



**COLLEGE OF MEDICINE AND HEALTH SCIENCES
SCHOOL OF MEDICINE AND PHARMACY
DEPARTMENT OF EMERGENCY MEDICINE AND CRITICAL CARE**

**GENDER DIFFERENCES IN PATTERNS OF INJURIES
AND TRAUMA IN THE EMERGENCY DEPARTMENT AT
KIGALI UNIVERSITY TEACHING HOSPITAL, RWANDA.**

*Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Master of
Medicine in Emergency Medicine and Critical Care.*

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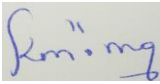
February, 2019

DECLARATION

The researcher

I hereby declare that this dissertation: “**Gender Differences in Pattern of Injuries and Trauma in the Emergency Department at Kigali University Teaching Hospital**” is my own work and has not been submitted by anyone to any other university for the award of a degree.

Dr Mumporeze Lise

Signature: 

Date: February 20, 2019

The supervisor

I hereby declare that this dissertation “**Gender Differences in Pattern of Injuries and Trauma in the Emergency Department at Kigali University Teaching Hospital**” was submitted by Dr Mumporeze Lise with my approval.

Dr Adam C Levine, MD, MPH, FACEP

Signature: 

Date: February 21, 2019

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DEDICATION

To my beloved husband SHEMA Pierre and my dear daughter SHEMA Aube Sia.

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LIST OF SYMBOLS AND ACRONYMS/ABBREVIATIONS

CHUK: Centre Hospitalier Universitaire de Kigali

ED: Emergency Department

GBV: Gender Based Violence

ICU: Intensive Care Unit

IRB: Institutional Review Board

KUTH: Kigali University Teaching Hospital

MMED: Masters of medicine

RTA: Road Traffic Accident

SAEM: Society of Academic Emergency Medicine

USA: United States of America

WHO: World Health Organization

ABSTRACT

Introduction: Gender roles, norms and behaviors influence traumatic injuries, the 3rd leading cause of morbidity in Rwanda. We assessed the gender differences and similarities in injured patients presenting to the emergency department of the busiest trauma center in Rwanda.

Method: We collected retrospective data using an emergency department database and enrolled 1387 trauma patients between 2013 and 2016. We did a prospective observational study of 145 trauma patients who presented to KUTH emergency department over a 4-week period. We collected data on demographics, mechanism of injuries, diagnosis, and outcomes. We analyzed differences between genders using appropriate statistical testing in the software R.

Results: For the retrospective population: the mean age for men was 34 years while for women it was 39 years. The most common mechanism of injury was road traffic accidents (50%). Overall, trauma was much more common among men than women ($p < 0.001$). Male patients were more likely to present intoxicated with alcohol as compared to female patients ($p = 0.02$). Long bone fracture was the most common type of injury for both sexes (58%). From the prospective analysis: we found that half of the patients were referred from lower level district hospitals, women were more likely to be involved in gender-based violence as compared to men ($p = 0.02$). Of the enrolled patients, 20.6% died. There was no association between mechanism of injury, diagnosis or outcome of injury with gender.

Conclusion: Men are more likely to experience trauma and present with multiple injuries. Gender-based violence is more common in women. Road traffic accidents in a young population was identified as a major burden in both men and women. Further research is necessary to evaluate for targeted measures that can reduce traumatic injuries and improve outcomes from trauma in both men and wom

CHAPTER I: INTRODUCTION

I.1. Background

Gender is well understood as a potential determinant of outcomes in many disease states. The 2010 WHO reports show that victims of RTA are more often male (74%) than female¹. Furthermore the younger population is most likely to be affected in trauma accidents. This may be explained by the fact that young males engage in riskier behavior (alcohol, drug abuse...) as well as greater exposure².

Research in high-income countries on gender differences in trauma epidemiology and outcomes has been occurring for the past two decades. In the US in 2000, a meta-analysis was completed to specifically understand gender differences among traumatic brain injuries³. The quantitative review unveiled that women fared worse than men across 85% of the variables examined, prompting other subsequent studies to explore more deeply the sex differences in trauma outcomes³.

Looking to East Africa and the Great lakes region specifically, very few studies have been done on gender differences and the epidemiology of trauma. In-depth studies on emergency medicine in Tanzania and Kenya have mainly focused on challenges and opportunities to develop emergency medicine physicians and clinical settings as well as disease and symptom presentation in the emergency department^{4,5}.

Separate studies have also been done on the extent of gender based violence (GBV) in the region and how to address these issues and integrate more women in health care in the Great Lakes region^{6,7}. However, rigorous medical research at the intersection of emergency medicine and gender in the region have still yet to be published.

We conducted this research to look at gender difference in patterns of injuries in the population consulting the busiest emergency department of Rwanda at Kigali University Teaching Hospital, a level 1 trauma center.

I.2 Problem Statement

We anticipate that a better understanding of gender differences in trauma has the potential to inform clinical strategies and public policy approaches to mitigate death and disability from trauma in both men and women.

I.3 Rationale

To date, little research exists exploring gender differences among the trauma population in Kigali, Rwanda. We are interested in analyzing the pattern of injuries of women compared with men who present to the KUTH emergency department. As KUTH is the busiest emergency department and main trauma center of Rwanda, we anticipate this single center study will enable us to see gender differences in trauma epidemiology and outcomes if any exist.

I.4 Research Question

Does the pattern of trauma and outcome of traumatic injuries differ from men to women presenting to KUTH-emergency department?

I.5 Objectives of the Study

I.5.1 Primary objective

To compare pattern of injuries among male and women presenting to KUTH-emergency department.

I.5.2 Secondary objectives

- Classify differences and similarities in types of trauma (burn, fractures...) and type of accidents faced by female and male patients presenting to the emergency room.
- Determine the age, time of triage, pregnancy status, where the patient has come from (ambulance or hospital transfer, home, work, etc.) amongst female and male patients.
- Determine if the trauma was reported intentional or not among female and male patients.
- Determine if involvement of alcohol or any other drug of abuse was suspected.
- Determine differences in disabilities from trauma, ICU need, length of stay and death as outcome in men and women.

CHAPTER II: LITERATURE REVIEW

II.1. Introduction

In 2000, injuries were the 10th cause of death globally, 6 years later, it had become the 8th ⁸. This burden is higher in developing countries.

