterwards. Rehabilitation addresses physical recovery as well as psychological recovery and the person's return to activity and participation in the community (WHO, 2011)
Thermal injury	Occurs when some or all of the cells in the skin or other tissues are destroyed by hot liquids (scalds), hot solids (contact burns) or flames (flame burns). Injuries to the skin or other organic tissues due to radiation, electricity, friction or contact with chemicals are also considered as burns (Peden et al., 2008)

List of Figures

- Map 1: Political map of Tanzania
- Figure 1: Under-five Mortality Rate (U5MR) and Infant Mortality Rate (IMR) trends (1975-2012) for Kilimanjaro Region
- Figure 2: Drawings of houses and living conditions made by female caregivers

List of Tables

- Table 1: Adapted Haddon Matrix applied to the risk factors for burns among children
- Table 2: Dangers in the communities listed (in random order) by the female caregivers in the FGD's
- Table 3: First aid applications and expected effects as reported by the study participants in Kilimanjaro and Arusha Regions
- Table 4: The possible negative effects of first aid applications as mentioned by the nurses
- Table 5: Education in the community as listed by the female caregivers and community leaders
- Table 6: Education of health care workers as listed by nurses in KCMC
- Table 7: Suggestions for safety improvement in the community

Acknowledgments

First I would like to express my appreciation and thankfulness to all the women, nurses and community leaders who were willing to share their stories and opinions during this research.

I would like to thank Prof. Outwater for her help in shaping my preliminary thesis ideas into a more focussed research topic. Many thanks also to the Tanzanian team of research assistants, Margereth Kimweri and Upendo Mamchony and my local supervisor, Joseph Lekule, for their guidance and assistance during the entire thesis process in Tanzania.

I also want to give thanks to Dr. Kirstin Mittermayer-Vassallo and Dr. Marja W. Wessels for their advice and suggestions during the last stages of the writing process.

Finally, my parents, thank you for your continuous encouragement during each step of this thesis.

Abstract

This study aims to provide insights in the beliefs, practices and health seeking behaviour of female caregivers related to the prevention and care of paediatric burn injuries in Arusha and Kilimanjaro Regions in Tanzania.

Female caregivers of children with burns and of children without burns were the primary respondents of this exploratory qualitative study. Key informants such as community leaders and nurses were also interviewed. This research sought information regarding health beliefs, practices and health seeking behaviour and in addition provided information about the contextual factors contributing to paediatric burn injuries and barriers and enablers to the use of health facilities in cases of burn injuries. Finally, this study identified different methods of prevention of burns in children within communities.

The analysis shows that young children are most vulnerable to sustain injuries, mainly scalds and flame injuries, often due to poor supervision of caretakers. These injuries took place in and around the house. The kitchen and waste pit were identified as the biggest hazards. The use of different first aid measures were described by the participants, some with specific expected effects on the burn wound. Multiple factors influenced health seeking behaviour of female caregivers such as poverty, transport problems, local beliefs and traditional values, perceived quality of care in health facilities and the negative behaviour of nurses.

Community leaders, nurses and female caregivers highlighted prevention as the most effective way to decrease the incidence of burn injuries. Suggestions regarding educational sessions, changes in practice and environmental adaptations were recommended.

Word count: 249

Key words: Paediatric burn injuries, prevention and care, beliefs and practises, female caregivers, Tanzania

1. Introduction

Fire-related burns remain a public health problem all over the world (Outwater et al., 2013), 90 to 95 % take place in low and middle income countries (LMIC) (Wesson et al., 2013; WHO, 2008). These LMIC have the lowest ability to handle negative economic consequences of burns (WHO, 2011).

On the African continent 6.1 fire-related deaths per 100,000 population each year occur. In a much larger proportion these burn victims experience injuries resulting in permanent disfigurements and disabilities causing stigma and rejection (WHO, 2008).

Prevention measures in high income countries have shown to be very effective in decreasing burn accident rates. While hot water heaters and unsafe electrical wiring are considered risk factors in high-income countries, the use of cooking pots at ground level and the use of kerosene for lamps and stoves are the main risk factors in many low income countries. These differences in risk factors require different strategies for burn prevention (WHO, 2011).

Not only prevention, but also pre hospital care can have a big impact on the outcome of a burn victim. Harmful first aid applications or a delay in definite treatment for example, can negatively affect the burn wound (Ringo and Chilonga, 2013). In developing countries emergency medical services (such as an ambulance system) are not widely available often resulting in the first assessment and treatment being given by relatives (WHO, 2011).

One of the low income countries in Africa is the United Republic of Tanzania (World Bank, 2014). Tanzania is the largest East-African country covering an area of 945 000 km² with a population of 50.76 million people (World Bank, 2014). As in many developing countries, burn injuries¹ remain a significant health problem in Tanzania (Chalya et al., 2011).

2. Paediatric burn injuries in the United Republic of Tanzania

The following chapter provides general data on Tanzania and the Districts where the research took place. Furthermore a short background is given about the under-five mortality rate (U5MR) in the country.

2.1. Background

2.1.1. General background

The United Republic of Tanzania, hereafter further referred to as Tanzania, consists of the islands of Zanzibar and the mainland (Tanganyika). The country has 30 Regions, 25 on the mainland and 5 on the islands of Zanzibar (See map 1). The population of Tanzania is rapidly growing. With a current annual growth rate of 2.7%, the population is expected to become twice its number in the coming 26 years (National Bureau of Statistics Dar Es Salaam & Office of Chief Government Statistician Zanzibar, 2013). The current life expectancy is on average 61 years (World Bank, 2014). The World Bank (2014), estimates that 28.2% of Tanzania's population in 2012 lived below the national poverty line.

¹ In this report, a burn injury includes both the thermal injuries and the inhalation injuries (mostly in combination with fire-related burns) unless the specific type of burn injury is mentioned.

Map 1 Political map of Tanzania



(Maps of the World 2012)

Within different Regions, the country has a variety of tribes, each with traditions and local languages.

The study on which this thesis is based, was conducted in two Regions, namely in communities in Arusha (Meru District Council) and Kilimanjaro (Same District) Regions. A part of the study took place in Kilimanjaro Christian Medical Centre (KCMC) situated in Kilimanjaro Region whereby some study participants came from Moshi Municipal Council, Rombo District Council and Moshi District Council.

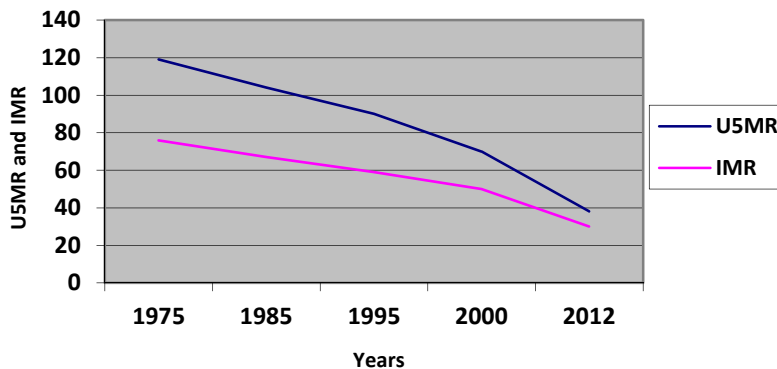
For more information on the Regions and Districts, See Annex 1

2.1.2. Arusha and Kilimanjaro Region, the Under-five mortality rate (U5MR)

Through the Reproductive and Child Health Strategic Plan 2008-2015, Tanzania aims to reduce neonatal, child and maternal mortality and morbidity in order to reach Millennium Development Goal (MDG) 4 and MDG5 (National Bureau of Statistics, 2011).

The U5MR in the country in 2013 was 52/1000 live births. With a decrease of 69% of the U5MR between 1990-2013, Tanzania reduced its U5MR by two thirds (You, Hug and Chen, 2014). The Kilimanjaro Socio-Economic report (unpublished 2014) confirms the big drop in the U5MR (See figure 1), from 119 deaths/1000 live births in 1975 to 38 deaths/1000 live births in 2012.

Figure 1: Under-five mortality rate (U5MR) and Infant Mortality Rate (IMR) trends (1975-2012) for Kilimanjaro Region



Adapted from (Regional Office Kilimanjaro Region (ROKR) and Belgian Technical Cooperation (BTC), unpublished 2014)

Injuries (together with fractures) are mentioned in the list of the ten most commonly reported causes of mortality and morbidity (for all ages) in the Region (ROKR & BTC, unpublished 2014).

3. Problem statement and justification

The problem statement and justification provide more detailed information about paediatric burn injuries in the Tanzanian setting and the importance and additional value of the study on which this thesis is based.

3.1. Problem statement

In Tanzania, 'young age' is one of the important risk factors for burn morbidity (Outwater et al., 2013). In particular children aged 0-5 years are at higher risk of burn wounds compared to adults (Justin-Temu et al., 2008; Outwater et al., 2013; Wesson et al., 2013).

Most of these burn injuries occur at home around open cooking fires. These injuries are mainly unintentionally and are a result of poor supervision by caregivers due to large family sizes and lack of safety measures at home (Chalya et al., 2011). Caretakers of children should be more cautious in preventing their children reaching the burn source (Justin-Temu et al., 2008). A distance of 1.5 metres between the child and the cooking fire is considered as safe (Outwater et al., 2013).

Prevention programs are crucial (Wesson et al., 2013), but when a burn injury occurs, immediate first aid after the burn is of great importance (Chalya et al., 2011). Applying an agent (such as sugar, cooking oil, mud, etc.) on a burn wound immediately after the injury is a well-known first aid practice in Tanzania and often performed by the caregivers (Justin-Temu et al., 2008).

3.2. Justification

Tanzania lacks specialised trained health staff and has few specialised burn centres with suitable medical equipment to give optimal care to burn victims (Chalya et al., 2011). Long distances to reach health facilities, poor transportation systems and absence of ambulances are possible causes of delay in definitive treatment (Atiyeh, Masellis and Conte, 2009).

In addition to inadequate infrastructure and lack of human resources, Chalya et al. (2011) described that transport costs, self-treatment at home and consultations with traditional healers contribute to the late presentation. Lack of knowledge regarding the seriousness of the injury contributes to the delay (Ringo and Chilonga, 2013) and children are often only brought to the hospital when the wound becomes infected (Chalya et al., 2011).

There are some studies about pre hospital care conducted in Tanzania. Justin-Temu et al. (2008) described the first aid treatment given to children in Dar Es Salaam Region. The study revealed that 88.3% of the study population used some kind of first aid treatment. Honey is the most commonly used application.

Chalya et al. (2011) conducted a similar study in Mwanza District and reported that 6.4% of patients in the study received appropriate first aid treatment, though it is not mentioned what is meant by 'appropriate' first aid measurements.

In a study conducted at KCMC hospital, Ringo and Chilonga (2013) described that honey was the most commonly used first aid measure. None of the research participants applied cool water to the burn wounds, showing a shortage in knowledge about first aid care among the study population.

The studies of Chalya et al. (2011), Ringo and Chilonga (2013) and Justin-Temu et al. (2008) mainly used quantitative research methods.

This study was conducted to obtain more qualitative, in depth information about beliefs and practices of female caregivers related to first aid care and prevention at their home environment. This information could be useful in the development of local health programs.

4. Study objectives and methodology

4.1. Study objectives

This study aimed to explore beliefs, practices and health seeking behaviour related to prevention and care of paediatric burn injuries by female caregivers in Arusha and Kilimanjaro Regions, Tanzania in order to make recommendations for health programs to be more responsive to the needs of the female caregivers.

4.1.1. Specific objectives

1. To identify the contextual factors contributing to paediatric burn injuries
2. To describe different health beliefs and health seeking behaviour of female caregivers related to paediatric burn injuries
3. To explore barriers and enablers in the use of health facilities
4. To identify different methods of prevention of paediatric burn injuries
5. To recommend how paediatric burn care services can be more responsive to practices and living conditions in order to improve these services in Tanzania

4.2. Study design

This study used an exploratory research design. The study includes a literature review, in depth interviews (IDI), focus group discussions (FGD) and observation.

4.3. Study area

The study was conducted in two Regions in North-Tanzania, namely Kilimanjaro and Arusha Regions. The IDI's with the female caregivers and the nurses took place in KCMC, a large tertiary hospital in Kilimanjaro Region as this health facility treats most of the burn patients coming from Arusha and Kilimanjaro Regions. KCMC serves also as a referral centre for patients with burns.

The FGD's were held in Same District (Kilimanjaro Region) and Meru District Council (Arusha Region). The overall dry and more rural Same District was chosen because reports of the nurses in KCMC hospital indicated that many young burn victims came from this District. On the other hand, Meru District Council is a greener area in the neighbourhood of a bigger city, namely Arusha –creating contrasting area's for the study².

4.4. Study population

Female caregivers of children with burns or without burns were the primary respondents of this study.

Female caregivers of children under-five with burns, who were admitted at KCMC hospital during the time of the study, were included first.

Inclusion criteria for caregivers were: female caregiver of a child under-five with burns, and the caregiver has sought medical attention at KCMC hospital/referral for the burn injuries at the time of the interview.

Exclusion criteria for the caregivers were: Caregivers of children who were just admitted or caregivers of children who were critically ill were excluded from the study due to ethical considerations as this was seen to place an extra burden on these caregivers during an already very stressful time in their lives.

