



4-12-2020

Understanding Etiologies of Road Traffic Crashes, Injuries, and Death for Patients at National Hospital Abuja: A Qualitative Content Analysis Using Haddon's Matrix

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Recommended APA Citation

Holmes, B. D., Haglund, K., Ameh, E. A., Olaomi, O. O., Uthman, U., & Cassidy, L. D. (2020). Understanding Etiologies of Road Traffic Crashes, Injuries, and Death for Patients at National Hospital Abuja: A Qualitative Content Analysis Using Haddon's Matrix. *The Qualitative Report*, 25(4), 962-974. <https://doi.org/10.46743/2160-3715/2020.4152>

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Abstract

Road traffic crashes and sequelae are reaching pandemic proportions globally and have currently achieved disproportionately high levels in Nigeria. Quantitative studies are accumulating in the peer-reviewed literature, but there is a paucity of qualitative research in Nigeria. Data for this study of structural and behavioral factors of road traffic crashes and injuries in Federal Capital Territory were collected in semi-structured interviews with crash survivors at National Hospital Abuja. Interviews were analyzed via qualitative content analysis, revealing crash location and participant beliefs about crash etiologies. Units of analysis were developed from participant statements and were structured within four a priori etiologic categories using Haddon's (1980) matrix: human-, vehicle-, physical environment-, and socioeconomic environment-related. Subcategories were generated. Human-related subcategories included reckless behavior and drivers, limited technical knowledge and skill. Vehicle-related subcategories included vehicular disrepair and lack of safety equipment. Physical environment-related subcategories included road disrepair, infrastructural inadequacy, and weather. Socioeconomic environment-related subcategories included government, prehospital care, money, and prayer. Subcategories were organized temporally by pre-event, event, and post-event phases, with most units of analysis allocated in the pre-event phase. These qualitative results can be utilized to guide future research along community-aligned priorities, and to structure community-engaged preventative and interventional efforts.

Keywords

Road Traffic Injury, Road Traffic Crash, Nigeria, Qualitative, Semi-Structured Interview, Content Analysis, Haddon's Matrix

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Road traffic crashes and sequelae are reaching pandemic proportions globally and have currently achieved disproportionately high levels in Nigeria. Quantitative studies are accumulating in the peer-reviewed literature, but there is a paucity of qualitative research in Nigeria. Data for this study of structural and behavioral factors of road traffic crashes and injuries in Federal Capital Territory were collected in semi-structured interviews with crash survivors at National Hospital Abuja. Interviews were analyzed via qualitative content analysis, revealing crash location and participant beliefs about crash etiologies. Units of analysis were developed from participant statements and were structured within four a priori etiologic categories using Haddon's (1980) matrix: human-, vehicle-, physical environment-, and socioeconomic environment-related. Subcategories were generated. Human-related subcategories included reckless behavior and drivers, limited technical knowledge and skill. Vehicle-related subcategories included vehicular disrepair and lack of safety equipment. Physical environment-related subcategories included road disrepair, infrastructural inadequacy, and weather. Socioeconomic environment-related subcategories included government, prehospital care, money, and prayer. Subcategories were organized temporally by pre-event, event, and post-event phases, with most units of analysis allocated in the pre-event phase. These qualitative results can be utilized to guide future research along community-aligned priorities, and to structure community-engaged preventative and interventional efforts. Keywords: Road Traffic Injury, Road Traffic Crash, Nigeria, Qualitative, Semi-Structured Interview, Content Analysis, Haddon's Matrix

Introduction

Road traffic crashes are one of the leading causes of injury and death globally, and injury and mortality rates are increasing. Current trends indicate that by 2030 crashes will become the fourth leading cause of disability-adjusted life year (DALY) loss (Mathers &

Loncar, 2006) and the seventh leading global cause of death (World Health Organization [WHO], 2018). The global death toll due to crashes has already escalated by 46% over the past two decades (Bhalla et al., 2014).

Low- and middle-income countries (LMICs) are disproportionately affected by the crash epidemic. Ninety-three percent of the world's crash-related deaths occur in LMICs where only 59% of its motor vehicles are registered (WHO, 2018). This problem is complicated by the economic toll of crashes in LMICs, where nearly one half of all healthcare expenditures in LMICs is used to treat injuries related to motor vehicle crashes (Zakeri & Nosratnejad, 2017).