Furthermore gender is recognized as an important determinant of health for both men and women⁹. Apart from biological differences, gender roles, norms and behavior have an influence on how male and female access medical care and how their needs are addressed¹⁰. Hence, gender will impact on the type of injuries male and women incur as well as their clinical outcome.

II.2. Importance of Gender Consideration in Emergency Patients

By talking about gender, we mean a state of being male or female with reference to biological, social and cultural differences. Even though these differences are obvious, they have been considered in clinical trials for only few decades¹¹. It then became evident that gender is an important factor in response to disease and treatment¹⁰ as well as influencing the incidence of different diseases.

Regarding emergency medicine as a specialty, gender consideration is relatively new¹². A review done in 2011 found 2 % of the studies done referred to gender specific outcome and 10% of studies included gender as a covariate or independent variable¹³. This is progressively changing. For example, the Journal of the Society of Academic Emergency Medicine (SAEM) selected gender specific emergency medicine research as the focus of its consensus conference in 2014 thus raising awareness for more gender-based research¹³.

II.3. Gender Differences in Trauma in Developed Countries

Research in high-income countries on gender differences in trauma epidemiology and outcomes has been occurring for the past two decades: in 1999, researchers in the US published a study delineating outcomes and presentation of facial injuries in female patients as distinctly different as those presented by male patients, particularly with respect to factors such as “the circumstances of injury, mechanism of assault, and role of intoxication in the incidence of injury¹⁴.”

A meta-analysis completed in 2000 in the US aimed at understanding gender differences to traumatic brain injuries³. The quantitative review unveiled that women fared worse than men across 85% of the variables examined, prompting other subsequent studies to explore more deeply the sex differences in trauma outcomes³.

That same year, in Denmark, researchers published a study focused on the prevalence of violence toward women in the country based on emergency medicine consultations¹⁵. The study looked at age, urban location, motherhood status, and marriage status as indicators of trauma experience and outcomes¹⁵.

Other similar studies include a 2002 British research article that published a first of its kind analysis that gender in addition to disease presentation can influence patient admission into the intensive care unit¹⁶.

Lastly, a study done in the Lazio region in Italy on women consulting the emergency department showed that in 2008, 7725 female victims of violence consulted emergency care (1.1% of all consultations) of which 45.8 % had contusions, 5.4 % had a neurotic disorder and 6.3% had complications of medical care. Foreign women were more likely to present with intentional injuries than were Italians (114.1 vs. 44.4 per 10,000)¹⁷.

Fast forward to more recently, now gender differences in presentation and outcome are a mainstay in many epidemiological studies focused on trauma. More nuanced studies are being done on the role of other socio-economic determinants in addition to gender and the role they may play in trauma outcomes¹⁸.

II.3. Gender Differences in Trauma in Low and Middle Income Countries

In low and middle-income countries, little research has been done to understand gender differences in trauma. Two decades ago, studies mainly looked at gender based violence before and during pregnancy as well as psychiatric trauma and violence related to maternal-fetal outcomes¹⁹. More recently, studies have been done documenting gender differences in trauma, particularly in complex emergency situations, and the need for screening for sexual and intimate partner violence²⁰.

Our study in Rwanda seeks to build off of this momentum and delineate gender differences in trauma alongside comparable studies in Zambia, which looked at injuries, outcomes, and hospital utilization by gender²¹.

In East Africa and the Great lakes region specifically, few studies have been done on gender differences and the epidemiology of trauma. In-depth studies on emergency medicine in Tanzania and Kenya have mainly focused on challenges and opportunities to develop emergency medicine physicians and clinical settings as well as disease and symptom presentation in the emergency department^{4,5}.

Separate studies have also been done on the extent of GBV in the region and how to address these issues and integrate more women in health care in the Great Lakes region^{6,7}. However, rigorous medical research at the intersection of emergency medicine and gender in the region have still yet to be published.

GBV is prevalent in the Sub-Saharan region, which includes Rwanda. In Rwandese emergency departments, little is known on the pattern of trauma and injuries of women who come for consultations.

Nevertheless, in the past few years, there has been an exciting push to unearth more analysis of emergency medicine care in Rwanda. For example, Dr. Levine's work included studies conducted at UTHK's emergency department on the "epidemiology of injuries and outcomes" among adult and "pediatric trauma patients receiving prehospital care"^{22,23}. Additional studies have focused on road traffic accidents as the main cause of physical trauma presenting to the emergency department²⁴⁻²⁶.

CHAPTER III: METHOD

III.1. Study description

The aim of this study is two-fold:

First, this study will classify differences and similarities in types of trauma and injury and types of accidents faced by female and male patients in the emergency room.

Second, the following characteristics will be identified: age of patient, time of triage, pregnancy status for female, where the patient has come from (ambulance or hospital transfer, home, work, etc.), whether injury was identified as an intentional assault (including sexual assault), and whether involvement of alcohol is suspected.

This study hypothesizes that the nature of injury, trauma, and accident differs significantly by gender.

III.2. Study design & duration

This study was a retrospective observational study followed by a prospective observational study of trauma patients presenting to KUTH-Emergency Department.

Differences in injury, trauma, and accident type between male and female patients as well as injury characteristics of female trauma patients were identified and analyzed using t-tests to compare means and chi-squared analyses to compare proportions. A significance level of $p < 0.05$ was used in all comparative statistical testing.

III.3. Study site

This study will be conducted at Kigali University teaching Hospital (KUTH) in the Emergency department. KUTH is one of the three referral hospitals in Rwanda and it serves as a main trauma center.

Until 5 years back, there was no designated emergency physicians in the whole country. A residency program was then started and now, the first Rwandese emergency physicians graduated in 2018.

KUTH helps as a training site for residents and that was the only place in Rwanda where an emergency department was run by designated emergency specialist before the graduation of the first 6 Emergency physicians in October 2018. The department has 33 beds.

III.4. Study population

The retrospective population of this study was provided by the hospital's database of emergency department (ED) encounters, which includes 3,329 patients presenting over a two-year period (01/2013-12/2013 and 07/2015-06/2016). The patients in this database are a random sample of approximately 145 patients per month who have visited the ED during the aforementioned time period.

This project represents a sub analysis of patients included in this database who sustained traumatic injuries, and the data collection for the database was subject to prior IRB approval, granted initially under Reference #: EC/CHUK/186/2016 and subsequently renewed for an additional year.

After this retrospective data collection, we did a 1 month collection of prospective interviews of 145 trauma patients presenting to KUTH-emergency department.