Female caregivers of children under-five with or without burns living in the community were also included in the study. Inclusion criteria for the caregivers in the community were: female caregiver of children under-five with or without burns.

Caregivers belonging to a community of a caregiver interviewed in the KCMC hospital were excluded from this study

Furthermore, healthcare staff, defined as nursing staff working in the health facility and caring for children under-five with burns, were included in the study as key informants.

Inclusion criteria for health staff were: working at KCMC at the time of the study and professional experience with burn injuries.

Community leaders were also included for an interview as key informants.

4.5. Sampling

Purposive sampling, more specific-criterion sampling was used. By interviewing female caregivers of children with burns admitted to the hospital and female caregivers of children in the community, nurses and community leaders, a broader scope of information was collected and this method allowed a triangulation of data. The data collection took place between October and December 2014.

² Although reports in KCMC indicated a higher number of burn cases coming from Same District compared to other Districts, no research has been done regarding the reasons behind these numbers. These Districts were also chosen on terms of accessibility (distance) due to limited resources for this study.

The study was a small exploratory study. The number of FGD's was 4 (± 7 participants/group) and of IDI's was 12 (4 nurses, 4 community leaders and 4 caregivers of children with burns in the hospital).

4.6. Recruitment

Recruitment was done through KCMC hospital, on the surgical ward/ICU where children with burns were admitted, in collaboration with nursing staff working at the wards. Weekly visits to the wards (and daily contact by phone with the nurses) in KCMC were made by the research assistants to see if mothers of children with burns were eligible and willing to take part in the study. Five mothers were approached and all mothers were willing to participate. One mother was later excluded from the study as her child was over 5 years of age at the time of the burning accident. The mothers were subsequently invited for an IDI and appointments were made between the research team and the participants that fitted best in order to not disrupt the daily activities of the participants. The nursing staff was approached by research assistants at the surgical ward and the intensive care ward (ICU) with the invitation to take part in an IDI.

Two Districts, Meru District Council and Same District were selected by the local supervisor. Within each District, 2 communities were randomly identified by the local District community health workers. Their village leaders were approached with an invitation for the community to take part in the study. Through the community leader, female caregivers of children living in the community were invited for a FGD. Additionally the community leader of each village was invited for an IDI. The research did not take place in the communities where the caregivers, included in KCMC hospital, resided in. This was thought to place another burden on these caregivers and it would reveal the identity of the burn victims within the communities. Therefore it was considered as ethically inappropriate.

4.7. Data collection techniques

4.7.1. Literature review

During the literature review, articles, existing data and reports on burn care were accessed and analysed. This provided more background on the topic and functioned as a guide in developing the study and topic guide.

4.7.2. In depth interviews

When informed consent was given, face to face interviews were conducted with female caregivers of children under-five with burns admitted in the health facility and with nurses (key informants) working in the health facility. Additionally, community leaders (often men) of the participating communities were invited for an interview as key informants. The interviews were done using an interview (topic) guide (See Annex 2) and took around 60 minutes. Notes were taken during the interview by one of the research assistants and after requesting permission to use the recorder, all interviews were audio taped.

4.7.3. Focus group discussions

FGD's were used to seek responses about first aid of burn injuries and prevention methods of caregivers (of children) living in the community and allowed a triangulation of data collection methods. After obtaining consent, based on a topic guide (See Annex 3), FGD's were held with

female caregivers of children under-five for approximately 90 minutes each. Four FGD's were conducted and each FGD consisted of caregivers of children with and caregivers of children without burn injuries to broaden the scope of discussion. A person qualified in leading FGD's guided the discussions and after consent, all FGD's were audio taped.

4.7.4. Observation

As most female caregivers came by public transport to the meeting point in the community for the FGD's, observation of their houses was not feasible. After a general introduction about the purpose of the FGD, all participants were asked to make a drawing of their house. The drawing, made in groups of 2-3 caregivers, provided additional information on the context of burn injuries and burn prevention.

4.8. Data processing and analysis

The research team consisted of the principal researcher (the MIH student), the supervisor, the local supervisor and two research assistants (interviewers/translators). As most nurses and caregivers could only speak Swahili, the interviews were conducted by a Swahili speaker (the research assistant(s)). The research assistants had previous knowledge in conducting interviews.

Interviews were recorded and additional notes during the interviews were made by the research assistants. All notes and audio tapes were collected by the researcher and discussed and translated with the research assistants.

The notes taken during the interview, together with transcribing the audio taped interviews and discussions allowed a systematic data processing. Data analysis started in the field and continued after every FGD and IDI. This was done manually using narrative methods. Data were collected and coded by theme or categories, and finally coded data were analysed.

During meetings with the research assistants, emerging themes from the different FGD's and IDI's were categorized, reviewed and integrated in the subsequent discussions for validation until a saturation point was reached. Comparisons between categories were made as appropriate. A summary of subthemes (See Annex 4) allowed revealing differences and similarities in major themes between different respondents.

4.9. Quality assurance

The study used a topic guide for the FGD and IDI. Prior to the start of the interviews, the research assistants received information about data collection methods and meetings were conducted between the researcher and research assistants to assure that research procedures were clear. During meetings with the local supervisor and the research assistants, the researcher explained the scope of the research, objectives and the topic guide. The topic guide was available in Swahili and English.

A pre-test of the topic guide took place at Mawenzi Regional Hospital with nurses and caregivers. Some changes were made as some questions or data collection tools were perceived to be unclear or not practical during the pre-test by participants or by the research team. During data collection and data analysis the researcher supervised the research assistants to safeguard the quality of the study and the study results. To ensure the quality of translation, one interview was translated independently by the local supervisor, functioning as an external translator. This translation was compared with the translation of the research assistants and no major differences were found, ensuring that translations made by the research assistants were adequate.

All members of the research team were involved in data processing, analysing and triangulation (different data collection methods, different kinds of participants were used establishing quality and validity in the study).

4.10. Ethical considerations

The study received ethical clearance from the Research Ethics Committee (REC) of Koninklijk Instituut Tropen Amsterdam (KIT) in August 2014 and from Kilimanjaro Christian Medical University (KCMU) Research Ethics Committee in Tanzania in October 2014. Additionally clearance was granted through the National Institute for Medical Research (NIMR) in Tanzania in December 2014. Permission to conduct the study in the hospital was obtained from the Executive Director of KCMC Hospital and the nurse in charge of the ward(s). Permission to hold FGD's in villages was obtained from the respective District Medical Officer and the village (community) leaders through a written letter.

Informed consent was obtained from every study participant. Only participants giving consent to participate in the study were included. Confidentiality and anonymity during processing data was guaranteed. During the FGD's the research team requested all participants to keep the discussed information confidential.

Only the research team had access to the data and all transcriptions used codes and unique numbers for participants. Permission was requested to record interviews and FGD's. The respondents were informed that withdrawal from the study was possible at any time and that it would not have consequences for treatment in the hospital or any future health care services. Tapes were kept in a confidential place and data were only used for study purposes.

Burn care and prevention are sensitive issues. During the interviews, caregivers of children with burns might have been reminded of the injury itself. In order to avoid distress/discomfort, interviews were held in a private quiet setting (in the hospital). The FGD's were held at a separate room available in the community/village.

During meetings with the research assistants, discussions took place on how to deal with sensitive issues concerning participants during the interview.

4.11. Limitations

As the research team consisted of health care workers, participants might felt they had to give 'socially acceptable' answers instead of explaining their own practices and opinions. In order to minimize this bias, the researchers did not conduct the study in their own work environment.

Concerning the IDI's with female caregivers of children under-five with burns admitted in KCMC, the study aimed to interview women coming from Kilimanjaro Region and women coming from Arusha Region. But during the time interval of the study, none of the female caregivers coming from Arusha Region whose children were admitted in KCMC were eligible for the study and only opinions from the caregivers coming from Kilimanjaro Region could be included. To avoid possible sensitivities, data regarding religion and tribal origin were not specifically collected during any of the FGD's or the IDI's. As interviews were held in Swahili and afterwards translated into English some language nuances might not have been optimal interpreted.

As this research is part of a master thesis, the time interval, the budget and human resources available were limited, which influenced the sampling size of the study. Only in a limited time

frame, women who volunteered to participate could be included in the study. The number of burn injuries per infant were not recorded or analysed within the dataset. As this is a small scaled study; the results are mainly useful for local communities and health facilities.

4.12. Dissemination of results

The results of the research will be shared with hospital staff and other stakeholders at the hospital and community. Small info sessions will be provided in the hospital and the communities. Information will be given on how the results could be used to tailor health programs in Arusha/Kilimanjaro Regions to the needs of female caregivers.

4.13. Conceptual framework

The framework used to guide the literature review and analysis of this study is mainly based on the Haddon Matrix applied on burn injuries in general (WHO, 2011) and the Haddon Matrix applied to risk factors for fire-related burns among children (Peden et al., 2008) (See Annex 5). These Matrixes are designed to show that injuries, such as burn injuries, are caused by a combination of host (the child), agent and environment within the different phases (WHO, 2011).

Furthermore, a refinement of remote factors from a study by Van Niekerk et al. (2006), namely cultural beliefs and traditions, are added to the Haddon Matrix (See Table 1) in order to address relevant factors for a low-middle income setting.

Table 1 Adapted Haddon Matrix applied to the risk factors for burns among children

PHASES	FACTORS			
	<i>Child</i>	<i>Agent</i>	<i>Physical Environment</i>	<i>Socio-economic Environment</i>
<i>Pre-Event</i>	Developmental issues, gender, age, vulnerability, lack of supervision, lack of knowledge about risk of fire in the home	Storage of flammable substances in the house, matches or lighters accessible for children, unsafe stoves or lamps	Housing in slums or congested areas, overcrowded households, no separation between cooking area and other areas, unsafe electrical wiring	Poverty, unemployment, illiteracy among parents, sibling who died of burns, lack of policies on flammable standards, social behaviour on the acceptability of acid-throwing
<i>Event</i>	Poor knowledge about evacuation procedures	Lack of access to a supply of water	Lack of access to call for help	Poor access to information and resources, inadequate communication infrastructure for calling emergency services
<i>Post-Event</i>	Lack of knowledge by caregivers and community about what to do immediately after a burn	Flammability of household materials and children's clothing, toxicity of smoke and burning household materials	Poor rescue and treatment skills, lack of access to water, inability to transport to medical care promptly	Inadequate burn care, inadequate access to burn centres and rehabilitation services, insufficient community support for those who have suffered burns

Within a context of cultural beliefs and traditions

(Adapted from Peden et al., 2008; WHO, 2011)

4.14. Search strategy

Articles for the problem statement, justification and the literature review were retrieved from Pubmed, Web of Science, Cochrane and Google Scholar. The search strategy used the following key words or a combination of these: 'Low income countries', 'United Republic of Tanzania', 'burn care', 'paediatric', 'treatment', 'epidemiology', 'first aid practices', 'prevention', 'management', 'causes', 'risk factors', 'challenges', 'opportunities'. Additionally data were used from the Bureau of Statistics Regional offices in Arusha and Kilimanjaro Regions.

5. Literature review

The results of the literature review are explained based on the phases mentioned in the adapted Haddon Matrix. The elements within the three different phases are presented in a Tanzanian context using existing literature. Prevention is not mentioned directly under the Haddon Matrix, but it was seen as an important part of paediatric burn injuries in this thesis and is therefore described in a separate section.

5.1. The pre-event phase and the injury event

Burn injuries during childhood are mostly sustained by children under the age of five years. These injuries are mainly burns caused by scalding or flames (Outwater et al., 2013).

Although some studies showed no significant difference in sex in this age group (Roman et al., 2012; Justin-Temu et al., 2008), other studies indicated that males are slightly more prone to sustain a burn injury as a male female ratio of 1.4:1 was reported (Chalya et al., 2011) and 62.9% of the paediatric burn patients being male (Koc and Saglam, 2012).

Burns are still one of the leading causes of death in female children under-five in Dar Es Salaam (mortality rate 7.0/100000/year) and Hai district (mortality rate 9.4/100000/year) and for male children under-five in Dar Es Salaam (mortality rate: 17.0/100000/year) (Moshiro et al., 2001). A more recent study showed that burn injuries are still a prominent problem in Tanzania, with a one month prevalence of 3.05% in children under-five (n=1440) (Roman et al., 2012).

Some children are more susceptible experiencing burns, including children with other health problems, such as epilepsy. Epilepsy is often not optimally treated due to poor understanding of the disease and poor compliance to prescribed drugs and therefore increases the risk of convulsions and a fall into fire (Albertijn, Bickler and Rode, 2006).

One older study described a link between a higher risk of paediatric burn injuries and previous burn injuries in siblings. This increased risk could be linked to a history of poor supervision in the family or other risk factors (Forjuoh et al., 1995).

Studies regarding burns in Tanzania indicated that paediatric burn injuries are mainly unintentional (Outwater et al., 2013) although intentional burns were reported in 2.5% (Justin-Temu et al., 2008)

The high numbers of paediatric burns amongst the age group of children under-five can partially be explained by the high dependence of this group on the caretaker's behaviour and supervision (Peleg, Goldman and Sikron, 2005). The lack of supervision is a possible danger for sustaining burn injuries (Munro, Van Niekerk and Seedat, 2005). Unemployment for example, forces the caretakers to go out and find a job, leaving their young children unsupervised (Albertijn, Bickler and Rode, 2006).