Sub-Saharan Africa has absorbed an inequitable impact from this epidemic, currently demonstrating the highest crash-related mortality rate per population in the world (Marquez & Farrington, 2013). Further, rates continue to trend upward over time. Nigeria, Africa's highest populated country, ranks 21st of 187 countries, ranked descendingly by change in relative mortality due to crashes between 1990 and 2010, 14th for change in years of life lost (YLLs), and 13th for change in DALYs (Lin, 2016). The crash-related mortality rate in 2012 was 162 per 100,000 in Nigeria, which is 636% higher than the global average of 22 per 100,000 (Korter, Olubusoye, & Salisu, 2013). A Nigerian has one chance in nine of dying due to a crash, and one chance in three of being injured due to one in his/her lifetime (Atubi & Gbadamosi, 2015).

Research on the epidemiology of crash problems in LMICs is increasing. However, studies such as those cited above predominantly report statistics, while there is a paucity of qualitative research (Holmes, Haglund, Beyer, & Cassidy, 2018). Qualitative exploration has the potential to enhance quantitative crash research by describing and explicating contexts and social processes surrounding crashes which are inexplicable in quantitative analysis (Roberts, 1997). Additionally, understanding local stakeholders' perspectives on the etiologies and potential solutions to crashes increases the likelihood that interventions will be supported, sustainable, and effective (Roberts, Smith, & Bryce, 1995).

The authors present a qualitative content analysis of explanatory factors of road traffic crashes in which patients at National Hospital Abuja (NHA) were involved using Haddon's (1980) matrix. Our primary objective is to identify structural and behavioral factors of road traffic crashes and injuries in Federal Capital Territory (FCT), Nigeria, in order to guide future research along community-aligned priorities, and to structure community-engaged preventative and interventional efforts. The authors' collaboration unites backgrounds of medical crash trauma care in FCT, local trauma registry development, qualitative project development and analysis, and research expertise in the global road traffic crash pandemic.

Methods

Data Collection

This paper reports the results of semi-structured interviews with road traffic crash survivors at NHA, performed over a 2-week period in August 2018. The primary author performed interviews within a private location (room or bay) at NHA. We chose semi-structured interviews as a data collection technique because of their structured flexibility, which both maintains uniformity in participant questioning and allows for individuality in responses and follow-up questions. This method can therefore encourage participants to provide deep and vital responses, thereby identifying new and meaningful concepts and themes (Dearnley, 2005) which contextualize crash and injury mechanisms. Semi-structured interviews have been utilized successfully in qualitative road traffic crash research in various LMICs in studying such themes as crash etiology, crash experience, injury care, prevention and intervention, and risky driving motivations (Holmes et al., 2018).

In order to understand both structural and behavioral factors of crashes and injuries in FCT, interviews addressed the following research question: “What are the locations and etiologies of crashes in which patients at NHA are involved?” Participants were included in this study if they were injured in a crash, if they were 18 years old or older, if they spoke English or if they had a companion who could translate for them, and if they provided informed consent. We selected these inclusion criteria to facilitate interactions with participants whose narratives would best inform our research question, based on our belief that adults injured in a crash who could communicate, with or without the assistance of another, in the native language of the primary author could provide the richest descriptions of their crash experiences and beliefs about etiologies. We employed a convenience sampling technique to maximize collected data within a limited collection timeframe. Saturation was achieved within 25 interviews. The primary author informed each participant that the interview would be audio recorded and transcribed, then stored in a secure digital repository, and that personal identifying features would be deleted. Interviews lasted up to 30 minutes and were structured by the following interview guide:

1. Where did your crash occur?
2. Tell me about this location and car crashes.
Prompts:
Did something about this location contribute to your crash?
Do many crashes happen here?
Is there something about this location that makes crashes more likely?
Is there something about this location that makes it more likely for someone to be injured or killed in a crash here?
3. What could be done at this location to prevent crashes in the future?
4. What could be done at this location to prevent injuries or deaths due to crashes?
5. Many people feel that injuries and deaths due to car crashes are a major problem in Nigeria.
Prompts:
In your opinion, how much of a problem are crashes for people in Nigeria?
What do you think is causing the problem of crashes in Nigeria?
6. What could be done in Nigeria to decrease crashes?
7. What could be done in Nigeria to prevent injuries or deaths due to crashes?
Prompts:
For example, seatbelts and helmets can prevent people from being injured or killed in a crash; would those precautions work here?