III.4.1. Selection of the study population

Inclusion criteria

Retrospective enrollment consisted of patients admitted at KUTH-emergency department for trauma care during the two year period of 01/2013-12/2013 and 07/2015-06/2016.

Prospective enrollment consisted of trauma patients who presented to the same department, from 15th July to 15th August 2018.

Exclusion criteria

Patients admitted for non-trauma or medical care.

III.5.Sampling method

For the retrospective portion, we used a random sample of 145 patients from the ED database who visited the emergency department each month during a two year period as mentioned above.

Following our retrospective data collection, we conducted a 4 weeks prospective study where we collected data with interviews of trauma patients admitted in the Emergency Department.

III.5.1. Sample size calculation

The database includes a random sample of 145 patients out of the total population of patients presenting to the ED. Of the 3329 patients in the database, we excluded 1942 for incomplete data or exclusion criteria. We remained with a total population of 1387 for the retrospective data.

For the prospective part, as we have no epidemiological study for CHUK-emergency department, we went to the emergency admission record and found that every day there is 25 to 30 new patients. 30% of all new admissions are trauma patients. We used these information to calculate our population:

Number of trauma patient per 28 days = $[(30 \text{ patients} \times 30) / 100] \times 28 = 252$ patients

Using the Cochran formula: $n_0 = Z^2 P (1-P) / d^2$

n₀: Cochran sample size

Z: statistic for a level of confidence. At a confidence interval of 95%, $Z = 1.96$

P: expected prevalence or proportion which is 30%

d: level of precision which is 5%

We found that:

$$n_0 = (1.96)^2 \times 0.3 \times (1 - 0.3) / (0.05)^2 = 322$$

We then adjusted the sample size obtained to our study population using the modified Cochran formula:

$$n = n_0 / 1 + [(n_0 - 1) / N]$$

n: new adjusted sample size

N: population size which is 252 patients

$$N = 322 / 1 + [(322 - 1) / 252] = 141 \text{ patients}$$

Our sample size was then estimated at 141 patients. We ended up collecting data on 145 patients, which is slightly higher than our calculated sample size.

III.6. Study procedures

III.6.1. Procedures at enrollment

There was no procedure at enrollment for our retrospective study that used a previously IRB approved database.

Informed consent was first be obtained for our prospective interview.

III.6.2. Follow-up if cohorts study

For our prospective part of the study, we followed up our cohorts for all the period of stay in KUTH, from the time of admission until discharge or death.

III.6.3. Data collection

I participated in data collection and abstraction from charts for the Redcap database, which is a research database where all of the data for the all ED encounters database are kept. As I have participated in collection of data for this database, I have been granted departmental permission for subsequent extraction of data from the database for sub-analysis in this study in partial fulfillment of requirements for the degree of my MMED in Emergency medicine and critical care.

I also conducted 4 weeks prospective data collection using an IRB approved questionnaire (attached).

III.6.4.Data management and analysis

Differences in injury, trauma, and accident type between male and female patients as well as injury characteristics of female trauma patients were identified and analyzed using t -tests to compare means and chi-squared analyses to compare proportions. A significance level of $p<0.05$ was used in all comparative statistical testing.

III.7: Ethical consideration

III.7.1. Confidentiality

No providers or patient's names have been used in the process of chart abstraction into the Redcap database. We used numeric identifiers for both parts of the study and they will not figure in the final work after data analysis. Nevertheless, we carefully observed the ethical conduct governing the medical profession and no confidential information related to study participants is to be disclosed.

III.7.2. Informed consent

Informed consent was not needed for the retrospective sub-analysis of data in a previously developed database, but was mandatory for the prospective interview data to be used.

III.7.3. Ethical approval

The present proposal was submitted to the University of Rwanda, College of Medicine and Health Sciences Institutional Review Board (IRB) for ethical clearance before the research starts

.III.8. Logistics

III.8.1. Distribution of responsibilities

Lise MUMPOREZE, the investigator, has prepared this research proposal, has participated in data collection and did data extraction. She participated in analysis and prepared the final report for publication under guidance of Vinay Sharma for statistics and corrections from the supervisors.

III.8.2.Budget

All study chart reviews were completed by study staff as listed above without the need for employment of additional study staff.

Waiver of fee was requested and obtained considering this research is compulsory for MMed research project requirements.

CHAPTER IV: RESULTS

IV.1.Retrospective data

IV. 1. 1. Clinical characteristics of the study population

Using the all ED encounters database, for a 2 year period (01/2013-12/2013 and 07/2015-06/2016), we enrolled 1387 patients for our retrospective analysis.

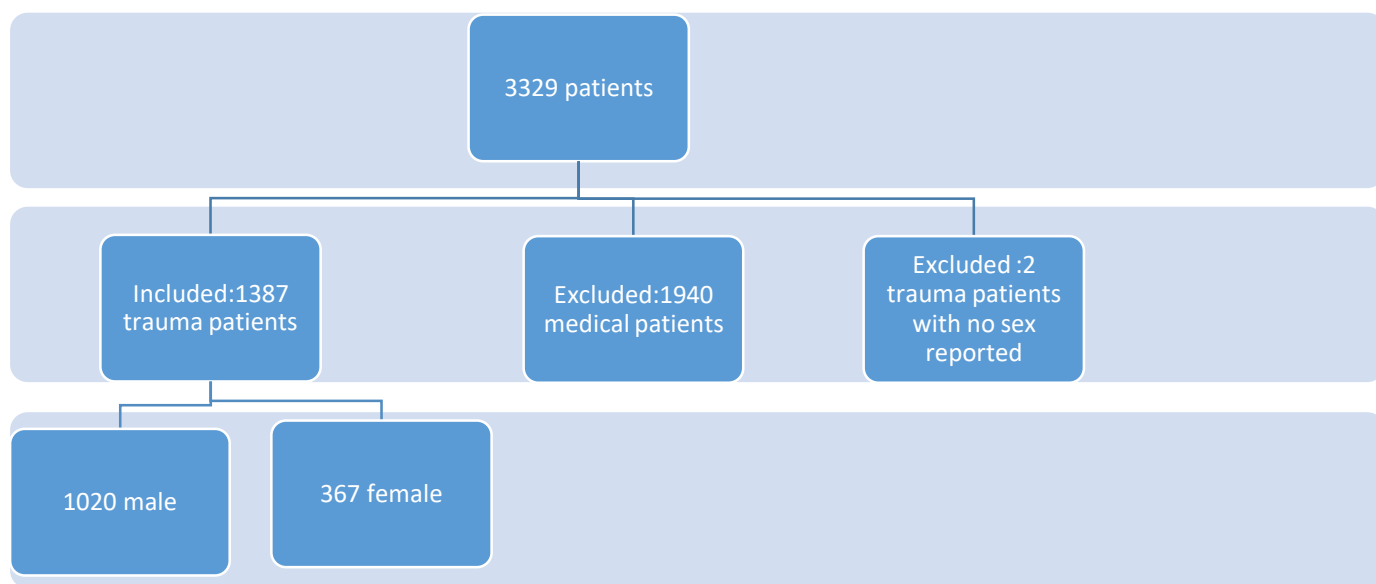


Figure 1: Enrolment of retrospective population

Of the enrolled patients, the mean age for male was 33.85 ± 14.66 years while for female it was 39.03 ± 18.46 years.

