

INJURY AND CARE-SEEKING BEHAVIOR IN SOUTHWEST CAMEROON: A COMMUNITY-BASED SURVEY

ABSTRACT

Trauma is a leading cause of death worldwide, but in many low and middle-income countries little is known about the incidence and patterns of injury. Existing data is predominantly derived from hospital-based registries that exclude the considerable percentage of injured persons who do not present to formal care. Failing to account for these individuals likely skews estimated incidence of national injury, morbidity, and mortality data and also results in under representation of vulnerable populations. There is currently a national initiative in the Republic of Cameroon to characterize injury and develop improved trauma systems; as part of this initiative the Ministry of Health recently sanctioned the opening of five regional trauma registries. However, additional population-based studies are needed to fill in critical knowledge gaps and target difficult to access populations who fail to present to care. To do this, we propose to conduct a large-scale community-based survey to determine yearly incidence and patterns of injury in the Southwest Region of Cameroon. In order to better characterize potential interventions to expand access of trauma care, individuals who report recent injury but did not seek formal care will receive semi-qualitative interviews to identify factors contributing to their therapeutic itinerary. Findings will be reported to the Ministry of Health of Cameroon to help guide evidence based policy change.

BACKGROUND

Approximately 9% of the world's deaths, more than 5 million deaths annually, are due to injury [1]. Low and middle-income countries (LMICs) bear a disproportionate burden of the global mortality attributable to trauma; however, in most cases, the specific epidemiology of injury in LMICs is largely unknown [2]. The reasons for this are multifactorial, but one contributing factor is the difficulty of determining incidence and patterns of injury in contexts where patients may not seek formal medical care.

The World Health Organization (WHO) estimates that the Republic of Cameroon has 101.8 yearly deaths per 100,000 persons attributable to trauma [1]. However, such estimates are inferred from incomplete retrospective hospital and transport records, and entirely exclude the significant proportion of injured patients who never receive formal care due to early death, lack of access, inability to pay, or cultural preference. Reliance on this partial and biased data for injury surveillance likely grossly underestimates the true incidence of injury and completely fails to describe injury among the most vulnerable populations [3, 4]. Without this information, it is not possible to accurately assess the burden of traumatic disease or craft relevant, impactful prevention policy and trauma treatment protocols.

Given growing national concern about trauma as a public health problem, a pilot trauma registry was designed to describe injury and trauma care at a busy tertiary hospital in Yaoundé, Cameroon. Over a 6-month period 2,855 injured

FIGURE 1: Under-representation of Low SES Patients Presenting with Injury to Central Hospital of Yaoundé

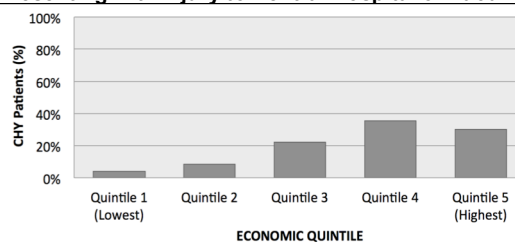
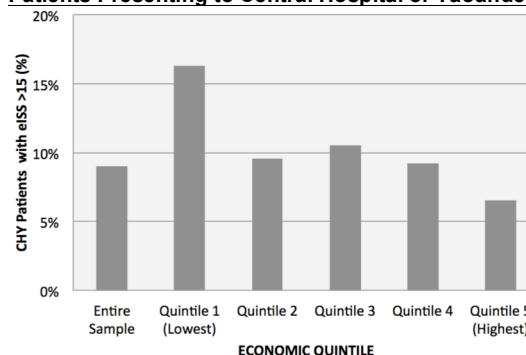


FIGURE 2: Percentage of Severely Injured Patients (eISS>15) by Socioeconomic Quintile Among Injured Patients Presenting to Central Hospital of Yaoundé



patients presented for care, comprising nearly half of all emergency room admissions and a greater than expected burden of disease [5]. Results were presented to the Ministry of Health in Cameroon, prompting the formation of a National Injury Committee. Subsequently, a permanent trauma registry system was mandated in Yaoundé as well as 4 additional hospitals sites throughout Cameroon.

While these registries represent an important advancement, registry records will not be adequate to describe the overall incidence and burden of injury in Cameroon. Yaoundé pilot registry data demonstrated that patients from the lowest socioeconomic strata (SES) were under-represented among patients presenting for injury (FIGURE 1), despite a correlation between low SES and more severe injury (FIGURE 2) [6]. We hypothesize that economically disadvantaged patients in Cameroon have equal or higher injury incidence than the general population, but are not presenting to formal care.