Interviews were recorded on a password-protected digital handheld device and then the primary author immediately transcribed them. Both the audio interview and transcription were then uploaded to Medical College of Wisconsin (MCW) Box, a secure data repository, and erased from the handheld device. Personal identifying features were deleted. Sixteen (64%) males and nine (36%) females were interviewed. Approximately 300 minutes of interviews were transcribed in total. This study was approved by the Institutional Review Boards at both NHA and MCW/Froedtert Hospital.

Data Analysis

We utilized Haddon’s (1980) matrix as an analytical framework for qualitatively evaluating the etiologies of crashes in FCT. William Haddon, Jr. developed the matrix as an

aid in studying injury epidemiology, and it appears in his papers in various forms throughout the 1960s, '70s, and '80s, and in other researchers' papers in augmented forms today (Runyan, 2015). Haddon's matrix separates temporal phases of injuries into "pre-event," "event," and "post-event" timing in rows, and classifies explanatory factors of injuries as "human-," "vehicle-," and "environment-related," in columns. The last column is commonly divided into "physical environment" and "socioeconomic environment" (Lu, 2006). When applied to road traffic crashes, the matrix is meant to identify all risk factors associated with a crash, and then inform and structure countermeasures: those meant to prevent crashes (pre-event phase), prevent or reduce severity of injuries (event phase), and reduce the adverse outcomes of crashes once they have occurred (post-event phase) (Mohan, Tiwari, Khayesi, & Nafukho, 2006).

This framework has been employed extensively in quantitative analysis of a broad spectrum of injury mechanisms, including crashes. Qualitative burn researchers have also recently recognized its utility in their research (Bazargani et al., 2013; Deljavan, Sadeghi-Bazargani, Fouladi, Arshi, & Mohammadi, 2012). We chose to use Haddon's (1980) matrix in this study for its ability to isolate both structural (including locational) and behavioral crash etiologies, and to optimize both data saturation and the applicability of our results for preventative and interventional purposes.

In this study, we conducted qualitative content analysis using interview data. Content analysis method is systematic and flexible (Schreier, 2014), and is the most commonly employed technique for qualitatively analyzing crash data in LMICs (Holmes et al., 2018). The primary author read each of the interviews and coded statements as the units of analysis. I drew initial codes from the a priori categories in Haddon's matrix: human, vehicle, physical environment, and socioeconomic environment (Haddon, 1980). I then cut and pasted statements into matrices in which codes were assigned as column headings, and rows were labeled "pre-event," "event," and "post-event." Review of data in the matrices led to identification of more specific codes, such as driver behaviorisms, vehicular and infrastructural disrepair, economic pressure, and faith, which captured participants' perspectives regarding how and why human, vehicular, and physical and socioeconomic environmental factors contributed to car crashes, injuries, and deaths. A quantitative assessment of the data such as numbers of crashes in various locations and numbers of participants citing certain crash factors facilitated identification of patterns within the data. I combined patterns with thematically coded data to describe and explicate contexts and social processes surrounding crashes. A second author also read each interview and simultaneously and independently performed the subsequent steps outlined above. Following independent analysis, the two authors then reviewed, compared, and discussed each other's findings together. We encountered some differences and discrepancies in our individually selected units of analysis, category assignments, and subcategory generation. These differences required iterative dialogue, reassignment, and regeneration to resolve the discrepancies and refine our findings, until we achieved results which both authors agreed on (Schreier, 2014).

Results

In this section we present Haddon's (1980) a priori categories and the generated subcategories (Table 1), and specific findings regarding both the locations of NHA patient crashes and the etiologies of crashes, injuries, and fatalities, as structured by Haddon's matrix.