The most common mechanism of injury was RTA: 49, 6% of our study population, whereas intentional injury accounted for 10.5% of our patients (146 patients). Alcohol and pregnancy status were reviewed as risk factors for trauma: in 1317 patients (95%), there was no documentation about alcohol status, also no pregnancy status for women was ever documented.

Looking at diagnoses, 534 patients had serious injuries of which 58, 4% (312 patients) were long bone fractures, followed by head injury 12,3% (66 patients) then c-spine injury 6,1% (33patients) .

Considering disposition and outcome, 639 patients were admitted in the hospital, among them 47 went to ICU. Of the admitted patients, 542 (85%) were discharged to their homes, 60 (9.4%) were referred to other hospitals, 33 (5.1%) died and 4 (0.62%) were lost to follow-up.

Table 1 Characteristics of retrospective study population

Variable	Male	Female	Missing data-male	Missing data - female
Triaged patients	468	159	552	208
Road traffic accident	537	151	20	6
Intent to harm:	111	35	209	84
a. Assault	87	33		
b. insurrection/fight	21	1		
c. self-inflicted	3	1		
Suspected Alcohol use	49	3	957	360
Diagnosis (fractures, head injuries...)	Incoherent data	Incoherent data		
Diagnostic tests in ED	770	254	0	1
ED intervention	977	343	0	1
Tetanus shot given	760	291	44	24
IV fluid ordered	507	110	43	25

blood ordered	73	17	44	24
Pain medication ordered	900	311	44	24
Severe injury	292	68	1	1
Serious injury type:			628	227
a. head injury	34	7		
b. facial trauma	16	7		
c. spine injury	29	6		
d. fractures	279	104		
e. chest trauma	7	1		
f. abdominal trauma	3	1		
g. wounds, contusion	4	4		
h. burn	1	2		
i. Pelvic injury	17	3		
patients admitted to the hospital	476	162	203	102
Disposition of none admitted patients:			18	6
a. Death in ED	30	6		
b. Transferred to other hospitals	27	3		
c. Home	265	87		
d. Fled	1	1		
ICU required	35	12	544	205

Patient outcome:			546	206
a. Died	24	9		
b. referred to other hospital	39	21		
c. discharged home	411	131		

IV.1.2. Statistical results

We used chi square test, t-tests and Fisher's exact test as appropriate for each variable to see if there was any association between our variables and gender.

We found that male patients are significantly younger than female (P value: 8.59E-08). They were reported to have used alcohol at time of injury more than female patients (P value: 0.02) and had higher rate of RTA (P value: 7.507 E-05).

We also found that male had many more number of severe injury compared to female (P value: 0.0002) and received more IV fluids (P value: 4.65 E-10).

Table 2 : Statistical analysis of retrospective data

Variable	P value	Percentage of missing data in male	Percentage of missing data in male
Age	8.59E-08	0	0
Triage	0.4355	54%	55%
Road traffic accidents	7.507 E-05	6.86%	6.27%
Intent to harm	0.6452	20.49%	22.89%
Type of intent of injury (self,assault)	1	89.22%	90.46%
Alcohol Use at Time of Injury	0.02	93.82%	98.09%
Injuries Examined	0.95	0.59%	0.54%
Location of Pain (skull/face/neck etc)	0.9418	0.00%	0.00%
ED interventions	0.1468	4.22%	6.27%
IVs ordered	4.65E-10	4.22%	6.81%
Blood Ordered	0.1416	4.31%	6.54%
Pain medication ordered	0.4343	4.31%	6.54%
Severe Injuries (None, ≥1)	0.0002	0.10%	0.27%
Type of Serious injury (Head/face, etc)	0.08		
Admitted	0.4297	19.90%	27.79%
ED Disposition (Death, fled, etc)	0.1344		
Cause of Death (arrest, shock, brain)	0.32		
Transfer to ICU	1	53.33%	55.86%
Outcome (Died, Referred etc)	0.2458		

IV.2 Prospective data

IV.2. 1. Clinical characteristics of the study population

We enrolled 114 males and 31 females. No patient was excluded for analysis as both met the inclusion criteria. There was no missing data.

We collected information about demographics, pregnancy status, mode of arrival to the hospital, mechanism of injury, type of injury and GBV. We also looked at the patients diagnosis, disposition, time spent in the hospital then their outcome.

The average age for male was 32, 6 years while for female it was 41, 7 years.