A recent survey of children in Cameroon's school system reported that 46.7% of school children identified as being injured in the past year; 31% of them did not receive formal care [7]. In other sub-Saharan African nations, reasons for non-presentation after injury included lack of access, expense, mechanism and sociocultural preference [3, 8-10]. Traditional quantitative and hospital-based methods fail to capture data on this population and present one of the major barriers to assessing disparities in access to trauma care [3, 4]. Potential approaches to addressing these knowledge gaps include the application of population-based and qualitative survey methods [3,10]. However, no sampling framework currently exists to employ these methods among the general population of Cameroon.

While national data would ultimately be ideal, community-based surveys are resource and time intensive. A critical first step would be to establish representative injury data on a regional scale. Once demonstrated to be feasible, this sampling protocol could be repeated throughout the other regions of Cameroon. Through this proposal, I will design and oversee the execution of a community-based survey, which will establish the yearly incidence of injury in the Southwest Region of Cameroon, and characterize patterns of injury and care-seeking behavior among patients who do not present to formal care. The Southwest Region is one of two Anglophone regions in Cameroon and has a mixed urban/rural population. It is served by the University of Buea and the Limbe Regional Hospital, one of the 5 hospitals that recently initiated trauma registry data collection. The project will be conducted in affiliation with the University of Yaoundé with direct oversight from Dr. Marie-Jose Micheline Essi, a PhD-trained medical anthropologist, with a regional base out of the University of Buea in conjunction with our collaborator Dr. Alain Chichom, Chief of Surgery at the University of Buea.

METHODS

Population and study design:

A sampling framework will be established using the most recent population estimates for the Southwest Region of Cameroon [11]. Sample departments, village/sub-regions, and households will be selected using established methodology to construct a multi-stage cluster sampling framework with selection probability proportionate to size [12, 13]. In order to minimize reporting bias among sampled families, Cameroonian nationals from the University of Buea Medical School will be trained in surveying and qualitative interview techniques. Over an eight-week time-period, the research assistants will travel to pre-selected households throughout the Southwest Region of Cameroon. Each target household will be asked to identify a family representative who will be approached for consent using a standard oral consent script. If granted, the research assistant will administer a pre-tested survey instrument to the representative regarding all members of the household (APPENDIX 2). Basic information collected will include demographics and indicators of economic status. Family representatives will be asked to identify members of the household who sustained injury within the past 12 months, as this timeframe has been demonstrated to minimize recall bias [14]. For the purposes

of the survey “injury” will include any sudden bodily insult directly resulting in death or loss of routine daily activity by any family member for at least one day [3]. For families who identify recent injury in one or more household member(s), data on injury type, care-seeking behavior, cost of treatment, and current disability will be gathered. This community-based survey methodology will engage populations not accessible through hospital data sources. Accordingly, families who report recent injury without presentation to formal care and families of reporting injury in pediatric patients will be targeted for an additional semi-structured qualitative interview to explore the reasons and values underlying care-seeking choices. Themes to be explored include attitudes and perceptions regarding accessibility, usability, and affordability of care (APPENDIX 3). All interviews will be recorded for cross-validation.

Sample size:

Sample size targets were estimated based on reported yearly incidence of injury found in community-based surveys in demographically similar Sub-Saharan African nations and ranged from 3 to 11.5% [3,15-16]. In accordance with this literature, a conservative estimate of 2% yearly injury incidence was used with a standard 25% tolerable error rate, 5% type I error, and 50% predicted non-response for a total necessary sample size of 5,950 persons. Given an estimated mean 7-person household [11] a total of 850 households will be targeted for sampling.

Data analysis:

Data will be transferred to secure computers and analyzed in a de-identified fashion. Descriptive statistics regarding injury incidence, type, treatment and outcome will be calculated by location and correlated to patient demographics and economic data. Based on the sample population, incidence of injury over a 12-month period will be estimated for Southwest Cameroon.