Table 1. *Qualitative categories/subcategories of road traffic crash, injury, and fatality etiologies*

Category	Human	Vehicle	Physical environment	Socioeconomic environment
<i>Subcategories</i>	Reckless behavior	Vehicular disrepair	Road disrepair	Government
	Limited technical knowledge and skill	Lack of safety equipment	Infrastructural inadequacy	Prehospital care
			Weather	Money
				Prayer

Locations

The location of a road traffic crash has been shown to be associated with crash injury severity and outcome for the population of crash patients at NHA. Specifically, NHA patients who were involved in a crash on an expressway or in an area where expressways transition to local roads (junctions, bridges, or roundabouts) are at a higher risk of dying at the hospital than those who were involved in a crash at a different type of location (Holmes, 2019). Twenty-four of the 25 interviewed participants in this study were injured on expressways or in transition zones; 13 were injured on an expressway, and 11 were injured in a transition zone. One patient was injured on a local road.

Human Factors

Human error is a historically and globally inculcated factor of road traffic crashes, injuries, and fatalities (Akanbi, Charles-Owaba, & Oluleye, 2009; Hedlund, 1985). In our study, qualitative content analysis of human factors resulted in the generation of two subcategories: reckless behavior and limited technical knowledge and skill. Reckless behavior was cited by all 25 participants (sometimes multiple times by a single participant) as a cause both of the participant's specific crash and of crashes in Nigeria in general. Driver behaviorisms were predominantly implicated (24 participants), though one participant attributed his brother's crash to pedestrian recklessness; his brother was struck while crossing an expressway junction drunk and on foot. Also, another taxi passenger observed that passengers rarely wear seatbelts: "Nobody bothers to strap." Participants offered several examples of driver recklessness as causes of their crashes, such as disregard for regulations, including speed limits (16 participants); inattentive and distracted driving (9); driving under the influence (7); emotional driving, including fear and maliciousness (5); impatience (5); overloading trucks or public transit (5); drowsy driving (4); and not performing vehicle maintenance (3).

Drivers' limited technical knowledge and skill was referenced by eight participants as a cause of crashes, both individually and generally. Several reasons for limitations in drivers' knowledge and skill were offered, including lack of formal training and licensure (6 participants), limited experience (3), parental negligence in preventing their children from driving (2), and unfamiliarity with the local terrain (1). One participant who had been injured as a passenger on a motorcycle taxi ("okada") was especially dubious of okada drivers' training generally, asserting, "As you see me now, I don't think I will ever in life go on okada!" Another, who was injured with her family when a reckless driver's vehicle lost control in the rain and careened into theirs, criticized Nigerian drivers generally and blamed their lack of training:

“Most of them don’t know how to drive cars yet on the road.” Similarly, another participant expressed, “Those that drive without license, there are many!” Finally, after affirming this etiology one participant demanded, “The driver should be a learned person, that know how to [drive], you know?”

Vehicular Factors

Qualitative content analysis of vehicle-related factors in crashes, injuries, and deaths resulted in the generation of two subcategories: vehicular disrepair and lack of safety equipment. Fourteen participants noted vehicular factors as causes of their crashes and injuries and in road traffic crashes, injuries, and deaths generally in Nigeria, with 8 decrying disrepair and 11 citing a lack of or need for better safety equipment. Aside from general disrepair, only one car part was specifically mentioned when participants expressed concern regarding Nigerian vehicles: tires. One taxi passenger recounted that his crash happened when the taxi’s “rear tire was removed. . . . Fell off.” Three other participants specified tire bursts as the cause of their crashes, and one truck driver believed that tire bursts are a significant cause of crashes, injuries, and deaths in Nigeria in general, pointing out: “[T]he tire of the vehicle will lose control and went and hit another place, that would be a lot, such an accident with burns or dead.”

Participants discussed the lack of several different pieces of safety equipment as causes of crashes, injuries, and deaths. Five participants mentioned a lack of seatbelts in their specific crashes. One participant was a passenger in a taxi minivan which crashed and “somersaulted” four times; she reflected somberly that her friend who had not used a seatbelt had died, while her friend who did, lived. Three participants shared that motorcycles are inherently dangerous, two of whom were personally involved in a motorcycle crash.

Four participants blamed a lack of innovation in Nigerian cars for both rule-breaking and crashes, surmising improved law abidance by drivers of vehicles equipped with speed alarms and speed limiters, and improved safety in vehicles with airbags. One participant even pleaded for researchers to produce safer vehicles, praying that God would “give the wisdom, so those people have the wisdom to produce a [safer] vehicle.”