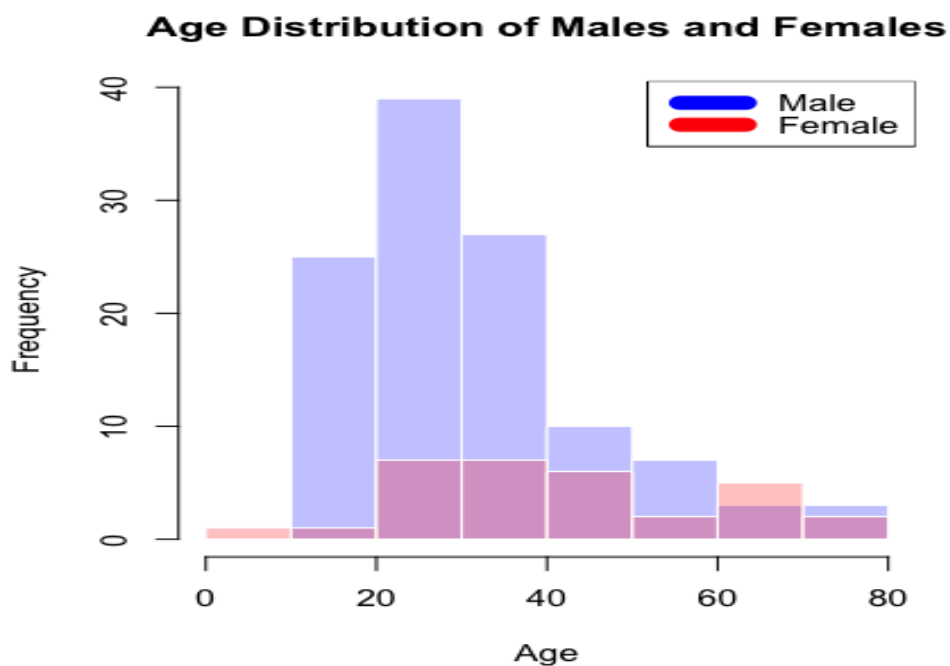


Figure 2: Age distribution by sex

Most of the patients came with ambulances from district hospitals

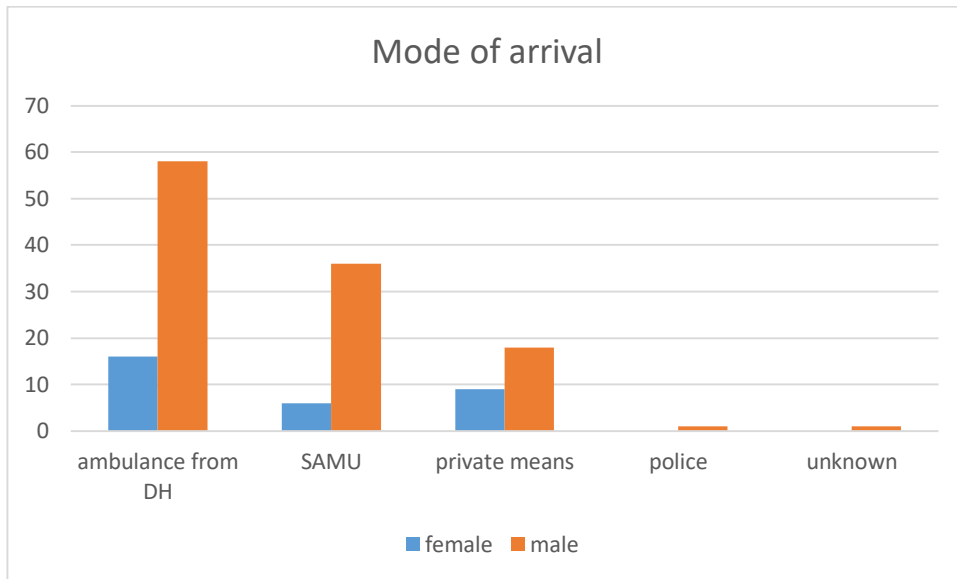


Figure 3: Gender distribution by mode of arrival

Most of the patients admitted needed to be seen by a doctor within at least the 10 minutes of arrival considering the South African triage scale.

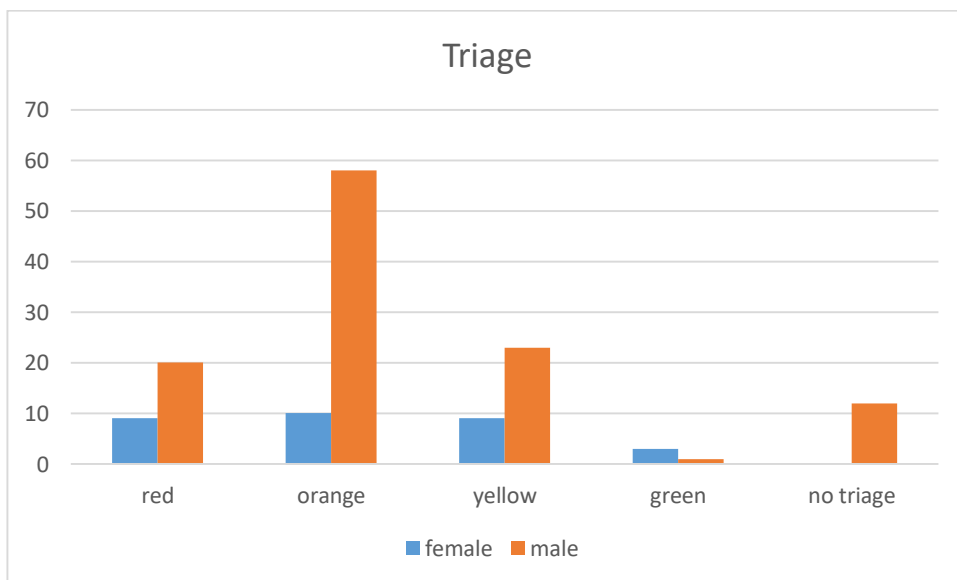


Figure 3: Gender distribution by triage category

For our female population, pregnancy test was positive for one woman and negative for another woman, it was not done for the remaining 29 patients.

Considering the mechanism of injury, road traffic accidents were the most common.

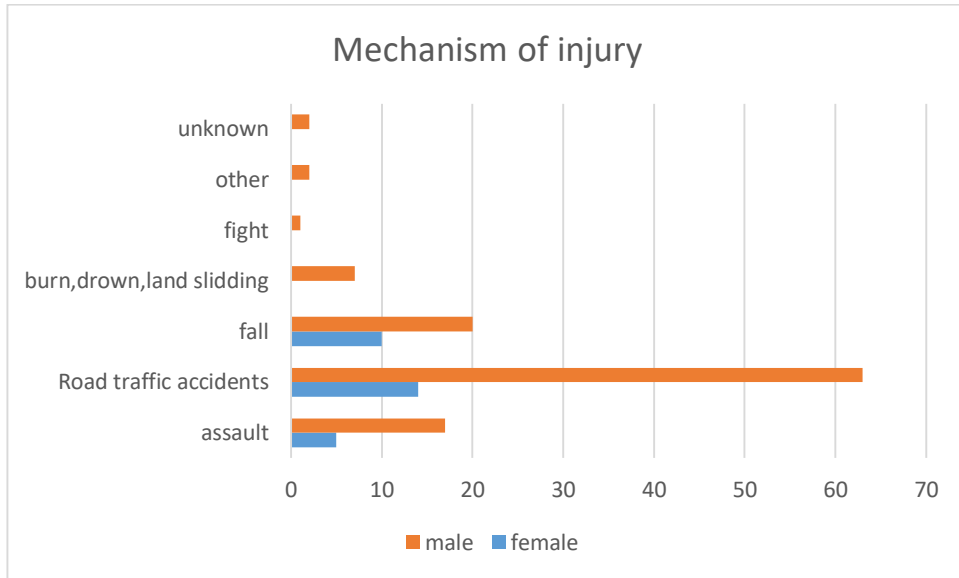


Figure 4 : Gender distribution by mechanism of injury

Intentional injuries were done to 18 men and 5 women of whom 2 men and 4 women said they were involved in a gender based violence.