The majority of burn injuries occur in or around the house. In the Tanzanian setting, dwellings often have only one room, used both as cooking and living area. Accidents regularly take place in the kitchen and sitting room. The charcoal stove and open cooking fire are predominantly used to prepare food and are a hazard to young children of sustaining scalds and flame injuries (Chalya et al., 2011). These traditional ways of cooking can also lead to indoor pollution,

resulting in possible inhalation injuries or acute respiratory infections in children (Outwater et al., 2013).

The limited time of parents or caretakers can be a possible cause of, for example leaving hot water within the reach of children (Munro, Van Niekerk and Seedat, 2005). The unsafe storage of flammables, such as liquid fuel, in the house makes it easy for children to reach and therefore also contribute to the risk of burn injuries. Likewise kerosene lamps, lightning rooms after dark, form a danger starting a fire and possibly cause burns (Albertijn, Bickler and Rode, 2006). Although the danger of flammables and kerosene among other things is often described in literature, no information regarding policies or guidelines concerning flammables was found for a LMIC setting.

Poverty is indicated as an important risk factor for burn injuries (Edelman, 2007; Albertijn, Bickler and Rode, 2006) and absence of running water in the house is an indicator of poverty (Delgado et al., 2002). Also Tanzania, particularly in the areas where this study was conducted, faces problems with water. The Arusha socio-economic profile (unpublished 2014) indicated a decline in clean water access for its population from 65% in 2005 to 58% in 2013. In Kilimanjaro Region an estimated 61.1% of the population had access to clean water in 2006, following an increasing trend leading to 73.9% in 2012 (ROKR and BTC, unpublished 2014). In the Tanzanian mainland 46.1% of households have access to clean water within a reach of 30 minutes (round trip), however, 45.2 % of households in Tanzanian mainland still spend more than 30 minutes to reach clean water (National Bureau of Statistics, 2011).

Studies described the relationship between poor parental education and burns (Locke 1990 cited in Delgado et al., 2002). Higher education of individuals is often linked to an enhanced socio-economic status and thus a decrease in burn risk exposures (Ringo and Chilonga, 2013). Lack of running water and absence of water heaters are mentioned in lower socio-economic groups as described in a Peruvian study. Cooking and bathing requires hot water, this water is heated in big pots placed on the ground floor causing a dangerous environment for the child (Delgado et al., 2013). Many Tanzanian households boil water in open pots close to the ground floor (Albertijn, Bickler and Rode, 2006). In contrast Roman et al. (2012) found no significant differences among the various educational levels of caregivers of children with burns in Tanzania.

Reports from the Regional offices in Arusha and Kilimanjaro Regions showed associations between parental education and illiteracy rate - an important factor to consider when planning educational sessions as part of prevention campaigns. The illiteracy rate is declining, however 26.6% of the population in Arusha Region and 19.2% in Kilimanjaro Region are still illiterate. In both Regions an unequal distribution between man and women is observed, with more women being illiterate (Regional Office Arusha Region (ROAR), unpublished 2014; ROKR & BTC, unpublished 2014).

5.2. The post- event, a road towards adequate care

Different studies indicated that the majority of caretakers do apply some kind of first aid immediately after the burn accident (Justin-Temu et al., 2013; Chalya et al., 2011). Most participants received their knowledge about treatment through friends/family (73%), while

only a minority of participants stated to have received knowledge from medical personnel (14%), school (7%) and media (6%) (Justin-Temu et al., 2008) .

Various materials are applied on the wound, some with devastating effects (Justin-Temu et al., 2008). These applications, together with delayed treatment due to late presentation, are common obstacles in Tanzania (Chalya et al., 2011).

Chalya et al. (2011) highlighted high costs associated with management of burns in health facilities. A Rwandan study revealed some of the problems of professional burn management in low income settings. Lack of personnel, supplies and equipment are named as big barriers in professional burn care. Health personnel often only have little or no training in burn treatment and rely mainly on their experience. Only few hospitals have separate burn units in Rwanda; and these units are not equipped with materials and supplies needed to give optimal treatment (Calland et al., 2013). Chalya et al. (2011) described similar problems with burn care in Tanzanian settings, while quality of care greatly defines the outcome of the burn patient.

Burn injuries have negative effects on financial resources during health care. Financial problems due to a long hospital stay of the burned child and possible long term effects, such as contractures, place a high burden on the burn patient and his/her family (Albertijn, Bickler and Rode, 2006).

5.3. Prevention

Burn management has to be improved; however, the greatest challenge lies in progressing towards adequate and successful prevention strategies (Atiyeh, Masellis and Conte, 2010).

Many research findings mentioned models and strategies for prevention (Van der Merwe and Steenkamp, 2012; Peleg, Goldman and Sikron, 2005). Although most burn injuries take place in low income settings (Wesson et al., 2013), the majority of prevention strategies are based on risk components in high income countries with well-equipped and high tech facilities (Forjuah and Gielen, 2008 cited in Van Niekerk, Menckel and Laflamme, 2010).

Literature findings indicate some of the factors leading to paediatric burn injuries and describe already barriers and problems influencing health seeking behaviour and prevention. This thesis places these findings in a specific context and adds in the findings in depth information regarding paediatric burn injuries in Arusha and Kilimanjaro Regions.

6. Research Findings

This chapter presents general characteristics of the study participants, followed by the actual findings of the study. This thesis focussed on burn injuries in children under-five. Findings are presented in accordance to the objectives of the study. After a short overview of general paediatric health problems in the community, contextual factors influencing paediatric burn injuries are described. Health beliefs focus mainly on beliefs regarding first aid practices. The whole process of health seeking behaviour is described and additional barriers and enablers in usage of health facilities are discussed. Finally an overview of preventive measures practised in the community and safety measure improvements as described by the participants is given.

6.1. Study characteristics of the respondents

A total of four female caregivers, all of children under-five with burns admitted in KCMC, were interviewed during IDI's. All caregivers brought their children directly to KCMC, none of them were referrals. Two caregivers lived in the urbanised area of Moshi Municipality Council (Rau, Longuo), one participant lived in Moshi District Council (Vijini) and one participant in Rombo District (Chekereni). The age of the burn victims ranged between 10 months to 3.5 years. Most of the burns occurred in boys and three caregivers reported that the burn accident took place in the kitchen (See Annex 6).

Furthermore four IDI's were conducted with nurses working with children with burns at different departments of KCMC and with varying years of work experience and education (See Annex 6). Three of the nurses worked on a surgical ward, being either the surgical ICU or the surgical department, as most children with burns were admitted on one of these units. One nurse worked at the dermatology unit at the time of the interview, but she was included in the study because of her extended experience of working with children with burns during her previous job at the surgical ICU.

A total of four FGD's with female caregivers of children under-five were included.

Two FGD's took place in Same District (Kilimanjaro Region), one in Ujamaa village (See Annex 6, FGD1) and one in Mnadani village (See Annex 6, FGD2). Two FGD's were held in Meru District Council (Arusha Region), one in Nguruma village (See Annex 6, FGD3) and one in Patandi village (See Annex 6, FGD4). Female caregivers were all mothers of the children under-five (with or without burns) unless mentioned differently. The experience with burn injuries mentioned in the FGD's might be of children in the direct family or of children from extended families such as children of relatives or neighbours.

A total of 15 women in Same were interviewed. Families of the participants consisted of 1-4 children of which most participants had only one child under-five at the time of the interview. A majority of respondents experienced burn injuries in children. Many could not recall during the FGD when the burn accident happened, so it is not mentioned whether all experiences with burns happened with children under-five.

The 15 female caregivers in Meru District Council had between 1-5 children per family, out of which only one child under-five per participant. Seven women had experienced burn injuries in children, but similar to the interviews in Same, most of the respondents in Meru, could not remember when the accident happened. One female caregiver in Patandi village (participant 1-FGD4) said the accident happened with one of her children at the age of seven, while another respondent (participant 4-FGD4) of the same village remembered that the accident took place when her child was four years old. Two participants in Patandi village (FGD4) were not the parents of the child. One indicated to be the grandmother of the child (participant 6-FGD4), the other one (participant 5-FGD4) was a relative, though both were acting as caregivers of the child(ren) at the time when the interview took place.

Village leaders were interviewed during separate IDI's. Leaders of each of the four villages were interviewed. Most respondents were male with only one female village leader in Ujamaa village in Same. Leaders in Same District clearly spent less time as leaders compared to those in Meru District Council (See Annex 6).

6.2. General Paediatric health problems in the community

Women in the community and community leaders were asked to think about dangers for young children in their local communities (See Table 2).

Table 2: Dangers in the communities listed (in random order) by the female caregivers in the FGD's

Dangers in the community	Explanation(s)
Diarrhoea	<ul style="list-style-type: none"> • Due to a lack or insufficient water supply in the community
Fractures	<ul style="list-style-type: none"> • The child can fall down while he/she is climbing in a tree, which can lead to a fracture of the upper or lower extremities • The child can fall down while playing with other kids and this can lead to a fracture of arms or legs
Drowning	<ul style="list-style-type: none"> • The child can fall into the water while playing • Sometimes the child can crawl close to a water basin and fall into it
Poisoning	<ul style="list-style-type: none"> • A child can drink poisonous drinks such as kerosene • A child might consider a bottle with liquids as juice and drink it, causing an injury or death
Burns	<ul style="list-style-type: none"> • A child can fall into an open fire • A child can get a burn injury when touching a gas cooker • A candle can cause a burn injury <p>➔ Further elaborated in 6.3.</p>

In Same District the shortage of water was a very commonly reported problem due to drought and poor functioning of water systems in and near the villages. This shortage causes two different health problems, diarrheal diseases (due to unsafe water) and paediatric injuries such as burns and fractures due to unsupervised children of women seeking for water.

“Most of the time mothers take long time to fetch water and leave children home alone and this leads to burn injuries.” (IDI community leader 1)

Although the majority of participants in Meru District Council experienced burn injuries in children, they reported that burns are not very common. In contrast they mentioned that children play around the village and can fall into the water or fall out of a tree or drink poison such as kerosene.

Community leaders focussed mainly on burn injuries and none did mention other problems in their community during the IDI's. They consider it as their task to educate the community on health and safety issues and are willing to collaborate with different professionals to find solutions for health problems.

6.3. Burn injuries and their contextual factors

Circumstances and causes

Burn injuries happen unintentionally; this is also the case in Arusha and Kilimanjaro Regions as mentioned by female caregivers.

The care of children is often seen as the responsibility of mothers or house girls; the same persons who are responsible for the preparation of food and housekeeping. Sometimes women or both parents are employed outside the house and leave their children during working hours in the care of a house girl. Female respondents indicated that house girls do not always take their job seriously, whereby children are unsupervised, resulting in a higher chance of sustaining a burn injury.

A community leader in Meru District Council reported that women employed outside the house often forget that their first responsibility is the care for their children and that these women should not leave this care to the house girl.

"If you leave the child alone with the house girl sometimes she is concentrated on other duties and leaves the child alone which causes burn injuries." (FGD2 P1)

"Some of the house girls do not take good care of the children." (FGD1 P1)

"Employed women, they forget that they have responsibilities to take care of their children and they leave it only to the house girl." (IDI community leader P4)

Both community leaders in Same District described how older siblings in the family have to watch their younger ones. However, they do not always take care of brothers or sisters carefully or they leave younger children alone.

Besides the supervision problems, a health care worker highlighted that many families share their small house with other relatives or other families. All kinds of different chores (e.g. preparing food, making homework) take place on a small surface, creating a dangerous environment for children.

"Some families have to share one house or room so it can be difficult to control the child because the bed is there and in the same room are the kitchen and the living space for all the family members." (IDI nurse P3)

Most families use traditional charcoals stoves, open cooking fires and gas cookers to prepare food. These ways of cooking contribute largely to burn injuries in young children in the community. Children can put their hands into the fire while the mother or the house girl is cooking.

"Children like to follow their mother while she is cooking, they can touch the stove and get burn injuries."(FGD4 P4)

"The majority of families are using an open cooking fire, a wood fire." (IDI community leader P2)

The kitchen is named by almost all participants, as the most common and dangerous place for children to sustain a burn injury. Small houses, discussed previously, often only have one or two rooms- a bedroom and a dining room (Sebule). The dining room (Chumba cha chacula) is used as kitchen or the kitchen (Jiko) is in a separate place outside the house (See Figure 2).

"The burn accident happened in the kitchen. I was cooking while sitting on the couch. My child was crawling along the stove where I used to fry vegetables." (IDI caregiver P4)

"It happened at home in the kitchen with hot black tea. The house girl was preparing tea in the kitchen. She put the pot with hot tea on the floor and went away to take a thermos to put the tea in. My child went there and the hot tea fell over him." (IDI caregiver P2)

Often hot tea or porridge is kept in a thermos that is stored on a table or the ground, making it easy for children to reach. Sometimes children serve hot tea to themselves when the mother is not around, causing scald injuries.

"For example, a mother can leave a thermos of tea and children serve themselves." (IDI community leader P1)

"Sometimes the mother is not around due to other duties and leaves the child alone and the child needs tea." (IDI nurse P1)

The mothers of the four children admitted in KCMC all reported the burn injuries happened as a result of scalding. Hot liquids such as soup, tea or boiling vegetables were the causes of the scalding.