Physical Environmental Factors

Qualitative content analysis of physical environment-related factors in crashes, injuries, and deaths resulted in the generation of three subcategories: road disrepair, infrastructural inadequacy, and weather. Twenty-four participants described the physical environment as a causative factor in their crashes and in crashes, injuries, and fatalities generally in Nigeria, and 15 implicated road disrepair specifically. Of the types of disrepair discussed, potholes, uncovered construction ditches, and culverts were the most commonly noted culprits (7 participants). One driver observed that a dysfunctional drainage system is the underlying cause of potholes and culverts, as rainwater cannot then be efficiently drained, and it erodes “all these bad roads.” Poor upkeep was also described by three participants. One passenger involved in an okada crash blamed the tall grasses growing in the roundabout for the driver’s inability to see and avoid an approaching car. The following comments were made, describing the status of roads in Nigeria: “The roads are generally bad. At one point or the other you have to do some swerving here and there. . . . [W]e need to work on our roads.” “A whole series of some accidents have been occurring here [Nigeria], definitely. Probably mostly some are probably from [culvert] or any kind of obstruction.” Crashes in Nigeria are the “result of bad roads in most areas.” “You see, the roads very bad. Very bad!” “Very bad road. Not a good road in Nigeria. . . . The potholes. Damages.” “[M]ost of the federal roads in our country, they’re not

taken care of. . . . For example, the road from Edo State to Kogi State is a deathtrap. Very, very deathtrap.”

Infrastructural inadequacy was also implicated as a cause of crashes, and infrastructural improvement was recommended as a solution, by 17 participants. Examples of infrastructural problems included traffic congestion, especially in transition zones (6); poor lighting (3); traffic lanes which are too few and too narrow (2); lack of barriers and guardrails (2); and a lack of pedestrian bridges (1). One participant was injured as a taxi passenger in a transition zone when a vehicle in front of hers missed the exit and suddenly began driving in reverse. She blamed the crash ultimately on traffic congestion in the transition zone, explaining, “There are so many vehicles by the road.” Another participant actually blamed taxi drivers for the congestion, at least on the road where he was injured: “So, so many people using that Airport Road; there’s so many taxi drivers.” Later in the interview this participant recommended installing speedbumps on Airport Road, averring, “when they put that traffic bump they will not too easy speed to pass there. . . .Speed bump, you understand, can make accident reduce on that Airport Road, I’m telling you!” Two other participants also recommended installing speedbumps, three recommended traffic lights on expressways, and one recommended placing a sign to notify drivers of upcoming road hazards.

Three participants observed that the weather was a causative agent in road traffic crashes, each blaming rain. One participant specifically recounted driving his truck into a large uncovered pothole in the expressway which had been obscured by rain.

Socioeconomic Environmental Factors

Qualitative content analysis of socioeconomic environment-related factors in crashes, injuries, and deaths resulted in the generation of four subcategories: government, prehospital care, money, and prayer. Twenty-two participants described socioeconomic causative and preventative factors of crashes. All but one of the 22 participants identified ineffective government practices as causes of crashes in Nigeria, such as limited regulation and enforcement of current laws (12 participants), limited road repair (6), limited road traffic related policymaking (3), corruption (2), and limited post-crash investigation (1).

Twelve participants described their own efforts to secure first aid and transportation to the hospital after their crash, illustrating the impoverished status of prehospital care as a causative factor in crash patient injuries and fatalities. “[W]hen the accident happened,” one truck driver recounted, “there’s nobody there.” Other participants attempted to hail their own transportation to the hospital: “I was like shouting, ‘Help! Help! Please help us! Help!’ Cars come, they come then slow down then speed up. Yes. Slow down, speed up.” “We climb out from window, climb out. And so, we started calling people, ‘Come and rescue! Come and rescue! Come and rescue!’ . . .Only God save us.” “So from there I call my boss to come over. So he came to pick me and took me to. . .National Hospital.” “So everyone has to find their way. So if I could calm down, I knew that I was shooting blood.” And summarily, “We have to rescue ourself out.” One pedestrian described her lack of human assistance after her crash, and her complete reliance on God:

I pray to my Father, “Please don’t let me to die this time around” . . . And I say, “God, send your angel from heaven to come and help me. Don’t let me to die” . . . I don’t have anybody to help me. I cannot have anything to say, only prayers. I leave everything to God.