The location of injuries also varied with the most common site being on the street

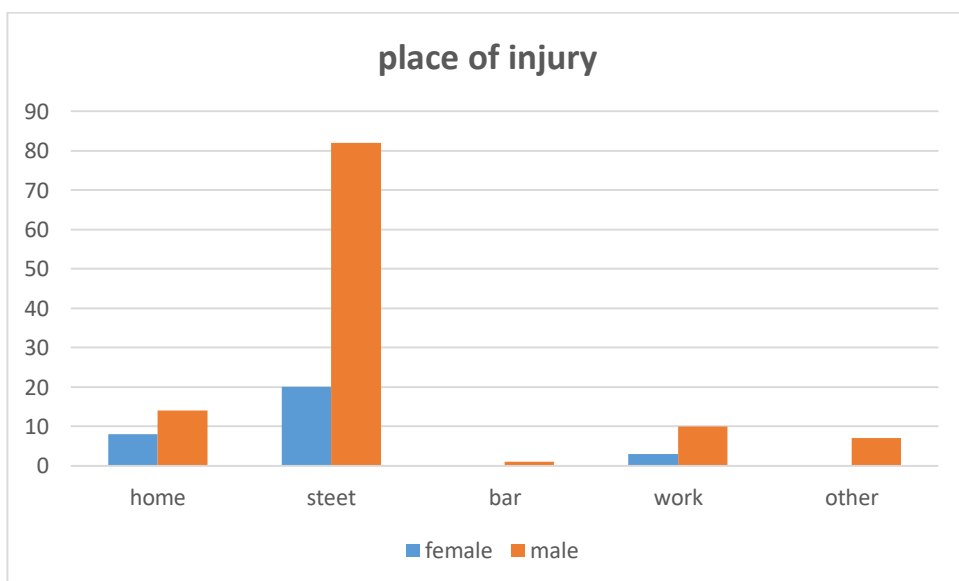


Figure 5: Gender distribution by Place of injury

We looked at alcohol as a risk factor for injuries: there was no alcohol level test done on any patient.

Trauma was reported intentional in 18 male and 9 female. The type of intent was reported as a GBV in 2 male and in 6 female.

Considering the diagnosis, fractures then head injury were the most common.

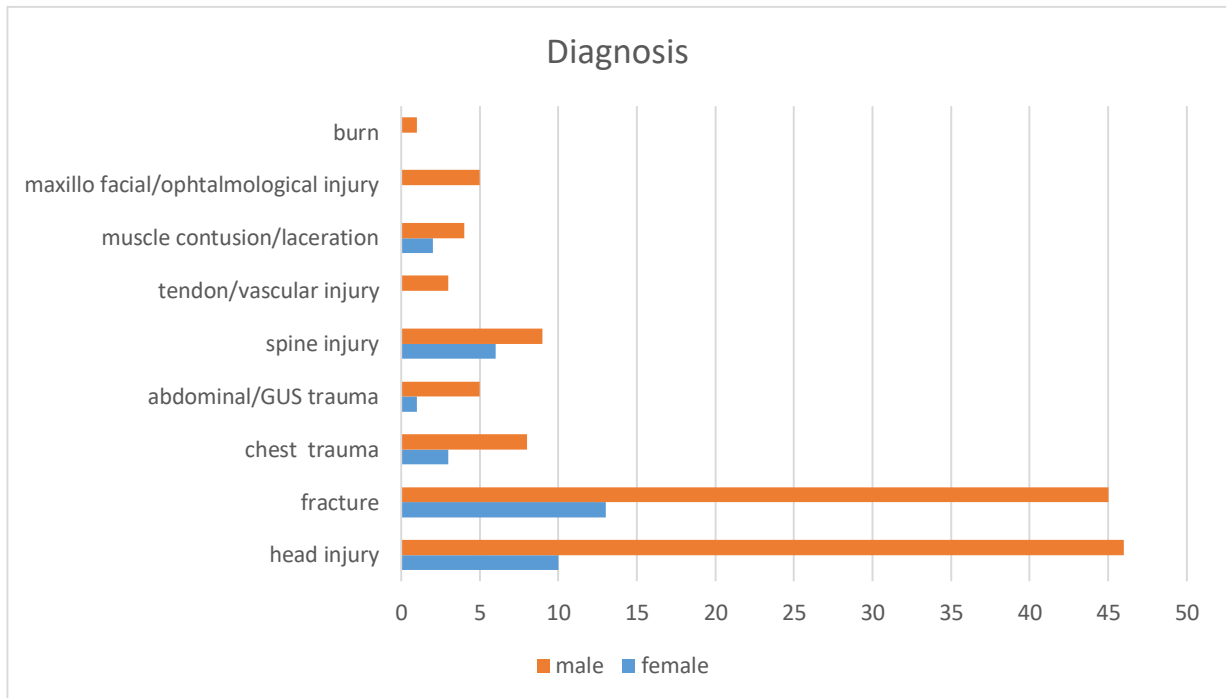


Figure 6 : Gender distribution by Diagnosis

Looking at outcome, most of the patients (72%) spent more than a week admitted in the hospital. 17 patients got discharged from the emergency within 24h of admission. Among the 145 enrolled patients, 30 died (20.69%), and others were discharged home or counter-referred to lower level district hospitals.