"My child touched the big pan with boiling soup." (IDI caregiver P1)

"The pot with the hot tea fell down on my child." (IDI caregiver P3)

Not only hot liquids, but also flammables, such as kerosene for lamps or match boxes are not stored safely out of reach of children.

"The child can play with a match box and cause fire and that leads to a burn accident." (FDG4 P2)

Many households use candles or kerosene lamps after dark, which are a source of accidents.

"A candle can fall and cause the mattress to catch fire, causing a burn accident." (IDI nurse P3)

During FGD's in villages, female caregivers discussed flame injuries caused by open cooking fires, candles or kerosene lamps and scalding injuries mainly caused by hot liquids, as the most common types of burn injuries in their communities.

Nonetheless electricity was also reported to be a possible cause of burns, caused by bad electrical wiring systems.

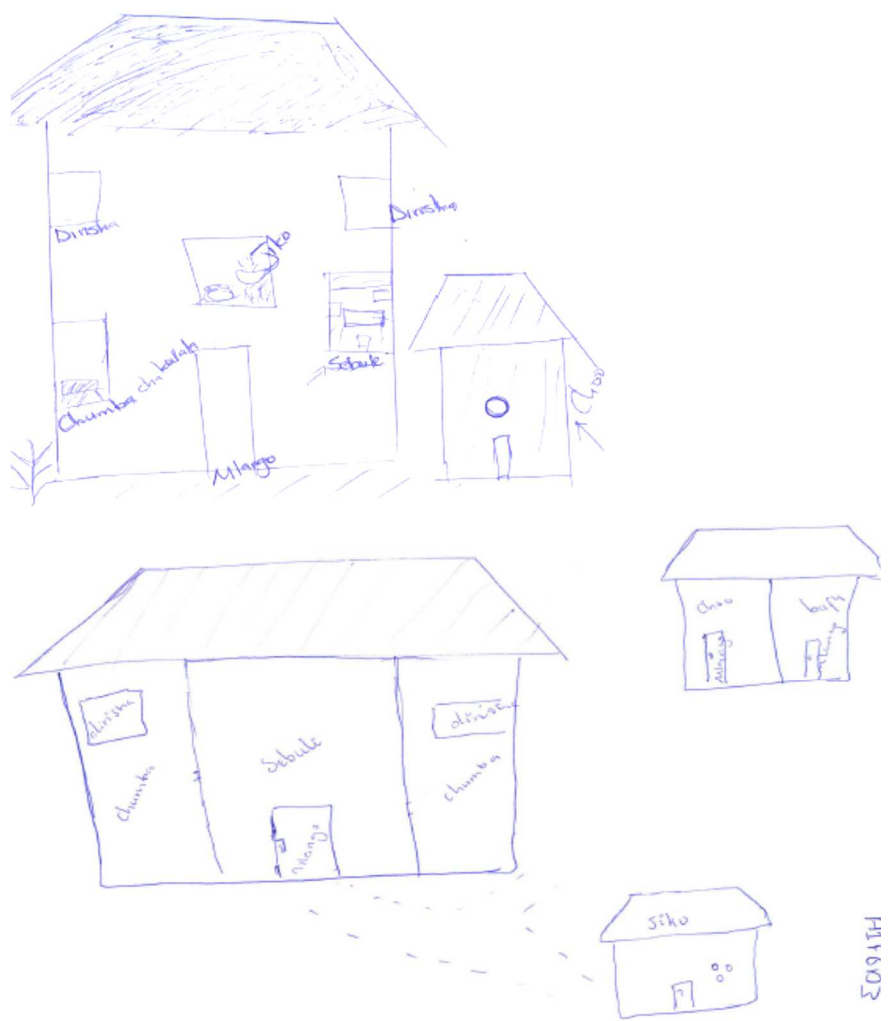
The surroundings outside houses contain dangerous places as well. During the two FGD's in Same District and FGD4 in Meru District Council, several female participants mentioned in particular the waste pit. In the communities trash is collected in a pit and waste is set on fire afterwards. Children like to play around or like playing in these pits and sustain injuries when waste is still hot.

"Outside, the pit for the waste material, domestic material, is dangerous." (FGD2 P5)

"You can get a burn injury by putting waste material on fire." (FGD4 P3)

Female participants in Same District reported dry stems of maize after harvesting and stored cow dung as possible hazards for children to sustain burn injuries. These materials were discussed as risk for burns due to their highly inflammable nature.

Figure 2: Drawings of houses and living conditions made by female caregivers



(FGD 3- participants from Nguruma village)

The burn wound

During the IDI's, female caregivers described burn wounds on different places on the body of their child, depending on the circumstances and causes of the injury.

When children touch hot drinks and food, the heat often causes injuries on arms and hands of children. Hot water can be spilled over the child resulting in injuries on the head, abdomen and legs.

"The wounds of my child are in the back and the buttocks." (IDI caregiver P2)

"My child is burned from the head, all part of the head, chest, abdomen, thighs and legs." (IDI caregiver P3)

Community leaders mentioned that burn wounds do not often happen in their community but if the children sustain burns, the wounds are often big and could have very negative long term effects.

"It causes blisters, fresh wounds and scalds... Scars can affect the child to get married when the child is grown up..." (IDI community leader P1)

These long term effects were also frequently discussed during the FGD's by female caregivers of children in the community and seemed to be of big concern to many caregivers.

"...they cause psychological problems because of the scar that can disfigure the body." (FGD1 P7)

"This may disfigure (shape of the skin) which can destroy the beauty of the child." (FGD2 P6)

"This can cause scars that sometimes lead to disfigurement and sometimes she feels different from others." (FGD3 P4)

Nurses described burn wounds in the hospital as red fresh wounds, blisters, scalds or wounds with the skin peeled off. The wounds differed in size and were often septic by the time the child was admitted. They all reported similar long term effects, such as disabilities, scar tissues resulting in keloids, amputation and contractures.

"These can be blisters, wounds such as fresh wounds with red skin. ...they result in contractures, sometimes this causes to lose some parts of the body and causes disabilities." (IDI nurse P3)

6.4. Health beliefs and health seeking behaviour

During FGD's in villages participants never discussed 'traditional healer' practices in their communities. None of the participants mentioned any visits to traditional healers in relation to burn care. They indicated that their knowledge (concerning first aid) came partly from (grand)parents in the community. Only during FGD4 in Patandi village one female caregiver

acknowledged the use of local herbs in combination with first aid measures, but she did not report the origin of the herbs or the reasoning behind using these.

Participants focussed mainly on discussing their beliefs influencing first aid customs and practices, as described further.

“We do this because of beliefs, inheritance from our elders.” (FGD1 P2)

During the IDI’s, community leaders did not talk about traditional healers. Only the leader of a village in Same District stated explicit that traditional healers are no longer around in her village.

“The traditional healers are out of date.” (IDI community leader P1)

First aid beliefs and practices

All respondents did apply some kind of first aid immediately after the burn injuries occurred. These measures differ a lot and some applications have very specific expected effects (See Table 3). During FGD4 in Meru District Council, a participant discussed the application of eggs or honey *“in order to prevent the heat to go inside the blood vessels”*. Another female caregiver in the same District mentioned the utilisation of a mixture of egg yolk and honey to keep the wound humid and to form pus on the wound and a female participant in Same District described the use of mud to prevent blisters.

Generally, almost all female caregivers during the FGD’s acknowledged that first aid is mainly used to relieve pain, prevent blisters and prevent the heat to go inside, reduce scar tissue and eventually to cure the wound.

Different communities have various customs regarding first aid applications. A community leader in Meru District Council mentioned the application of Vaseline in order to prevent the skin to wrinkle and to cool the wound, while a leader in Same District reported the use of maize flour to prevent further scalding or to remove existing scar tissue.

The overview of first aid applications (listed alphabetically) and expected effects is given in Table 3. Participants discussed different kinds of first aid, but honey and eggs were named as the most common used first aid measures. In most villages, female participants mentioned the use of rabbit fur to cover the wound temporarily if the child lived far away from a health facility.

Table 3: First aid applications and expected effects as reported by the study participants in Kilimanjaro and Arusha Regions

First aid application	Expected effects
<ul style="list-style-type: none"> • Baby care oil • Coffee • Cow dung • Eggs • Fresh milk • Honey 	<ul style="list-style-type: none"> • Prevention of blisters (<i>eggs, honey, mud</i>) • To cover the wound (<i>rabbit fur</i>) • To prevent the heat to go inside the body (<i>salt, honey, Vaseline</i>)

<ul style="list-style-type: none"> • Local herbal medicine • Local sodium bicarbonate • Maize flour • Mud • Rabbit fur • Salt • Urine • Vaseline • Water 	<ul style="list-style-type: none"> • To cool the wound (<i>Vaseline</i>) • To reduce pain (<i>honey</i>) • To heal the wound • To remove scar tissue (<i>maize flour</i>) • To prevent further scalding (<i>maize flour</i>) • To prevent wrinkling of the skin (<i>Vaseline</i>) • To dry the wound • To prevent the heat to go into the blood vessels (<i>eggs, honey</i>) • To form pus on the wound (<i>mix of egg yolk and honey</i>)
---	---

In IDI's with caregivers of children with burns, many of them described the shock immediately after the burn injury. Because of the sudden onset of the accident, most caregivers did not apply first aid of their choice. Often neighbours and relatives were the ones who gave information or took immediate action.

"I was shocked and did not know what to do until my neighbour advised me to apply mud and eggs although I already applied baby care oil." (IDI caregiver P4)

"You may panic during the accident and you may not find what you want to apply because of panic." (IDI caregiver P3)

"Soon after the accident people around poured cold water over the child. Neighbours said to apply salt on the wound and another said to apply water. They said salt prevents heat to penetrate the body. I will not use salt again" (IDI caregiver P1)

Few caregivers mentioned using water as first aid measure. These findings correspond with opinions of nurses who expressed their concerns about wrong treatment of burn injuries causing infection of the wound and making hospital care difficult.

"They do apply honey, Bicarbonate although this makes the wound to become deeper instead of healing." (IDI nurse P1)

An imaginary situation about a burning accident was presented during the FGD's to female caregivers in villages. Afterwards participants replied that, if they were in the situation portrayed, they would pour cold water or sand over the child or put a blanket over the child, followed by applying some of the earlier mentioned first aid methods such as e.g. eggs and honey. This might indicate that some of the mothers made a difference between the action taken directly after the accident and the application of first aid. The reasons behind the use of cold water or a blanket could be to stop the fire and assess the wound as mentioned by female caregivers in all four villages.

These results contradict previous answers about first aid care. Either mothers knew that cold water is the correct answer, but in daily life they do not use this good practice. Or, more likely in this study, pouring water is not considered as a first aid measure but is just done to extinguish the fire, where after they apply the above listed first aid practices on the burn wound.

“Me, I may take water and pour over the child to put out the fire and then remove the clothes so that I can assess the wounds and then I would apply eggs.” (FGD3 P3)

“Mama Ericki will pour cold water and remove the clothes.” (FGD1 P1)

“...apply mud to prevent blisters...” (FGD2 P5)

“I can use heavy clothes, such as a blanket to put out the fire.” (FDG3 P4)

Caregivers reported that different advices were given by the nurses. One caregiver explained that the nurse told her to apply honey or eggs whilst another caregiver received the information from a nurse to only use water in case of burn injuries. Within this context, the educational background of the mentioned health workers is not known, neither is known if they are all working at the same institution.

“ ...and I heard from one nurse that if the child sustains a burn injury you can apply honey or eggs as first aid and then send the child to the hospital.” (IDI caregiver P3)

“I will not use anything apart from cold water because nurses told me not to apply anything but cold water.” (IDI caregiver P1)

The decision-making process

The decision to visit a health facility is often made immediately after the accident as many of the participants mentioned. They actually had different thoughts on who made the decision. Female caregivers answered that often the mother is the one who decided to go to the health facility. This can be explained by the mother being the caregiver who is most often the one who is around during the accident. Community leaders, mostly male respondents, indicated the father (as head of the household) to be responsible for making the decision. The role of the father was mainly linked to the financial responsibility. Hospital bills and all additional costs concerning the care for the child are seen as his responsibility.

Regularly female caregivers mentioned to contact relatives or family members to ask for advice and assistance. Female caregivers mentioned as well that a neighbour, the house girl or a friend could be the one who had to decide. Most of the female respondents shared the idea that the decision had to be taken by the one who was around at the time of the accident in order to limit the delay.

“Me, as the mother of my child I have to make the decision to send my child to the hospital. I cannot wait for my husband while my child is sick and in pain.” (IDI caregiver P3)

“Yes she will communicate with anyone to find help for transport to take Ericki to the hospital, also she will contact relatives and friends to inform them about the situation in order to help her.” (FDG3 P2)

The decision to visit a health facility seems to be influenced by the perception of the severity of the wound. The severity was categorised by female caregivers into three aspects, namely size, look and place of the wound on the body. Small wounds were treated at home. A red coloration of the wound or blisters on the wound were seen as indications of severe wounds and were a reason to send the child to a health facility. Wounds that occurred on the head/face, chest or abdomen of the child were often linked to big wounds and therefore were best treated in health facilities.