Qualitative interviews will be transcribed and critical themes identified and adjudicated by multiple research team members until saturation. To do this, all interviews will be analyzed thematically using both deductive and inductive elements. In the first round of analysis, two of the primary investigators will independently review the transcripts and assign code according to a theoretical framework. Discrepancies between coders will be analyzed with UCSF and local collaborators to establish clear definitions for all coding elements. Following adjudication, a contact summary sheet will be generated summarizing main themes that will be reviewed in an ongoing-fashion for saturation. Transcripts will then be re-evaluated for application of axial and selective code. Data will be grouped based on patterns identified in the underlying data with development of inductive codes and revision of existing codes. Throughout analysis, findings will be reviewed with the UCSF and Cameroon teams to ensure thematic fidelity of key themes related to injury and care-seeking.

TIMELINE

Dates	Site	Agenda
July 1- Aug 15	San Francisco	- Sampling Framework Generation - Research Assistant Selection - Database Assembly
Sept 1- Oct 15	Buea, Cameroon	- Research Assistant Qualitative Training - Survey Pre-testing and Iteration
Oct 15- Dec 15	Southwest Cameroon	- Data acquisition and quality control - Preliminary analysis with partners
Dec 15- June 21	Buea, Cameroon & San Francisco	- Final data analytics - Ministry of health report - Manuscript submission

POTENTIAL LIMITATIONS

Potential limitations of this study include the possibility of lower than expected prevalence of injury or family participation rate and the potential for inaccurate reporting or non-disclosure of injury. Although it is obviously not possible to know the exact incidence of injury prior to the study, sample size was generated using highly conservative evidence-based estimates. It will also be easily possible to expand the protocol if preliminary data demonstrates under-sampling. Estimates of family non-response were also conservative, however to ensure the highest likelihood of participation and accurate reporting, all survey questions, consent scripts, and survey protocols will be extensively pre-tested on local populations, with iterations based on participant feedback. To minimize bias, all interviews will be conducted in the family's native language by trained Cameroonian nationals. It is important to note, however that this protocol will likely remain susceptible to certain patterns of under-reporting. For example, we anticipate that self-inflicted or intentional injuries may be under or mis-reported. Nevertheless, the information generated from this survey will provide critical previously unstudied information and provide insight into system improvement opportunities.

SIGNIFICANCE AND INNOVATION

There is a growing concern over the impact of injury in Cameroon. The proposed study will provide critical new information on injuries, access to care, and surgical disparities by employing non-hospital, population-based surveying in conjunction with qualitative research methods to characterize injury and care-seeking among difficult to target populations. It is often assumed that disparities in care are solely financially motivated, but this is not necessarily the case. Improved understanding of the root causes underlying care-seeking behavior will enable the development of systems programming to expand participation in formal care. To ensure the feasibility and applicability of this important but ambitious project, this study relies on bringing together the expertise of partners in disparate fields, integrating academic surgeons in Cameroon and the United States with experts in the fields of medical anthropology, epidemiology, biostatistics, and health economics. It will foster research and collaboration between surgical trainees in the United States and Cameroon as part of a larger objective to foster sustainable research and surgical quality improvement systems in sub-Saharan Africa. The results produced will constitute the most comprehensive data on patterns of injury, facilitators, and barriers to treatment that has ever been conducted in this population and will integrate with and fill knowledge gaps in the newly formed national trauma registry. Taken together, these two projects represent an overarching initiative toward the formation an evidence-based trauma system capable of sustainably improving and expanding care to the population of Cameroon. Importantly, one of the strongest factors potentiating this project is the demonstrated investment of the Ministry of Health in the timely improvement and implementation of their own trauma system. This is reflective of a burgeoning global push toward universal health coverage by the WHO and Sustainable Development Goals. The ongoing relationship of UCSF and our Cameroonian partners with the Ministry of Health makes us uniquely positioned to translate study findings expediently into policy. As such, all methodology and results will be shared with partners in the Ministry of Health to directly inform prevention policy and trauma systems planning. Additionally, characterization of the epidemiology of injury will enhance local and global advocacy efforts towards appropriately allocating resources for injury prevention and support systems.

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APPENDIX I: PROPOSED BUDGET

<i>Personal International Travel:</i>	USD
Flights	\$1,800
Visa Fees	\$400
<i>In- Country Expenses</i>	USD
Research Assistant Salary x 15 research assistants	\$6,000
In-country travel and security x 15 research assistants	\$4,000
Audio recording equipment x 15 research assistants	\$2,000
Translator Fees	\$1,500
Pens, Paper, Copying and Data Storage Fees	\$200
Qualitative Analytic Software	\$1,000
<i>TOTAL</i>	\$16, 900

APPENDIX 2: COMMUNITY BASED SURVEY

Injury in Southwest Cameroon: Community Based Survey with Emphasis on Therapeutic Itinerary