A variety of money-related issues were described by seven participants as causes of crashes, injuries, and fatalities in Nigeria. Three participants expressed concern regarding limited access

to healthcare for financial reasons. One patient explained from her gurney, “If people don’t have money, they cannot be here,” while another worried about her own financial situation: “[H]ow am I going to ever get pay bills like this? You get?” Another whose entire family was hospitalized due to a crash expressed gratitude for her health insurance but noted that many other victims are less fortunate: “I work with government, so I am given national health insurance. . . . So that is what is helping us. If not, I wouldn’t have been here. I cannot afford.” One taxi driver complained that aside from being expected to drive victims to the hospital, taxi drivers are also frequently billed for the victims’ medical care: “The drivers are left to settle the hospital bills of the person that was hit. And take him to the hospital.” Other money-related issues include armed robbers “attacking on the highway” and causing crashes (2 participants), and drivers loading too many people and/or goods into their vehicles in order to earn more money (3). “Sometimes bike people [okada drivers] run out of patience and having to slow down, because they want to drop you and go get that again. They are after fast money.”

Finally, five participants opined that prayer is a necessary practice to remedy the problem of road traffic crashes, injuries, and fatalities in Nigeria: “[A]ll Nigerians need prayer.” Comments about prayer indicate participants’ religiosity but may also hint at fatalistic beliefs and behaviorisms (Kayani, King, & Fleiter, 2012) as well as a lack of faith in human-mediated preventative and interventional measures.

Temporal Factors

Haddon’s matrix accounts for temporality in the assessment of injury epidemiology by identifying explanatory factors in pre-event, event, and post-event phases. Most comments made by this study’s participants involved pre-event processes (78%, 156 units of analysis). Nine percent involved processes at the time of the event, and 13% involved post-event processes. Table 2 shows the frequency of units of analysis per pre-event, event, and post-event subcategories, within each Haddon’s category.

Table 2. *Qualitative unit of analysis frequency in temporal subcategories*

Human	Pre-Event	Event	Post-Event
Reckless behavior	55	5	3
Limited technical knowledge and skill	12	0	0
Total	67	5	3
Vehicle	Pre-Event	Event	Post-Event
Vehicular disrepair	4	6	0
Lack of safety equipment	10	1	1
Total	14	7	1
Physical Environment	Pre-Event	Event	Post-Event
Road disrepair	17	0	0
Infrastructural inadequacy	20	2	1
Weather	0	3	0
Total	37	5	1
Socioeconomic Environment	Pre-Event	Event	Post-Event

Government	31	0	2
Prehospital Care	0	0	15
Money	3	1	3
Prayer	4	0	2
Total	38	1	22

Discussion

Each of this study's 25 participants described a form of reckless behavior as a human-related cause of their crash or crashes in general. Examples included speeding, overloading vehicles, distracted driving, and driving drowsy. Some participants offered the opinion that increased earning potential is a reason some drivers may speed, overload their vehicles, and drive long hours. One truck driver alleged that in an effort to maximize both delivery loads and driving-time efficiency drivers of cement trucks which are made to carry 1,200 bags of cement will frequently load 60,000. They also speed, he complained. Two other participants suggested that okada drivers will similarly intentionally load excessive numbers of passengers on their motorcycles and speed in order to maximize profit, and three others leveled this accusation at their taxi drivers, one of whom prior to their crash seated 19 passengers in a 14-seater. Driving drowsy may also be an upshot of drivers' efforts to earn money. This last participant reported that his taxi van driver fell asleep at the wheel after driving "all the night to the morning" to drop off passengers and pick up more, presumably for financial reasons. Another participant's driver seemed more distracted while driving drowsy. There is a known relationship between driving drowsy and increased distractibility (Anderson & Horne, 2013). Participants, nearly to the person, suggested improved government regulation as a solution to the problem of reckless human behavior.

While these issues of speeding, overloading, distracted driving, and driving drowsy appear superficially to be human-related etiologies, they may have socioeconomic underpinnings as "upstream determinants"; that is, factors which structure the issues categorized as "human-related" (Oni et al., 2019). The relationship between these human-related issues and socioeconomic status was suggested by one participant who blamed the "present administration" for drivers' current financial problems, and when asked what can be done to decrease the number of crashes or deaths in Nigeria, answered,

Empowerment of the youth. And employment. Empowerment and employment . . . Because the young boys when they graduate are not being empowered. . . . Everybody cannot be a government worker. But even if you're not a government worker there must be a way for you to make a living. Am I correct?