“Burn accidents particular in the head, I will rush the child to the big hospital for good services.” (FGD4 P4)

“...A terrible accident, for example a burn on the abdomen...” (FGD4 P8)

“If the wound is small, she might apply Vaseline and honey and after three days the wound is dry.” (FGD3 P6)

The health facility

Transport to health facilities depends on multiple factors- availability, distance to the facility and cost. If the health facility is close by, caregivers take the child by foot. If the family has enough money and transport is available, caregivers go by (private) car, bicycle, motorbike or taxi.

“...I hired a motorcycle and rushed to KCMC.” (IDI caregiver P4)

“Because we are nearby a road, we took a taxi and within 10 minutes we were in the hospital.”(IDI caregiver P1)

As mentioned earlier, children with small wounds are often said not to be taken to hospitals. Instead they were treated at home with medicine bought at a local pharmacy or a nearby dispensary. If the wounds were perceived as severe injuries, the children were mostly brought to a hospital. The majority of female participants would bring their children to Government based hospitals as the care for children under-five is free of charge. However, some female caregivers argued that care in Government hospitals is delayed and so they preferred bringing their children to a private clinic. Regional and District hospitals are visited by female caregivers in order to consult a specialist.

“They expect to meet professionals so that they can get quality care. They believe that the professionals will help them.” (IDI community leader P1)

“The reason is that they will find professional health care services.” (IDI nurse P3)

“They will bring Ericki to the hospital because there are specialists who know different types of treatment and care.” (FGD3 P2)

The main expectations of visiting health facilities were receiving high quality care, care delivered by professionals and if possible to consult a specialist.

6.5. Barriers and enablers to the use of health facilities

Barriers

Caregivers want to seek health care for their children; however, the whole process is influenced by barriers.

Cost has a big impact on multiple stages of the health care process, namely health seeking behaviour and choice of health facility. If health facilities are not nearby, transport needs to be paid to reach the facilities. Public transport is cheap, but often not safe while taxi fees can be high.

Additionally in some health facilities, not all services are free of charge. A lack of money often causes delays in health seeking behaviour.

“Let’s say my child sustains a burn injury and it is suddenly and at that time I do not have money. When you go to a health facility for example in our hospital called Patandi, before you see a doctor you have to pay. She or he will prescribe medicine which needs to be purchased. So when I have no money during the situation I have to provide first aid to my child till the next day or days until I get money to bring my child to the hospital.” (FGD3 P1)

“Sometimes it happens you do not have money for the transport or the hospital costs”. (IDI caregiver P3)

Besides transport fees, several female caregivers mentioned during the FGD’s the problem with availability of reliable and safe transport that hinders them to go to health facilities.

“I am willing to take any available transport which will assist me to reach the health facility quickly.” (FGD4 P6)

“...another is the lack of transport, for example when it is during the night I will provide my child with first aid until the morning and then I will bring my child to the hospital.” (FGD3 P3)

Additionally, poor road infrastructure influences caregivers to reach health facilities as highlighted by a caregiver during an IDI .

"I can quickly send my child to the hospital if the infrastructure is good (the road)." (IDI caregiver P3)

Once caregivers arrive in the health facility, care is repeatedly delayed and not optimal due to lack of equipment and behaviour of the staff.

"Sometimes health centres or hospitals, the equipment they are using is not good and can cause infection."(IDI caregiver P4)

"...long waiting services in a hospital..." (FGD1 P4)

Behaviour of the health care personal, mostly nurses, was a frequently reported barrier. Female caregivers highlighted problems with nurses attitude such as the use of bad language, shouting and stigmatisation.

"... but also poor reception of the nurses, where when you arrive, they use bad language, they shout and they question you which even causes a delay in care." (FGD2 P7)

"In some health care facilities the staff is not good. You can reach the facility and find nurses, you start to give the history of what happened with the child, but the nurse has no interest and leaves you there while your children are in pain and crying." (FGD3 P1)

Nurses are aware of this problem and acknowledged the use of bad language, poor reception and communication with caregivers as a barrier towards optimal care.

"...customer care, for example nurses language..." (IDI nurse P1)

Female caregivers and nurses identified beliefs and traditional values as obstacles to optimal care. These beliefs and values, earlier discussed as beliefs and practices related to the use of first aid measures and the use of local medicine such as herbs, can according to the nurses, cause harm to the initial wound.

Table 4: The possible negative effects of first aid applications as mentioned by the nurses

First aid application	Effects as reported by the nurses
Honey	<ul style="list-style-type: none">• Makes the wound to become deeper
Sodium bicarbonate	
Herbal medicine	<ul style="list-style-type: none">• It forms dead tissue on the wound

Moreover, they can cause delay in health seeking behaviour as some might believe the wound will heal or they are afraid of the reaction of professional health care workers.

"...wrong believes... or they give the child local herbs at home..." (FGD4 P4 +P3)

"...also the believe in certain first aid methods and they believe it will cure the wound." (IDI nurse P4)

Finally, lack of knowledge regarding burn care is mentioned as barrier not only in relation to health seeking behaviour, but also towards appropriate and successful prevention of burn wounds (See 6.6.).

All mothers of burn victims highlighted in IDI's lack of knowledge in their community about burn care in relation to the use of possible harmful first aid applications and delay in health seeking behaviour.

" When my child got burnt other people said that I should just apply honey and they said not to take my child to the hospital." (IDI caregiver P1)

"...When it happened to my child, it is the first born, so I did not know what to do." (IDI caregiver P4)

Female caregivers in communities and their leaders emphasised on the importance of education in their communities. Not only education about first aid was considered as important by the female caregivers. Also information regarding safe storage of equipment and regarding simple adaptations of the kitchen such as closing a door or making a barrier while cooking.

"No any training is given concerning burns. It is very important to get the session so that we can impact knowledge in order to reduce burn accidents in the community." (IDI community leader P1)

"Education on how to set aside electrical equipment and other equipment which can cause burns." (FGD 2 P6)

Also the education (regarding burn care) of health professionals is not optimal. The providers mentioned that information and training on care for burn victims is nearly non-existing in health facilities and is acknowledged as a big shortcoming by health professionals in their training and daily work. Nurses reported to have a low understanding of burn care.

"I have no training in burn care."(IDI nurse P1)

"Us, nurses who are caring for children with burn injuries should undergo training about burn care."(IDI nurse P4)

Community workers on the other hand, mentioned the importance of professional attitude of health care workers, in particular nurses. This attitude was mentioned earlier by female caregivers as a possible barrier to seeking health care.

Enablers

During the FGD's and IDI's very few enablers were highlighted by participants.

Caregivers pointed out that improvements in health facilities leading to good quality health services would convince them to visit these facilities. One caregiver of a child with burns reported that the short distance to the health facility enabled her to reach the facility immediately after the injury occurred.

6.6. Prevention

Current practices in the community

In the community, female caregivers and their community leaders believe that burns could be prevented and actions are taken to prevent these injuries in young children. Supervision of young children is an important measure.

A participant of a FGD in Meru District Council reported that while preparing food, children are kept out of the kitchen or the place where the cooking takes place. Another respondent in a FGD in the same District mentioned the safe storage of flammables, such as match boxes and kerosene lamps.

"I will tell older children to take care of small children while I am away so that she/he cannot touch hot instruments or play with things that can cause fire." (FGD3 P5)

"Put far away the match box so that children will not reach and manage to put on a fire." (FGD4 P4)

A participant of an FGD in Same reported the practices of safety measures concerning waste disposal in her community. Waste that needs burning outside the house in the waste pit, is set on fire in the evening so that the fire is off and cooled down by early morning before children start playing outside the house.

"We burn waste during the night and make sure in the morning there is no fire around."(FGD1 P5)

Suggestions for safety improvement

Several suggestions for safety improvement were expressed by participants. Education about several topics related to burn injuries is seen by all participants as a crucial measure in decreasing burn injuries in young children in communities. Yet female caregivers and community leaders mentioned that education/information about burn injuries had never been offered to their community so far.

Education should be given to different members of the community: mothers and house girls as main caregivers of children, the child itself and community leaders. However, as mentioned earlier, advice is often given by neighbours or relatives, therefore it is important to include them in the educational sessions. School children should also be invited for these sessions.

Numerous topics for educational sessions were listed during the interviews (See table 5).

Table 5: Education in the community as listed by female caregivers and community leaders

Topics for educational sessions in the community
<ul style="list-style-type: none"> • Education on first aid • Education on how to control fire • Education on prevention of burn injuries <ul style="list-style-type: none"> ○ Education about different causes of burn injuries (inside and outside the house), also (especially) about electrical wiring ○ Education about safe storage • Education on advantages and disadvantages visiting health care facilities

As mentioned earlier, nurses indicated the shortage of their knowledge regarding medical burn care of patients. They underlined the importance of education about fluid resuscitation, sterility and timely referral from a health centre to a hospital

An overview of educational topics for health care workers is listed in table 6.

Table 6: Education of HCW as listed by nurses in KCMC

Topics for educational sessions for HCW
<ul style="list-style-type: none"> • Education on the total care of a burn patient: <ul style="list-style-type: none"> ○ Education about fluid resuscitation ○ Education about the importance of changing linen regularly ○ Education about the importance of sterile care ○ Education on signs and symptoms indicating a referral • Education about communication, social skills and interaction with the patient and his/her caregiver(s)

Besides of education, several female caregivers emphasised during the FGD's and IDI's, on keeping children away from the cooking area. But there is lack of safe playing areas for children in the community, as mentioned by a mother in Meru District Council.

If an adult cannot supervise the child, at least someone, even an older sibling should be involved as advised by several female caregivers in Meru District Council. However as reported previously, these siblings are often also not taking care of their younger ones.

Table 7 provides a summary of the 5 main topics reported by the participants. All suggestions are focussed only on actions that could be taken specifically within the communities.

Table 7: Suggestions for safety improvement in the community

Topic	Suggested Measure
Supervision	<ul style="list-style-type: none"> • Involve other siblings as caretakers for younger children • Inform the house girl on taking care of the child
Education	<ul style="list-style-type: none"> • Give health education about burn injuries to mothers and house girls • Teach the child not to touch flammables or equipment that can cause fire
Storage	<ul style="list-style-type: none"> • Store hot food and drinks away from children

	<ul style="list-style-type: none"> • Store match boxes and kerosene lamps on a safe distance from children
Cooking	<ul style="list-style-type: none"> • After cooking, extinguish the fire/charcoal • Make sure that children are not around while cooking • Introduce another way of cooking (instead of the charcoal stove) • Make sure you close the door when you are cooking
Waste disposal	<ul style="list-style-type: none"> • Burn waste on proper times (when children are not around, when there is not too much wind) • Make sure to extinguish the fire in the waste pit with water

7. Discussion

The main aim of this study is to add data to previous research in order to target paediatric burn injuries more adequately and in order to develop prevention strategies tailored to needs of an at risk population in Arusha and Kilimanjaro Regions.

Few studies in Tanzania described practices of caregivers related to burn care. Most of these studies are conducted in hospital settings with caregivers of children with burns. Other studies have listed epidemiological information, data about management and treatment. Yet, few studies concerning burn care in Tanzania have been conducted in communities.

In this discussion the main findings of the study are reported following the (adapted) Haddon Matrix. This Matrix, also used by the WHO, shows the interaction between different stages and factors leading to injuries, including burn injuries (Peden et al., 2011; WHO, 2008).

In this report, the Haddon Matrix assisted to map the possible factors leading to burn injuries within the context of this research. These factors need to be presented taking into account cultural beliefs and traditions, missing in this Matrix. Therefore this study added this component and described in the findings the beliefs of female caregivers regarding burn care and how these can also influence the health seeking process.

Based on the overview presented in the Matrix, prevention strategies can be designed and tailored to the needs of the target population

Young children are particularly prone to sustain burn injuries. Our study found that flame and scald injuries are the most common types of burn injuries in children under-five. These results are consistent with literature findings (Outwater et al., 2013; Chalya et al., 2011). Three out of four burn victims were male in this study; however, as the sample size is small this finding cannot be generalised.

The natural curiosity of a child, their limited understanding of dangers and the dependency on caretakers all attribute to their vulnerability (Van Niekerk, Rode and Laflamme, 2004).

The importance of supervision was highlighted by many caregivers in the study of this thesis. This is done mostly by mothers or house girls. Often older siblings have to look after their younger ones. Supervision in combination with multiple chores of caretakers is a challenging combination. Mothers leave their children alone when they go and fetch water or while they go to work. House girls have to look after children but sometimes concentrate on other tasks.

These examples indicate that expected chores may undermine the ability to supervise children as described in the study of Van Niekerk et al. (2007). Although little support is given for the effectiveness regarding supervision measures (Bars et al., 1998 cited in Van Niekerk et al., 2007) and despite the challenges in providing supervision, caregivers in this study view this task as their responsibility and name it as a topic of their proposed safety improvement measures.

During this study, participants did not associate burns with any underlying pre-existing illness. However, in literature epilepsy is named as the most common underlying illness linked to burn injuries (Outwater et al., 2013).

Caregivers do not always use the first aid measure of their choice. This can be explained by the shock they experience immediately after the burn injury event. On the other hand, in this thesis, lack of knowledge regarding burn care and prevention was repeatedly reported by female caregivers. This knowledge gap can have an impact on the choice of first aid care and further health seeking behaviour.