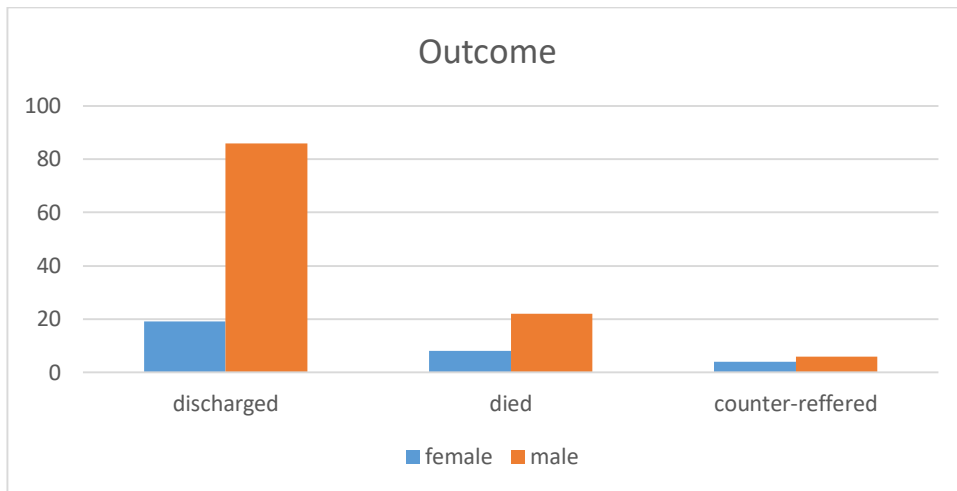


Figure 7: Gender distribution by outcome.

IV. 2.2. Statistical results

We again used chi square test, t-tests and Fisher's exact test as appropriate for each variable to see if there was any association between our variables and gender. We found that:

-Male are more likely to present at a younger age compared to female (P. value: 0.0003).

-Using the South African total early warning score, male patients are more likely to be triaged orange compared to female patients(P.value:0.042).

-Female are more likely to present with GBV (P value:0.01).

Table 3 : Statistical analysis of prospective data.

Variable	Pvalue	Variable	Pvalue
Triage		Mechanism of injury	1
a. red vs not red	0.3873	a. assault	1
b. orange vs not orange (red excluded)	0.042	b. RTA vs no RTA	0.8
c. red and orange vs green and yellow	0.1	c. unintentional accidents	0.48
Age	0.0003	Diagnosis	0.56
Mode of arrival	0.17	Intentional injuries	1
Location of injury	0.25	Accidental injuries	0.48
GBV	0.01	Time spent in the hospital	0.19
Outcome	0.19		

CHAPTER V: DISCUSSION

We analyzed differences and similarities in patterns of injuries as well as their outcomes considering gender in patients who presented to KUTH emergency department. We found that trauma injuries affect males more than female and males are relatively younger compared to female. Road traffic accidents were the most common mechanism of injury for both sexes but male were more likely to be involved in them compared to female. Male were more likely to present with severe injury and receive more resuscitative measures. Even if we had a lot of missing and further research needs to be done, alcohol as risk factors for injury was suspected more in male than in female. Pregnancy test was not standard of care for female involved in trauma. Gender based violence was more likely to happen in female patients. There was no association between gender and the mode of arrival at the hospital, the type of injury or the patient outcome.

The fact that males were more affected by trauma than female (73% of the retrospective study population, 78% of the prospective study population) is equally true globally²⁷ and more specifically for other eastern Africa countries like Kenya where 85% of trauma patients were male and in Uganda 70%^{28,29}. Patients involved in those traumatic events are generally young (below 40 years), and similar findings have been found by other researchers from Uganda, Kenya, and the USA³⁰⁻³².

Most of patients who get admitted come by ambulance from a lower level district hospital where they are supposed to get a primary survey done. This means that majority of the severely injured trauma patients reach the level 1 trauma center with delay as they first pass by the lower level center to be triaged, stabilized then referred to appropriate trauma center. This highlight the need of effective emergency care delivery at the district level. The same awareness was raised in Kenya when studies found that the mean pre-hospital time of trauma of patients presenting to Kenyatta national hospital (a level I trauma center) was 2,56 hours which was significantly different from developed countries where for instance in Seattle transport time was ≤ 30 minutes for 54% of patients³¹. More studies are needed to see the effect of this transfer system on the mortality of severely injured patients.

Road traffic accidents are a major burden. In depth research is needed to identify risk factors for these accidents in Rwandese settings.

Considering type of injuries, fractures are the commonest diagnosis followed by head injuries, spine injuries and chest trauma. There is no specific pattern of injuries attributable to gender.

We found no association between intentional trauma (fight, assault ...) and gender. On the other hand women were more likely to be involved in a gender based violence as type of intent compared to male. This study didn't look at the prevalence of GBV but it showed that there is still some degree of violence against woman though it is less compared to other hospital of the region such as Nairobi women's hospital (663 GBV patients for a 1 year period vs. 33 and 5 assault patients for our retrospective and prospective population)³³.

Alcohol association with gender was found in our retrospective study but not found in our prospective study. This could be due to our smaller sample and the fact that alcohol level was never explicitly tested. Even though we do not have enough data on the extent of alcohol involvement as a risk factor for trauma, elevated alcohol levels at time of injury has been suspected more in male patients than in female patients.

The care of trauma patients in the emergency care generally include pain management, fluid/blood resuscitation, tetanus shot delivery and request for specific investigation. As the incidence of trauma is higher in male patients presenting to CHUK, and their type of injury tend to be more severe, men get more resuscitative measures (fluid ordered...).

Pregnancy status evaluation is not standard of practice in CHUK/emergency department, this makes it difficult to know the extent of physical trauma in pregnancy, yet studies done have shown that in Africa 23% to 40 % of women have physical trauma during their pregnancy³⁴ as opposed to some developed countries such as UK where trauma in pregnancy is rare (1% in one study)³⁵. As Rwanda is a country where there is promotion of gender equality³⁶, doing pregnancy tests in women with trauma is an area of improvement in order to know whether more protection is needed or not.

Most of the patients admitted get discharged but the number of deaths is still elevated (20% of our prospective population) and this is equally true of other East African countries such as Kenya (10, 6% of death were due to trauma in a study by Gladwell et al)²⁷.

CHAPTER VI: LIMITATION OF THE STUDY

-This is a single center study.

-Some information were missing from the retrospective data (triage category at presentation, pregnancy status...)

-We used convenient sampling method for the prospective data.

-As our study period was short (28 days) this gives less power to our prospective results.

-No epidemiological study was done for us to know the prevalence of trauma in CHUK /emergency department. We had to rely on the admission records for us to know the study population.