Identification			
Family Name:		Study #:	
Address:		Date of Interview:	
House:		Family Representative:	
Street:		Number of Family Members*:	
Village:		Number of Children:	
District:			
Consent	☐ Yes	☐ No	☐ Not Eligible

**Defined as persons sleeping in and/or sharing one daily meal in house, including family representative*

Section 1: Household Demographics			
1.1 Socioeconomic Demographics			
	Question	Answer	
1.1.1	Is the household?	☐ Rural ☐ Urban	
1.1.2	Does the family own a cellphone?	☐ Yes ☐ No	
1.1.3	Does the household?	☐ Own the home ☐ Rent the home ☐ Live for free	
1.1.4	Does the household own agricultural land?	☐ Yes ☐ No	
1.1.5	What type of cooking fuel is used in the household?	☐ Wood ☐ Charcoal ☐ Liquid Petroleum Gas (LPG) ☐ Kerosene ☐ Other	
1.2 Incidence of Injury			
1.2.1	Has any member of the household been injured within the last year?	☐ Yes ☐ No	If no, survey is complete
1.2.2	How many separate injury events occurred within the family over the past year?	☐ 1 ☐ 2 ☐ 3 ☐ 4 or More	For each injury event, fill out a separate section 2 form.
Section 2: Injury Event			
2.1 Injury Characteristics			
2.1.1	How old was the injured person at the time of injury?	____ Months (<1 y) ____ Years	If < 18 years, complete survey and proceed with semi-qualitative interview
2.1.2	Where was the person when they became injured?	☐ In the home ☐ Private residence ☐ Street/Highway ☐ Railway Line ☐ Trade/Service Area ☐ Construction site ☐ Work site ☐ Body of water ☐ Sports area ☐ School ☐ Open Land ☐ Public Area ☐ Unknown ☐ Other	

2.1.3	What caused the injury?	☐ Road Traffic Injury ☐ Blunt force ☐ Fall ☐ Sharp force ☐ Drowning ☐ Burn ☐ Poisoning ☐ Choking ☐ Electrocution ☐ Firearm ☐ Explosive Blast ☐ Venom ☐ Unknown ☐ Other	
2.1.4	If caused by Road Traffic Injury, what mode(s) of transportation were involved?	☐ Pedestrian ☐ Bicycle ☐ Private car ☐ Taxi ☐ Motorcycle ☐ Mototaxi ☐ Truck ☐ Minivan/bus ☐ Bus ☐ Train ☐ Unknown ☐ Other	Specify:
2.1.5	What part(s) of the body were injured?	☐ Head ☐ Neck ☐ Upper extremities ☐ Chest ☐ Back ☐ Abdomen ☐ Lower extremities	
2.1.6	On the day of the injury, did the injured person?	☐ Die ☐ Lose consciousness ☐ Stop breathing	
2.2 Injury Treatment			
2.2.1	What type of person first provided help to the injured person?	☐ Family member ☐ Non-family acquaintance ☐ Bystander ☐ Police officer or other public official	
2.1.2	How was the injury treated? List all that apply. If more than one type of care was sought please clearly indicate the numeric order in which care was sought (1 first care type sought, 2 second care type sought, etc)	___ 1. No treatment sought ___ 2. Friend or family member ___ 3. Community elder ___ 4. Local healer ___ 5. Medical professional outside hospital or clinic ___ 6. Hospital or clinic ___ 7. Other ___ 8. Unknown	If HIGHEST # = 1: go to 2.1.3 2-4: go to 3 , and proceed with semi qualitative interview 5: go to 2.1.5 6: go to 2.1.4 7: specify: then go to 2.1.12 8: go to 2.1.12
2.1.3	Why was no treatment sought?	☐ Injury not significant ☐ Treatment too expensive ☐ Lack of expert or facilities ☐ Health care services too far away ☐ Other	Proceed to question 2.1.12
2.1.4	Did the patient remain in the hospital >=1 night?	☐ Yes ☐ No	How many nights? _____
2.1.5	Did the patient receive an operation as part of their treatment?	☐ Yes ☐ No	