In this study it became clear that the preparation of food happens in the house or in a separate kitchen outside. The typical charcoal stove, gas cooker and open cooking fire are the biggest hazards for young children found in this thesis. Caregivers mentioned the use of barriers, such as for example closing the door while cooking, as safety improvements. The introduction of another way of cooking was also discussed during the study; however, none of the participants could name an example. Fires are at ground level which makes it easy for toddlers and young children to sustain burn injuries (Outwater et al., 2013). Future research needs to be done about the use of solar power and ways to improve the traditional charcoal stove (Outwater et al., 2013).

The creation of barriers is equally important concerning storage of flammables. Kerosene lamps and hot water for tea can be placed on a higher shelf and match boxes can be stored away so children cannot reach these dangerous goods. Caregivers are aware of these simple, but effective measures of creating barriers (Dowswell, 1996 cited in Van Niekerk et al., 2007). Yet they emphasise in our study the importance of more education on the topic in the community.

A lack of water, mainly mentioned by participants in Same District can contribute to an increased risk of burn injuries as described by the study of Delgado et al. (2002).

Our study also identified another danger, not often described in literature, the waste pit outside the house. Children sustain burns while playing around waste pits when the waste is still hot and are therefore prone to scalding. A possible solution to this hazard could be to burn waste during the night under supervision of a community member. Simon (2008) mentions the dangers for human health during waste burning activities in Tanzania. However, little attention is given to the danger of paediatric burns in relation with waste disposal. Additional research is necessary to identify patterns and to find solutions or alternatives to waste disposal practices.

This study indicated that the kitchen in particular contained many hazards for children. This finding aligns with results of previous studies done in Tanzania (Outwater et al., 2013).

We found that places in and around the house are the most dangerous areas for young children to sustain burn injuries. The high incidence of burns in the house can be partially explained by the structure of the building. As participants explained, many of them live in

small houses with a large family and possibly relatives. They have to share a small living space wherein almost all chores take place at different times during day and night. Additionally typical waste disposal happens through burning as described earlier and contributes to paediatric burn injuries in the community.

In our study, lack of money reflects mainly in transport problems and the use of health facilities. Poor road infrastructure and lack of reliable and affordable transportation, especially during the night, hinders the population to go to health facilities. Most participants would bring their children to a Governmental based facility as the health care for children is free. However, not only a financial burden causes a barrier visiting health facilities of their choice, also the behaviour of health care staff, mainly nurses, was highlighted during interviews. Nurses have little or no education regarding care of burn injuries. Health care workers indicated that this lack of knowledge influences their job satisfaction level and stretched the importance of educational sessions for nurses. Research on the relation between additional education of health care staff, health care staff job satisfaction and their behaviour towards patients care would be of high interest.

Perceived quality of care, costs, beliefs and traditions influence the decision making process and might be the cause of delay. Participants inherit beliefs and traditional values regarding burn care from their grandparents or receive information from relatives and neighbours. These beliefs and traditions, such as the use of mud or salt on the burn injury described in this study, could be harmful for the burn wound. Female participants listed these beliefs and traditions as possible barriers towards health seeking behaviour mainly because of fear of being stigmatised by professional health care workers. Despite of their traditions and beliefs and the associated fear, all caregivers in this setting reported an intention to seek health care immediately after the burn injury, in contrast to research done in Ghana where caregivers sought health care only after the wound started to show signs of infection (Atiyeh, Masellis and Conte, 2010).

The decision to search professional help is made by the person who is around at the time of the accident and is not dominated by the father. Caregivers expect high quality care defined as care by professionals in a well-equipped health facility where the waiting time is short and the reception by health care staff is friendly. Yet, expectations of caregivers are far apart from the current situation of health facilities. Tanzania has few highly equipped facilities for taking care of critical burn patients; even though plans have been made for the construction of burn units around the country (Mitchell, Giiti and Gallagher, 2013) none are operational at the moment.

While healing of the wound is the overall goal of applying first aid, female caregivers described different expected effects of the several first aid applications. These expected effects provide more background information on beliefs and reasons of female caregivers behind the use of first aid. Ringo and Chilonga (2013) show in their results collected at KCMC, that none of the participants used water as first aid and urge on the problem of knowledge about the importance of water amongst caregivers. Though our study findings show that caregivers do know about the use of water after a burn injury, yet this seems not to be considered as a first aid measure but more likely as a way to put out the fire. Additional larger scaled research is necessary to list the effect of these local practices on wound care and to determine the use and purpose of water in the whole burn care process.

In our study most caregivers pointed out the importance of preventive measures in their communities and how these can positively influence a decrease in burn injuries. In contrast Outwater et al. (2013) described that many caregivers in Tanzania believed that burn accidents were inevitable and therefore not preventable.

The care for burn victims is complex, the cost for the health care system is high (Atiyeh, Costagliola and Hayek, 2009) and it puts a high demand on children, families and communities (Chalya et al., 2011). Therefore the best way of trying to reduce the burden of burns in LMIC is prevention (Outwater et al., 2013).

This thesis shows the need for education about preventive measures and highlights the topics named by participants. However, educational sessions alone are proved to be non-effective in developing countries. Improvement in knowledge does not necessarily have a positive impact on the behaviour (Van der Merwe and Steenkamp, 2012).

Intervention programs can have a positive impact. Although not commonly reported, combined programs (See Annex 7), where education is only a part of the whole plan, are considered as the best way to have positive impacts on burn injuries in children (Peleg, Goldman and Sikron, 2005).

8. Conclusion

Paediatric burn injuries are still very common in Tanzania and contribute largely to childhood morbidity and mortality. The waste pit and kitchen are the most dangerous areas for children to sustain burn injuries found in this study. Several first aid measures are taken by female caregivers, all with different expected effects on the wound. Cost and transport problems influence health seeking behaviour of female caregivers, but at the same time the perceived quality of care of health facilities and the attitude of nurses determine the entire process. All participants named the importance of prevention. Changes in practice, environmental adaptations and education are needed to provide these caregivers with a more enabling environment to take appropriate precautions and actions.

9. Recommendations

The following recommendations are made based on the literature and the study findings. A strategy for prevention based on this study was made (See Annex 7). Many study participants asked after the interviews if they could receive an information session after the study was completed³. All efforts will be made to provide an information session in each community and in KCMC in order to share these results and to make this information accessible for the participants who can translate these recommendations into actions. If possible a limited evaluation of these sessions will be made in time to be able to describe the effects of the small intervention.

Only recommendations considered as feasible in the context of the included study population/area are mentioned in preventing burn injuries:

³ Although this is a small scaled study, both the research assistants and the researchers find it important to share the results in the community and with staff in the hospital.

community

- Provide information on the importance of child supervision in the community and on ways to improve this supervision in combination with planning of daily activities
- Discuss with all community members and inform them about the danger inside and outside the house
 - Discuss with community members feasible adaptations in cooking
 - Suggest a supervised scheduled burning of waste material
 - Inform and discuss with community members safe storage of flammables and dangerous equipment in and around their houses
- Inform and discuss with community members about simple ways to create barriers concerning the cooking set up (e.g. a door between kitchen and other areas)
- Provide education to all community members about first aid measures

Health facility

- Organise training regarding burn care for nurses in health care facilities. This training could consist of several sessions and should include basic assessment of a paediatric burn injury, fluid resuscitation and management of burn wounds. The development of a simple protocol would not only be positive for the entire management of burn injuries but could also contribute to correct referrals to different health facilities.

References

- ✓ Albertijn, R, Bickler, SW, Rode, H 2006, 'Paediatric burn injuries in Sub Saharan Africa - an overview', *Burns*, vol. 32, pp. 605-612
- ✓ Atiyeh, B, Costagliola, M, Hayek, S 2009, 'Burn prevention mechanisms and outcomes: Pitfalls, failures and successes', *Burns*, vol. 35, pp. 181-193
- ✓ Atiyeh, B, Masellis, A, Conte, C 2009, 'Optimizing burn treatment in developing low- and middle-income countries with limited health care resources (part 1)', *Annals of Burns and Fire Disasters*, vol. 12, n. 3, pp. 121-125
- ✓ Atiyeh, B, Masellis, A, Conte, C 2010, 'Optimizing burn treatment in developing low- and middle-income countries with limited health care resources (part 3)', *Annals of Burns and Fire Disasters*, vol. 13, n. 1, pp. 13-18
- ✓ Calland, JF, Holland, MC, Mwizewa, O, Petroze, RT, Ntakiyiruta, G, Patel, K, Gampper, TJ, Byiringiro, JC, Campbell, CA, Calland, JF 2013, 'Burn management in sub-Saharan Africa: Opportunities for implementation of dedicated training and development of speciality centers', *Burns*, viewed 10th December 2013, <http://dx.doi.org/10.1016/j.burns.2013.05.015>
- ✓ Chalya, PL, Mabula, JB, Dass, RM, Giiti, G, Chandika, AB, Kanumba, ES, Gilyoma, JM 2011, 'Pattern of childhood burn injuries and their management outcome at Bugando Medical Centre in Northwestern Tanzania', *BMC Research notes*, vol. 4, no 485
- ✓ Delgado, J, Ramirez-Cardisch, ME, Gilman, RH, Lavarello, R, Dahodwala, N, Bazan, A, Rodriguez, V, Cama, RI, Tovar, M, Mescano, A 2002, ' Risk factors for burns in children: crowding, poverty, and poor maternal education', *Injury Prevention*, vol. 8, pp. 38-41
- ✓ Edelman, L 2007, 'Social and economic factors associated with the risk of burn injury', *Burns*, vol. 33, pp.958-965
- ✓ Forjuoh, SN, Guyer, B, Strobino, DM, Keyl, PM, Diener-West, M, Smith, GS 1995, 'Risk factors for childhood burns: a case-control study of Ghanaian children', *Journal of Epidemiology and Community Health*, vol.49, pp.189-193
- ✓ Justin- Temu, M, Rimoy, G, Premji, Z, Matemu, G 2008, 'Causes, Magnitude and management of burns in under- fives in district hospitals in Dar Es salaam, Tanzania', *East-African Journal of Public Health*, vol. 5, no 1, pp. 38-42
- ✓ Koc, Z, Saglam, Z 2012, 'Burn epidemiology and cost of medication in paediatric burn patients', *Burns*, vol. 38, pp. 813-819

- ✓ Maps of the World 2012, viewed 17th December 2014, <http://www.mapsofworld.com/tanzania/tanzania-political-map.html>
- ✓ Mashreky, SR 2010, 'Developing a Framework of Prevention of Childhood Burn in a Low-Income Country Perspective: Epidemiological Appraisals', PhD thesis, Karolinska Institutet, Stockholm
- ✓ Mitchell, KB, Giiti, G, Gallagher, JJ 2013, 'Survey of care and evaluation of East African burn unit feasibility: an academic burn centre exchange', *Journal of Burn care and Research*, vol. 34, no 1, pp. 78-81
- ✓ Moshi, H 2014, *Kilimanjaro Christian Medical Centre*, viewed 30th December 2014, <http://www.kcmc.ac.tz/>
- ✓ Moshiro, C, Mswia, R, Alberti, KGMM, Whiting, DR, Unwin, N, Setel, PW 2001, 'The importance of injury as a cause of death in Sub-Saharan Africa: results of a community-based study in Tanzania', *Public Health*, vol 115, pp. 96-102
- ✓ Munro, SA, Van Niekerk, A, Seedat, M 2005, 'Childhood unintentional injuries: the perceived impact of the environment, lack of supervision and child characteristics', *Child: care, health and development*, vol.32, no 3, pp. 269-279
- ✓ National Bureau of Statistics Dar Es Salaam & Office of Chief Government Statistician Zanzibar 2013, *2012 Population and Housing Census*, National Bureau of Statistics & Office of Chief Government Statistician, Dar Es Salaam & Zanzibar
- ✓ National Bureau of Statistics 2011, *Tanzania Demographic and Health Survey*, National Bureau of Statistics, Dar Es Salaam
- ✓ Outwater, AH, Ismael, H, Mgalilwa, L, Temu, MJ, Mbembati, NA 2013, 'Burns in Tanzania: morbidity, mortality, causes and risk factors: a review', *International Journal of Burn trauma*, vol.3, no 1, pp. 18-29
- ✓ Peden, M, Oyegbite, K, Ozanne-Smith J, Hyder, A, Branche, C, Rahman, A, Rivara, F, Bartolomeus, K 2008, *World report on child injury prevention*, World Health Organisation and UNICEF, Geneva
- ✓ Peleg, K, Goldman, S, Sikron, F 2005, 'Burn prevention programs for children: do they reduce burn-related hospitalisations?', *Burns*, vol. 31, pp. 347-350
- ✓ Regional Office Arusha Region (unpublished), *Arusha socio-economic profile 2014*, Regional Office Arusha Region, Arusha
- ✓ Regional Office Kilimanjaro Region & Belgian Technical Corporation (unpublished), *Kilimanjaro socio-economic profile 2014*, Regional Office Kilimanjaro, Moshi