Such socioeconomic status disparity may be fueling drivers' motivation to speed, overload, and drive long hours. This reported problem with empowerment and employment may also be a reason for the current burgeoning young male okada driver population in Nigeria, many of whom are informally trained and unlicensed (Salako, Abiodun, & Sholeye, 2013). As suggested in the literature, this shift in etiology from human-related factors to socioeconomic environment-related factors shifts the primary interventional focus from behavior change to "a focus on policy levers" (Oni et al., 2019).

Many participants also described vehicle- and physical environment-related etiologies of road traffic crashes. Vehicle-related participant comments centered on the lack and misuse of seatbelts, and tire bursts. Bridging the gap between vehicles and the physical environment, one participant noted that tire bursts are commonly caused by poor road conditions, especially potholes, "because where there's holes like that, there will be some places that the stones that

are used for the road will be sharp, so it could easily make a tire burst.” Road disrepair, opined one truck driver, is primarily caused by overloaded trucks, and road disrepair is “the mosting way [crashes] happen in Nigeria.” Another possible cause of road disrepair is poor drainage, suggested one participant. The relationship between poor drainage on roads and road failure is well known (Abhijit & Jalindar, 2011), and experts have shown on road load tests that when the ground water table is raised, rates of rutting increase in each layer of the road (Saevardottir, Erlingsson, & Carlsson, 2014). Several participants also reported infrastructural causes of crashes, two of whom had been injured in a transition zone and implicated traffic congestion as a culprit in their crashes.

Twenty-two participants expressed belief that socioeconomic-related factors play direct causative roles in crashes. While the majority of participant comments involved preventative government and law enforcement policies and practices during the pre-event phase, the socioeconomic environment category hosted the most units of analysis in the post-event phase of any category. Most of these addressed post-crash, prehospital care. Nearly half of the participants described difficulty in securing transport to a healthcare facility following their road traffic crash, illustrating the well-documented scarcity of out-of-hospital emergency care in LMICs (Kironji et al., 2018). Surprisingly, despite the obvious concern displayed by each of these 12 participants, none of them mentioned a need for or the absence of trained emergency medical technicians and transport, though one did recommend building first aid stations “every 10 to 20 kilometers interval” along expressways. This may indicate both the lack of access to, and the lack of public conceptualization of, prehospital care in FCT. Subsequently, policymakers in this type of setting, it is argued, should focus their efforts on improving the availability of emergency transport and trained personnel (Kironji et al., 2018).

Limitations

We selected participants by convenience sampling, which may be seen as a methodologic limitation of this study as using that approach limits the generalizability of our findings. However, these participants’ perceptions and opinions are important to understand and disseminate. Their beliefs have value, not just because road traffic crashes are quickly becoming one of Nigeria’s topmost causes of injury and death, but because patients at NHA who were injured at crash locations like those where 96% of this group of people were injured have the highest odds of death due to crash (Holmes, 2019). This study’s results justify and can inform and guide future qualitative assessment of Abuja’s road traffic crash epidemic using probability sampling methods.

Conclusion

This study explored the locations and etiologies of NHA patients’ road traffic crashes via semi-structured interviews and qualitative content analysis using Haddon’s matrix. Qualitative findings highlight the perceived risk factors for crashes, injuries, and death, which frequently included reckless behavior and infrastructural inadequacy leading up to the crash; vehicular disrepair at the time of the crash; and a lack of post-crash, prehospital transport and care. This latter finding—and specifically that nearly half of this study’s crash survivors sought their own nonmedical transport to NHA—may astound road users in higher income countries. It punctuates the need for further community-informed research studying post-event socioeconomic factors of road traffic crashes in LMICs. Continued studies can inform and spark community-engaged preventative and interventional efforts.

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Article Citation

Holmes, B. D., Haglund, K., Ameh, E. A., Olaomi, O. O., Uthman, U., & Cassidy, L. D. (2020). Understanding etiologies of road traffic crashes, injuries, and death for patients at National Hospital Abuja: A qualitative content analysis using Haddon's Matrix. *The Qualitative Report*, 25(4), 962-974. <https://nsuworks.nova.edu/tqr/vol25/iss4/6>