2.1.6	What caused the patient to leave the hospital?	☐ Death ☐ Discharged ☐ Left without discharge	
2.1.7	After discharge, did the medical staff recommend the patient return for additional follow-up?	☐ Yes ☐ No	
2.1.8	After discharge, did the patient return for additional follow-up?	☐ Yes ☐ No, it wasn't needed ☐ No, it was too expensive ☐ No, it was too far away ☐ No, other	For "Other," specify: _____ _____ _____
2.1.9	How satisfied were you with the care your family member received?	☐ Completely satisfied ☐ Somewhat satisfied ☐ Neither satisfied nor dissatisfied ☐ Somewhat dissatisfied ☐ Completely dissatisfied	
2.1.10	Did your family experience any of the following while seeking formal care?	☐ Long wait times ☐ Poor treatment by staff ☐ Non- functioning equipment/ Poorly kept facilities	
2.1.11	If someone in the family were to experience a severe injury now would you seek formal care?	☐ Yes, at the same facility ☐ Yes, at a different facility ☐ No	
2.1.12	Approximately how much did all treatment cost for this injury (including provider fees, hospital fees, supplies, cost of tests and procedures)?	_____	
Section 3: Outcomes			
3.1 Mortality			
3.1.1	Is the patient alive?	☐ Yes ☐ No	
3.1.2	When did the injured person die, relative to their injury?	☐ <24 hours ☐ 1-3 days ☐ 4-7 days ☐ 8-14 days ☐ 15 days – 1 month ☐ >1 month- 3 months ☐ >3 months- 6 months ☐ >6 months-9 months ☐ >9 months- 1 year	
3.1.3	Would the death have occurred if the person had not been injured?	☐ Yes ☐ No ☐ Unknown	
3.2 Disability			
3.2.1	Following injury, was there even one day that the injured family member was not able to care for themselves, requiring the assistance of another person?	☐ Yes ☐ No	If yes, specify how many days: _____
3.2.2	Following injury, was there even one day that the individual was not able to work or go to school?	☐ Yes ☐ No	If yes, specify how many days: _____
3.2.3	Please estimate the total wages lost as a result of the injury? (This value does not include treatment costs)	_____	
3.2.4	Following the injury, did it become more difficult for the family to afford expenses such as food and rent?	☐ Yes ☐ No	

3.2.5	Following the injury, did household income decrease?	☐ Yes ☐ No	
3.2.6	Following the family member's injury, did the family have to borrow money to be able to repay debts or afford basic necessities like food and rent?	☐ Yes ☐ No	
3.2.7	Does the individual have post-injury disability in any of the following (defined in differences in ability before and after the injury)	☐ None ☐ Speaking or communicating ☐ Dressing or eating ☐ Leaving the home ☐ Shopping or traveling ☐ Engaging with friends or family ☐ Working or going to school	
3.2.8	Is the assistance of another person at home essential every day for some basic activities of daily living like dressing and eating?	☐ Yes ☐ No	
3.2.9	Did any member of the family have to quit their job or stop going to school in order to care for the injured family member?	☐ Yes ☐ No	
3.2.6	Has the patient been readmitted to the hospital or needed formal care for issues related to their injury (other than scheduled follow-up visits)?	☐ Yes ☐ No	If yes, specify how many times: _____ re-admissions _____ other medical consultations
3.2.7	Does the patient still need medical care for issues related to their injury?	☐ Yes ☐ No	

APPENDIX 3: SEMI QUALITATIVE SURVEY QUESTIONS

Families should receive the semi-qualitative interview only if they have reported an injured family member < 18 years old at the time of injury or if the respondent replied to Question 2.1.2 with answers 2-4. The interview needs to be completed only one time for each family.

Dimension	Questions
Availability: The existing health services and goods meet clients' needs.	What types of services exist? Which organizations offer these services? Is there enough skilled personnel? Do the offered products and services correspond with the needs of poor people? Do the supplies suffice to cover the demand?
Accessibility: The location of supply is in line with the location of clients.	What is the geographical distance between the services and the homes of the intended users? By what means of transport can they be reached? How much time does it take?
Affordability: The prices of services fit the clients' income and ability to pay.	What are the direct costs of the services and the products delivered through the services? What are the indirect costs in terms of transportation, lost time and income, bribes, and other "unofficial" charges?
Adequacy: The organization of health care meets the clients' expectations.	How are the services organized? Does the organizational set up meet the patients' expectations? Do the opening hours match with schedules of the clients, for instance the daily work schedule of small-scale farmers? Are the facilities clean and well kept?
Acceptability: The characteristics of providers match with those of the clients.	Does the information, explanation, and treatment provided take local illness concepts and social values into account? Do the patients feel welcome and cared for? Do the patients trust in the competence and personality of the health care providers?

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