- ✓ Ringo, Y, Chilonga, K 2013, 'Burns at KCMC: Epidemiology, presentation, management and treatment outcome', *Burns*, no 4
- ✓ Roman, IM, Lewis, ER, Kigwangalla, HA, Wilson, ML 2012, 'Child burn injury in Dar Es Salaam, Tanzania, results from a community study', *International Journal of Injury Control and Safety Promotion*, vol 19, no 2, pp. 135-139
- ✓ Simon, AM 2008, 'Analysis of activities of community based organisations involved in solid waste management, investigating modern mixed approach', thesis, University of Wageningen, Wageningen
- ✓ Van der Merwe, AE, Steenkamp, WC 2012, 'Prevention of burns in developing countries', *Annals of Burns and Fire Disasters*, vol. 25, no 4, pp. 188-191
- ✓ Van Niekerk, A 2007, 'Paediatric burn injuries in Cape Town, South Africa', thesis, Karolinska Institutet, Stockholm
- ✓ Van Niekerk, A, Menckel, E, Laflamme, L 2010, 'Barriers and enablers to the use of measures to prevent paediatric scalding in Cape Town, South Africa', *Public Health Nursing*, vol. 27, no 3, pp. 203-220
- ✓ Van Niekerk, A, Rode, H, Laflamme, L 2004, 'Incidence and patterns of childhood burn injuries in the Western Cape, South Africa', *Burns*, vol. 30, pp. 341-347
- ✓ Van Niekerk, A, Seedat, M, Menckel, E, Laflamme, L 2006, 'Caregiver experiences, contextualisations and understandings of the burn injury to their child. Accounts from low-income settings in South-Africa', *Child: care, health and development*, vol. 33, no 3, pp 236-235
- ✓ Van Niekerk, A, Seedat, M, Menckel, E, Laflamme, L 2007, 'Caregiver experiences, contextualisations and understandings of the burn injury to their child. Accounts from low-income settings in south Africa', *Child: Care, health and development*, vol.33, no 3, pp. 236 – 245
- ✓ Wesson, HKH, Bachani, AM, Mtambeka, P, Schulman, D, Mavengere, C, Stevens, KA, Millar, AJW, Hyder, AA, van As, AB 2013, 'Paediatric burn injuries in South-Africa: A 15 years analysis of hospital data', *International Journal of the care of the injured*, vol. 44, pp. 1477-1482
- ✓ World Bank 2014, *Data Tanzania*, viewed 15th November 2014, <http://data.worldbank.org/country/tanzania>
- ✓ World Health Organisation 2008, *A WHO plan for burn prevention and care*, WHO, Geneva

- ✓ World Health Organisation 2011, *Burn prevention: Success stories, lessons learned*, WHO, Geneva
- ✓ You, D., Hug, L., Chen, Y. 2014, *Levels and trends in Child mortality*, United Nations International Children's Emergency Fund (UNICEF), New York

Annex 1: Additional background information

Arusha Region

Arusha Region covers an area of 34,515 km². It is divided into 6 Districts (7 Councils), several divisions, wards and villages. The main ethnic groups living in Meru District Council are the Arusha, Masaai, Meru and Chagga. (Regional Office Arusha Region (ROAR), unpublished 2014).

In Arusha Region, Meru District Council has a total of 54 health facilities. Although the number of health facilities increased over the years, a shortage of professional health care staff, drugs and equipment are still barriers that hinder optimal care (ROAR, unpublished 2014).

Kilimanjaro Region

Kilimanjaro Region, dominated by Mt. Kilimanjaro covers 13,209 km². The Region has 6 District Councils and 1 Municipal Council and is divided into several divisions, wards and villages (Regional Office Kilimanjaro Region (ROKR) & Belgian Technical Corporation (BTC), unpublished 2014).

Kilimanjaro Region, inhabited predominantly by the Pare, the Chagga and some migrants from the Usumbara Mountains, is fairly well equipped with health facilities (ROKR & BTC, unpublished 2014).

The mainly rural Moshi District Council and urban Moshi Municipal Council together have a total of 10 hospitals, 16 health centres, 113 dispensaries and some mobile clinics for a total population of 651,029 (ROKR & BTC, unpublished 2014). One of these hospitals is Kilimanjaro Christian Medical Centre (KCMC), a 450 bed teaching hospital serving as a referral hospital for a population of 11 million people in North-Tanzania (Moshi, 2014).

The rural Rombo District Council with a population of 200,859, is in contrast to Moshi, one of the Districts with the fewest health centres available.

Same District is geographically the biggest district within Kilimanjaro Region with a total population 269,807. Same is predominantly a rural and very dry area. Currently 2 hospitals, 8 health centres and 60 dispensaries are responsible for health care in the District (ROKR & BTC, unpublished 2014).

Annex 2: Topic guide IDI's

IDI female caregiver (KCMC) (English version)

1. *Consent*

I am working together with a student of the master in International Health in the Netherlands. We are very interested in hearing your opinions about first aid measures and prevention methods regarding burn injuries in children. You have been invited for an interview. If you decide to take part, this interview will require around one hour of your time. This interview will be conducted at a private quiet place at the hospital grounds, at a time that is convenient for you.

The decision to take part in this discussion has to be entirely yours and you are free to withdraw from the study at any given time. There are no right or wrong answers, we are interested in your opinion and ideas and it is your choice to refuse to answer.

With your permission we would like to audio tape this discussion so that we can assure that we capture all ideas, information, thoughts and opinions mentioned during this interview. All these records will be kept on a secure computer. Your name will not be mentioned in any of the reports.

2. *Introduction*

- Ask if there are any questions before starting the interview
- Ask how the child is doing in the hospital, to make the caregiver more comfortable

3. *Questions*

General information

1. Could you tell me your age
2. Could you tell me where you live (village name)?
3. Is the child admitted in the hospital your child or are you a family member/friend?
4. How many children do you have?
5. How old is the child admitted at the hospital?

Factors contributing to a burn injury

6. Could you tell me where the burn accident happened (at home, outside, school,...)
7. Could you tell me what caused the burn accident to happen (petrol lamps, cooking fire,...)
8. Could you tell me where the child has the burn wounds on his/her body
 - size, depth, wound description

Health beliefs and health seeking behaviour (including first aid practises) of female caregivers

9. Could you tell me what happened right after the child sustained the burn injury?
10. Did you apply anything on the burn wound after the accident happened?
If YES, go to Q.10
If NO, go to Q. 12
10. What did you apply on the wound (water, oil,...)?
 - when did you apply this (right after the burn injury happened, after some time,...)
 - what made you decide to apply that on the burn wound (customs, local beliefs,...)?
 - who/where did you get the information to apply that on the burn wound?
11. What effects did you expect this application to have on the burn wound (lowering the pain, reduce scar tissue, no idea,...)
12. What made you decide not to apply anything on the wound?
13. When did you seek health care for your child (immediately, after some hours, next day)

14. Where did you seek health care for your child (health facility, traditional healer, hospital,...)
- why did you choose to go there (proximity, quality, cost, accessibility, availability,...)?
15. Who took the decision to seek health care (you, your husband, family member,...)
- did you consult anyone in your family or community for advice?
16. Could you think of barriers and/or enablers that you face in consulting/going to health care facilities (cost, transport, quality,...)?

Prevention methods (at the home environment) and barriers and enablers towards prevention and first aid

17. Could you think of the places in your house or community that might be dangerous for young children to sustain a burn injury?
18. How would you prevent another burn injury to happen?
- Do you have ideas how to prevent burn injuries in your house/community?
19. Could you tell me about prevention methods that are practised in your community (protected cooking fires,...)
20. Concerning the first aid (if applied)
- would you apply the same first aid again?
 - did you face any barriers in applying the first aid of your choice?
21. What do you think about education/information sessions about burn injuries?
22. If education would be given, could you name 3 topics that you think need to be addressed during an education session?
23. Do you have any more questions or suggestions for me?

IDI health care provider (nurse) (key informant)

1. Consent

I am working together with a student of the master in International Health in the Netherlands. We are very interested in hearing your opinions about first aid measures and prevention methods regarding burn injuries in children. You have been invited for an interview. If you decide to take part, this interview will require around one hour of your time. This interview will be conducted at a private quiet place at the hospital grounds, at a time that is convenient for you.

The decision to take part in this discussion has to be entirely yours and you are free to withdraw from the study at any given time. There are no right or wrong answers, we are interested in your opinion and ideas and it is your choice to refuse to answer.

With your permission we would like to audio tape this discussion so that we can assure that we capture all ideas, information, thoughts and opinions mentioned during this interview. All these records will be kept on a secure computer. Your name will not be mentioned in any of the reports.

2. Introduction

- Ask if there are any questions before starting the interview
- Focus on children under-five years of age hereafter called children under-five

3. Questions

General information

1. Male/female
2. Years of experience as a nurse
3. Educational background
4. How many years have you been working in a hospital with children with burn injuries?

5. Did you receive any education/training related to burn care?

Factors contributing to a burn injury

6. Could you tell me where burn accidents happen most often (home, outside, school,...)
7. Could you tell me what causes burn accidents to happen (petrol lamps, cooking fire,...)
8. Could you tell which type of burn injury children have (scalds, flame injury, others,..)
9. Could you tell me where on the body children have burn wounds
 - place, size, depth
10. Could you name possible long term physical effects of these burn injuries in children (disability)

Health beliefs and health seeking behaviour (including first aid practises) of female caregivers

11. What can you tell me about application/first aid by caregivers (in the community) on a burn wound after the accident happened?
 - Do they apply anything on the wound (water, mud,...)
 - When do they apply this (right after,...)
 - What makes them decide to apply that on the wound (customs, local beliefs,...)
 - who/where did they get the information to apply that on the wound?
 - expectation that this application might have an effect on the burn wound (lowering the pain, reduce scar tissue,...)
12. Can you tell me when caregivers seek health care for their child in case of a burn injury (immediately, after some hours, ...)
13. Can you tell me where they seek health care for their child (health facility, traditional healer, hospital,...)
 - reasons for choosing to go there (proximity, cost, quality, accessibility, availability,...)
14. Can you tell me who takes the decision to seek health care (the female caregivers, the husband, family member,...)
15. Could you think of barriers and/or enablers that they face in going/consulting a health care facility (cost, transportation, quality,...)

Prevention methods (at the home environments) and barriers and enablers towards prevention and first aid

16. What places in the houses/community are most dangerous for young children to sustain a burn injury?
18. Could you name prevention methods that you think might be helpful in preventing burn injuries in children?
19. Could you tell me about prevention methods that are already practised in communities to prevent burn injuries from happening? (protected cooking fires,...)
20. What do you think about education/information sessions about burn injuries?
21. If education would be given in communities, could you name 3 topics that you think need to be addressed during an education session?
22. Do you have any more questions or suggestions for me?

IDI community leader/village leader (key informant) (English version)

1. Consent

I am working together with a student of the master in International Health in the Netherlands. We are very interested in hearing your opinions about first aid measures and prevention methods regarding burn injuries in children. You have been invited for an interview. If you decide to take part, this interview will require around one hour of your time. This interview will be conducted at a private quiet place, at a time that is convenient for you.

The decision to take part in this discussion has to be entirely yours and you are free to withdraw from the study at any given time. There are no right or wrong answers, we are interested in your opinion and ideas and it is your choice to refuse to answer.

With your permission we would like to audio tape this discussion so that we can assure that we capture all ideas, information, thoughts and opinions mentioned during this interview. All these records will be kept on a secure computer. Your name will not be mentioned in any of the reports.

2. Introduction

- Ask if there are any questions before starting the interview
- Inform that the questions all focus on children under-five-young children

3. Questions

General information

1. Male/female
2. Could you explain your role in the community?
3. Could you name some of the reasons for injury in young children in this community
4. How concerned are you about the possibility that young children in the community will sustain a burn injury?
 - Do burn injuries happen frequently in this community?
5. To your experience, has there been any training in burn care in your community?
 - if yes, what/when/ for whom?

Factors contributing to a burn injury

6. Could you tell me where burn accidents happen most often (home, outside, school,...)
7. Could you tell me what causes burn accidents to happen (petrol lamps, cooking fire,...)
8. Could you tell which type of burn injury children have (scalds, flame injury, others,..)
9. Could you tell me where on the body children have burn wounds
 - place, size, depth
10. Could you name possible long term physical effects of these burn injuries in children (disability)

Health beliefs and health seeking behaviour (including first aid practises) of female caregivers

11. What can you tell me about application/first aid by caregivers (in the community) on a burn wound after the accident happened?
 - Do they apply anything on the wound (water, mud,...)
 - When do they apply this (right after,...)
 - What makes them decide to apply that on the wound (customs, local beliefs,...)
 - who/where did they get the information to apply that on the wound?
 - expectation that this application might have an effect on the burn wound (lowering the pain, reduce scar tissue,...)
12. Can you tell me when caregivers seek health care for their child in case of a burn injury (immediately, after some hours, ...)

13. Can you tell me where they seek health care for their child (health facility, traditional healer, hospital,...)

- reasons for choosing to go there (proximity, cost, quality,...)

14. Can you tell me who takes the decision to seek health care (the female caregivers, the husband, family member,...)

15. Could you think of barriers that they face in going/consulting a health care facility (cost, transportation, quality, accessibility, availability,...)

Prevention methods (at the home environments) and barriers and enablers towards prevention and first aid

16. What places in the houses/community are most dangerous for young children to sustain a burn injury?

18. Could you name prevention methods that you think might be helpful in preventing burn injuries in children?

19. Could you tell me about prevention methods that are practised in communities to prevent burn injuries from happening? (protected cooking fires,...)