-We couldn't control for confounders of our results

CHAPTER VII: CONCLUSION AND RECOMMENDATION

VII. a. CONCLUSION

Our study described the injuries treated in CHUK/emergency department. It showed that road traffic accidents are a major burden. Males are more likely to be involved in traumatic events and they mostly present at age below 40. Women are more likely to be involved in GBV.

There is no association between gender and a specific diagnosis but male tend to present with more severe form of injuries. The care of patients is the same for both sex. Some gaps to be filled in patients care were identified (testing alcohol level, doing pregnancy tests, better documentation of patients' data...)

VII. b. RECOMMENDATION

The Ministry of Health and Rwanda Traffic Police should create more strategies to prevent road traffic accidents among which include controlling alcohol consumption among drivers.

The media needs to sensitize males on taking more precautions while doing their daily activities and avoiding high risks situations for trauma.

The Ministry of Gender should continue campaigns to fight against GBV in order to eradicate it completely.

CHUK/emergency department should include alcohol testing and pregnancy status in the policy of management of trauma patients and quality improvement projects should be done to identify gaps in management and correct them in order to reduce mortality of trauma patients.

Researchers should conduct more studies on:

- The impact of transfer systems on outcome of trauma patients.
- The impact of alcohol on morbidity and mortality of trauma patients
- The incidence of GBV in pregnancy

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APPENDIX.1: QUESTIONNAIRE

A.IDENTIFICATION

DATE:

NAME:

AGE:

SEX:

PREGNANCY STATUS (IF FEMALE):

B. EVENTS AROUND TRAUMA

DATE& HOUR OF TRAUMA:

MODE OF ARRIVAL AT CHUK : ambulance from DH----- SAMU----- Private means----
police-----

TRIAGE (DATE, HOUR AND COLOR):

MECHANISM OF INJURY:

PLACE OF INJURY: Home----- Street ----- bar----- work----- other-----

ANY ALCOHOL TAKEN AT TIME OF INJURY?

- By the patient? -----

- By anyone else involved in the traumatic event (specify who)? -----

DIAGNOSIS:

WAS THE TRAUMA INTENTIONAL? -----

WAS THE TRAUMA AN ACCIDENT? -----

IS THERE ANY GBV? Yes.....

No

I don't know.....

DISPOSITION:

OUTCOME: discharged..... referred to DH.....
.....

DATE OF DISCHARGE:

Died.....

DATE OF DEATH:

.....

APPENDIX.2: CONSENT FORM

INFORMED CONSENT FORM

I,....., after having received satisfactory explanation on the research about Gender differences in patterns of injuries and trauma in the emergency department at Kigali University Teaching Hospital, Rwanda ,accept to participate in this study.

My identity shall be kept confidential and I am free to leave the study at anytime.

Participants name/caregiver :.....
name:.....

Researchers

Signature:.....

Signature:.....

KWEMERA GUTANGA AMAKURU MU BUSHAKASHATSI

Jyewe,....., maze gusobanurirwa neza ubushakashatsi ku kumenya itandukaniro ku bwoko bw ibikomere mu bagabo n abagore bivuzwa muri urugenge y’i bitaro bya kaminuza I Kigali(CHK) ,nemeye gutangamo amakuru.

Umwirondoro wanjye ntuzatangazwa kandi nemerewe kuva muri ubu bushakashatsi igihe cyose mbyifuje ,nta nkurikizi.

Amazina y’utanze amakuru.....

Umushakashatsi.....

Umukono.....

Umukono.....

UGIZE IKIBAZO BAZA/IF ANY QUESTION ,PLEASE ASK:

-Prof Gahutu Jean Bosco/ CMHS IRB Chair : 0783340040

-Sunday Francois Xavier/ IRB board : 0788563311 , sundayfrax@gmail.com

-Lise MUMPOREZE/ Principal investigator: 0788818591 , lisemumporeze@gmail.com

APPENDIX 3: ETHICAL APPROVAL

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Dr MUMPOREZE Lise
 School of Medicine and Pharmacy, UR

Kigali, 10/10/2018

Notice of Renewal of Approval for Research Project: No 348 /CMHS IRB/2018

Your Project title "*Gender Differences in Patterns of Injuries and Trauma in the Emergency Department at Kigali University Teaching Hospital, Rwanda*" has been evaluated by CMHS Institutional Review Board.

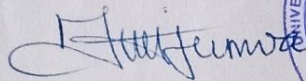
Name of Members	Institute	Involved in the decision		
		Yes	No (Reason)	
			Absent	Withdrawn from the proceeding
Prof Kato J. Njunwa	UR-CMHS	X		
Prof Jean Bosco Gahutu	UR-CMHS	X		
Dr Brenda Asiimwe-Kateera	UR-CMHS	X		
Prof Ntaganira Joseph	UR-CMHS	X		
Dr Tumusiime K. David	UR-CMHS	X		
Dr Kayonga N. Egide	UR-CMHS	X		
Mr Kanyoni Maurice	UR-CMHS	X		
Prof Munyanshongore Cyprien	UR-CMHS	X		
Mrs Ruzindana Landrine	Kicukiro district		X	
Dr Gishoma Darius	UR-CMHS	X		
Dr Donatilla Mukamana	UR-CMHS	X		
Prof Kyamanywa Patrick	UR-CMHS		X	
Prof Condo Umutesi Jeannine	UR-CMHS		X	
Dr Nyirazinyoye Laetitia	UR-CMHS	X		
Dr Nkeramihigo Emmanuel	UR-CMHS		X	
Sr Maliboli Marie Josee	CHUK	X		
Dr Mudenge Charles	Centre Psycho-Social	X		

After reviewing your protocol, **Continuation of Approval has been granted to your study.**

Please note that approval of the protocol and consent form is valid for **12 months**.
 You are responsible for fulfilling the following requirements:

1. Changes, amendments, and addenda to the protocol or consent form must be submitted to the committee for review and approval, prior to activation of the changes.
2. Only approved consent forms are to be used in the enrollment of participants
3. All consent forms signed by subjects should be retained on file. The IRB may conduct audits of all study records, and consent documentation may be part of such audits.
4. A continuing review application must be submitted to the IRB in a timely fashion and before expiry of this approval.
5. Failure to submit a continuing review application will result in termination of the study.
6. Notify the Rwanda National Ethics committee once the study is finished.

Sincerely,



Professor Kato J. NJUNWA
**Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR**



Date of Approval: October 10th, 2018
Expiration date: October 10th, 2019

Cc:

- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate Studies, UR