20. What do you think about education/information sessions about burn injuries?

21. If education would be given in communities, could you name 3 topics that you think need to be addressed during an education session?

22. Do you have any more questions or suggestions for me?

Annex 3: Topic guide FGD

Focus group discussion for caregivers in the community (English version)

1. Consent

I am working together with a student of the master in International Health in the Netherlands. We are very interested in hearing your opinions about first aid measures and prevention methods regarding burn injuries in children. You have been invited to participate in a focus group discussion. If you decide to take part, you'll spend one morning/afternoon around 90 min. Together with around 6 other women in a discussion.

We understand how important it is to keep the information given confidential and private. Therefore we ask the other participants in this discussion to respect each other's confidentiality. However we cannot guarantee that all members will do so.

The decision to take part in this discussion has to be entirely yours and you are free to withdraw from the study at any given time. There are no right or wrong answers and it is your choice to refuse to answer.

With your permission we would like to audio tape this discussion so that we can assure that we capture all ideas, information, thoughts and opinions of every member of the group. All these records will be kept on a secure computer. Your name will not be mentioned in any of the reports.

2. Introduction (10 min.)

- Introduction of the facilitator
 - o about the topic and the aim of the research (focus on children under-five)
 - o about what will happen with the information gathered
 - o about the reason why these women are asked to participate
 - o about recording
 - o about the process of the FGD
- introduction of the group as a start + intro questions:
 - a. What are some of the dangers of young children in this community?
 - b. How concerned are you about the possibility that your child/children in the community will sustain a burn injury?

3. Task 1 (20-25 min.)

(The interviewer provides a drawing of the human body and a drawing of a house)

I would now like to discuss the factors that might contribute to a burn injury of the child(ren) in your community (focus on young children under 5)

- a. When you think of 'burn wounds', could you tell us what different types of wounds you know?
- b. Could you explain us how these wounds looked like?
- c. Could you (name)/show on the picture the places where you think these burn injuries in children would happen most often in this community
 - o Places in the house (bathroom, kitchen,...)
 - o Outside or elsewhere in the community
- d. Could you name for each place what could cause the burn injury to happen there?
 - o Open cooking fire
 - o Petrol lamps
 - o Hot water kettle
 - o Others

- e. Could you write down or draw where on the body most burn injuries in young children happen and what the effects might be of this injury after a longer period of time (drawing of body of child can be given by facilitator)
- o Long term physical effects such as problems with moving arm, legs, scarring,...

4. Task 2(20-25min)

I would now like to discuss the health seeking behaviour (including first aid practises) and beliefs related to burn injuries in your community We will use a little story to start our discussion.

The water is boiling on the fire as a meal needs to be prepared for the family. The children are playing outside until suddenly the little boy Ericki comes too close to the fire. His clothes (kanga)catches fire.

- a. What will mama Ericki do?
- b. Will she contact anyone?
- c. What is the role of baba (father) Ericki?
- d. Is there a role for the siblings of Ericki?
- e. Who makes decisions and when?
- f. Would the same be done if the little daughter Pendo falls into the fire?
- g. Where do they go?
- h. How will they go?
- i. When will they go?
- j. Who joins Ericki?
- k. If they bring him to a health facility, why will they bring Ericki?

Discussion:

- Does it depend on the kind of burn wound (size, place on the body, depth,...)
- Why would you choose for that kind of first aid? (Beliefs, customs,...)
- If a child sustains a burn injury, would you go to seek health care?
 - o Where (health centre, hospital, traditional healer, village elder,...)
 - o When (immediately, the next day,...)

Discussion:

- Why would you go to a certain health facility (proximity, quality,...)
- Does the kind of burn injury influence your decision to go somewhere?
- Who takes normally the decision to go to the health facility? (you, your husband, family members,...)
- What barriers/hinders you to visit a health facility?

5. Task 3 (20-25min)

I would now like to discuss prevention methods (at your home environment) (using paper task

1) If you look again at the places in the house/outside where most burn injuries take place, can you think of ways you would prevent these accidents to happen in the community?

Discussion:

- Do you have suggestions for improvement of safety concerning burn injuries?
 - o Adjustment open cooking fire
 - o Safer play areas children
 - o Education/teaching of children/caregivers (about prevention and first aid)

6. Conclusion/debriefing (10 min)

- Every participant can add anything else
- Answer remaining questions
- Thank participants for their corporation

Annex 4: Subthemes and categories as identified by the research team

Injuries in common			
Burn injuries	<ol style="list-style-type: none"> 1. Dangers in the community 2. The role of the community leader 		
	<ol style="list-style-type: none"> 1. Circumstances of the burn injury 2. The burn wound 3. First aid 	<ul style="list-style-type: none"> ➤ Places ➤ Causes ➤ Type ➤ Effect ➤ Kind of first aid ➤ The info about first aid ➤ The expected effects 	✓ Place on the body
Health seeking behaviour	<ol style="list-style-type: none"> 1. Health care facility 2. The decision making process 3. The role of the (family) members in the community 	<ul style="list-style-type: none"> ➤ Enablers and barriers ➤ Kind of health facility ➤ Transport 	
Prevention	<ol style="list-style-type: none"> 1. Methods of prevention 	<ul style="list-style-type: none"> ➤ Suggestions for safety improvement ➤ Current practises in the community 	
Education and information	<ol style="list-style-type: none"> 1. Education of health professionals 2. Education of the community 	<ul style="list-style-type: none"> ➤ Suggestions for educational sessions 	

Annex 5: Haddon Matrix

Haddon Matrix applied to the risk factors of fire-related burns among children

Phases	Factors			
	Child	Agent	Physical environment	Socioeconomic environment
Pre-event	Developmental issues, including experimentation; gender; vulnerability – including disabled children, refugees, street children; lack of supervision; parents smoking in the home or in bed; lack of knowledge about risks of fire in the home.	Storage of flammable substances in the house; combustibles, matches or lighters accessible to children; unsafe stoves or lamps; fireworks.	Housing in slums or congested areas; overcrowded households; no separation between cooking area and other areas; absence of flame-retardant household materials.	Poverty; unemployment, illiteracy among parents; sibling who died of burns; lack of fire-related building codes and their enforcement; lack of policies or laws on smoke alarms, sprinkler systems, access to hydrants; lack of policies or laws on flammability standards.
Event	Unmaintained smoke alarms and sprinkler systems; child not wearing flame-retardant clothing; poor knowledge about evacuation procedures.	Lack of sprinkler systems; lack of fire hydrants or other access to a supply of water.	Lack of functioning smoke alarms; lack of clear and easily accessible escape routes; lack of access to telephone to call for help.	Poor access to information and resources to minimize risk; inadequate communications infrastructure for calling emergency health services.
Post-event	Inaccessible first-aid kits; lack of knowledge by caregivers and community about what to do immediately after a burn.	Flammability of household materials and children's clothing; toxicity of smoke and burning household materials.	Poor emergency or fire department response time; poor rescue and treatment skills; lack of access to water; inability to transport to medical care promptly.	Inadequate burns care; inadequate access to burn centres and rehabilitation services; insufficient community support for those who have suffered burns.

(Peden et al., 2008)

Haddon Matrix applied to the risk factors of burns

PHASES	FACTORS			
	HOST (PERSON)	AGENT	PHYSICAL ENVIRONMENT	SOCIOECONOMIC ENVIRONMENT
PRE-EVENT	<p>Use of fireworks.</p> <p>Smoking in the home or in bed.</p> <p>Lack of knowledge about risks of fire in the home.</p>	<p>Storage of flammable substances in the house.</p> <p>Combustibles, matches or lighters accessible to children.</p> <p>Unsafe stoves or lamps.</p>	<p>Housing in slums or congested areas.</p> <p>Overcrowded households.</p> <p>No separation between cooking area and other areas.</p> <p>Unsafe electrical wiring.</p> <p>High (unsafe) temperatures of hot water heaters.</p>	<p>Poverty, unemployment, illiteracy.</p> <p>Lack of fire-related building codes and their enforcement.</p> <p>Societal attitudes on acceptability of acid-throwing.</p>
EVENT	<p>Poorly maintained smoke alarms and sprinkler systems.</p> <p>Child not wearing flame-retardant sleepwear.</p> <p>Poor knowledge about evacuation procedures</p>	<p>Lack of sprinkler systems.</p> <p>Lack of fire hydrants or other access to water supply.</p>	<p>Lack of functioning smoke alarms.</p> <p>Lack of clear and easily accessible escape routes.</p> <p>Lack of access to telephone to call for help.</p>	<p>Lack of policies or laws on smoke alarms.</p> <p>Inadequate communications infrastructure for calling emergency services.</p>
POST-EVENT	<p>Lack of knowledge of first aid.</p>	<p>Flammability of household materials and children's clothing.</p> <p>Toxicity of smoke and burning household materials.</p>	<p>Low level of first aid, emergency medical services, and hospital burn care.</p>	<p>Inadequate access to burn centres and rehabilitation services.</p> <p>Insufficient community support for those who have suffered burns.</p>

(WHO, 2011)

Annex 6: Characteristics of the respondents

Characteristics of the female caregivers of children under-five with burns (KCMC)

Participant	Place of residence	Total # of children (yrs)	Age of child with burns (yrs)	Sex of child with burns	Area of injury on the body	Place where the injury happened
P1	Rau	2	3.5	Boy	Back and thigh	Outside the house
P2	Longuo	2	2.8	Boy	Back and buttocks	Kitchen
P3	Marangu	1	2	Boy	Frontal part of the head, the abdomen, thighs and legs	Kitchen
P4	Chekereni	1	10 months	Girl	Face, arms	Kitchen

Health care workers: Characteristics

Participant	Total working experience (yrs)	Working experience (yrs) with children with burns	Current place of work	Job title	Education
P1	13	13	Surgical ICU	Nursing officer	Diploma
P2	13	12	Surgical ICU	Nurse in charge	Diploma
P3	7	7	Surgical department	Enrolled nurse	Certificate
P4	15	15	Dermatology department	Nursing officer	Bachelor

FGD1 Same District –Ujamaa: Socio-demographic characteristics of the respondents

Participant	Total # of children	# of children < 5	Burn injury in (extended) family
P1	2	2	Yes
P2	3	2	Yes
P3	1	1	Yes
P4	1	1	Yes
P5	3	1	No
P6	1	1	No
P7	3	1	No

FGD2 Same District-Mnadani: Socio-demographic characteristics of the respondents

<i>Participant</i>	<i>Total # of children</i>	<i># of children < 5</i>	<i>Burn injury in (extended) family</i>
P1	4	1	Yes
P2	2	1	No
P3	1	1	No
P4	2	1	No
P5	1	1	Yes
P6	3	1	Yes
P7	3	1	Yes
P8	3	1	Yes

FGD3 Meru District Council-Nguruma: Socio-demographic characteristics of the respondents

<i>Participant</i>	<i>Total # of children</i>	<i># of children < 5</i>	<i>Burn injury in (extended) family</i>
P1	2	1	No
P2	3	1	No
P3	1	1	No
P4	1	1	No
P5	4	1	Yes
P6	5	1	Yes
P7	1	1	No

FGD4 Meru District Council-Patandi: Socio-demographic characteristics of the respondents

<i>Participant</i>	<i>Total # of children</i>	<i># of children < 5</i>	<i>Burn injury in (extended) family</i>
P1	4	1	Yes
P2	1	1	No
P3	2	1	No
P4	2	1	Yes
P5	1	1	Yes
P6	2	1	Yes
P7	1	1	No
P8	3	1	Yes

Village (community) leaders: Characteristics

Participant	Sex	Experience as village leader (yrs)	Village name
P1	Female	5	Ujamaa
P2	Male	4.5	Mnadani
P3	Male	20	Nguruma
P4	Male	20	Patandi

Annex 7: A strategy towards action

Based largely on the model of Van Niekerk (2007) and the framework of Mashreky (2010), a strategy (See figure below) was constructed. This strategy is made on a community based level and provides specific suggestions concerning paediatric burn prevention for the population of this study. The strength of this strategy lies in the combined interventions that have to take place simultaneously.

Education is only one part of the model. Education needs to take place on a community level. It could be organised by trained health staff or community workers providing information about burn care to the entire community.

The changes in practice and the environmental adaptations emphasise more on the daily live and the environment. Some changes will take time and might be hard to change such as the adaptations in cooking and housing layout. These actions would require support from government authorities to assist in regulations and financial resources for housing construction and lay out. Additionally the question remains also if the communities would be open for changes in housing lay out.

But on the other hand, some simple actions such as safe storage and creations of barriers might have a positive effect on prevention of burn injuries. These straightforward interventions, do not require big financial resources, can be set out and implemented on a community level and seem to be accepted by the target population.

As this strategy focuses on the community, the improvements in health care are not listed. However, the nurses' attitudes are a big barrier that can be addressed within health facilities. Nurses themselves seem to be open for an attitude change. The underlying issues which might partly provoke this behaviour such as shortages of staff and equipment will be harder to tackle immediately. Although participants mentioned problems with equipment among other things in the facilities that was not within the scope of this research and therefore no suggestions can be made concerning this topic.

Combined strategy for burn prevention

